

TENDER NO. 4Q/2021/22



SCM – 516 | Approved by Branch Manager: 03/04/2020

Version: 5

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FRAMEWORK CONTRACT DOCUMENT (PANEL TYPE)

FOR THE

TERM TENDER FOR DRILLING, TESTING AND REHABILITATION OF BOREHOLES IN PRIMARY AQUIFERS IN CAPE TOWN

Framework Contract Period: 36 Months from Commencement Date

Works Projects :

Section 1 (Standard Drilling): Not exceeding R20 000 000

Section 2 (Testing): Not exceeding R10 000 000

Section 3 (Specialised Drilling): Not exceeding R10 000 000

VOLUME 3: DRAFT CONTRACT

ISSUED BY:	COMPILED BY:	For official use.
DIRECTOR: BULK SERVICES WATER AND SANITATION CITY OF CAPE TOWN Water and Sanitation Head Office Cnr Mike Pienaar Boulevard & Voortrekker Road BELLVILLE	iX Engineers (Pty) Ltd 31 Allen Drive Loevenstein CAPE TOWN 7530	TENDER SERIAL No.:
		SIGNATURES OF CITY OFFICIALS AT TENDER OPENING
		1.
		2.
		3.

July 2021

NAME OF TENDERING ENTITY	
EMAIL ADDRESS OF TENDERING ENTITY	
FAX NUMBER OF TENDERING ENTI	
NATURE OF TENDER OFFER (please indicate below)	
Main Offer (see clause C1.1)	
Alternative Offer (see clause C.2.12.1)	

FILE REFERENCE NO:

Contract
Part C1: Agreements and Contract

1C1
Data
Agreements and Contract Data

Reference No. 4Q/2021/22

Part C1: Agreements and Contract Data

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CITY OF CAPE TOWN

WATER AND SANITATION
CONTRACT NO. 4Q/2021/22

TERM TENDER FOR DRILLING, TESTING AND REHABILITATION OF BOREHOLES IN PRIMARY
AQUIFERS IN CAPE TOWN

C1.2 Contract Data

Part 1: Contract Data provided by the Employer

GENERAL CONDITIONS OF CONTRACT

The following standardised General Conditions of Contract:

General Conditions of Contract for Construction Works, Third Edition, 2015

prepared by the South African Institution of Civil Engineering (SAICE) shall apply to and form the General Conditions of Contract for this contract. Copies of these conditions of contract are obtainable from the South African Institution of Civil Engineering (SAICE), Private Bag X200, Halfway House 1685, Tel: (011) 805 5947, Fax: (011) 805 5971, e-mail: civilinfo@saice.org.za.

Copies of the General Conditions of Contract are available for inspection and scrutiny at the offices of the Employer.

The Pro-formas bound with the General Conditions of Contract 2015, on pages 96 to 113 shall not apply to this Contract and shall be replaced with the documentation bound into this Contract Document.

The General Conditions of Contract make several references to the Contract Data for specific data, which together with these conditions collectively describe the risks, liabilities and obligations of the contracting parties and the procedures for the administration of the Contract. The Contract Data shall have precedence in the interpretation of any ambiguity or inconsistency between it and the general conditions of contract.

The General Conditions of Contract shall be read in conjunction with the variations, amendments and additions set out in the Contract Specific Data below. Each item of data given below is cross-referenced to the clause in the General Conditions of Contract to which it mainly applies.

The documents forming the Contract are to be taken as mutually explanatory of one another. For the purposes of interpretation, the priority of the documents shall be in accordance with the following sequence.

- a) the Form of Offer and Acceptance,
- b) the Contract Specific Data within the Contract Data,
- c) the General Conditions of Contract for Construction Works, Third Edition, 2015,
- d) the Drawings,
- e) the Scope of Work,
- f) the Pricing Data, and
- g) the conditions of tender, the tender data and tender schedules.

If an ambiguity or discrepancy is found in the documents, the Employer's Agent shall issue any necessary clarification or instruction.

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:

Clause 1.1.1.2:

Add the following after "Bill of Quantities":

, also referred to as Schedule of Rates,

Clause 1.1.1.7:

Add the following after "Contract" and before "means":

, also referred to as Framework Contract or term tender contract,

Add the following after "Acceptance,":

including, if applicable, the Form of Offer and Acceptance in a Works Project contract document, in which case "Contract" includes the Works Project contract,

Clause 1.1.1.11:

Add the following after "Acceptance":

... of a Works Project.

The Contract Sum for each Works Project shall

Section 1	Not exceeding R20 million (including contingencies and VAT)
Section 2	Not exceeding R10 million (including contingencies and VAT)
Section 3	Not exceeding R10 million (including contingencies and VAT)

Clause 1.1.1.13:

The Defects Liability Period is **12** months per Works Project for Section 1.

The Defects Liability Period is **12** months per Works Project for Section 2.

The Defects Liability Period is **12** months per Works Project for Section 3.

Clause 1.1.1.14:

Delete "Commencement Date" and replace with:

date specified in the Works Project contract for commencement with Works execution,

The time for achieving Practical Completion, inclusive of non-working days referred to in Clause 5.8.1 below, but exclusive of special non-working days (Clause 5.8.1), will be determined for each Works Project as specified in the Works Project contract document.

Clause 1.1.1.15:

The **Employer** is the CITY OF CAPE TOWN, represented by the Director : Bulk Services, Water and Sanitation, or such other Director named in the Works Project contract document(s), and/or such other person or persons duly authorised thereto by the Employer in writing.

The name of the Employer is: CITY OF CAPE TOWN
 WATER AND SANITATION

and is referred to in the Contract documents by the terms "Employer", "City of Cape Town" or "Council" as the context provides.

Clause 1.1.1.16:

Add the following after "Contract Data":

in the Works Project contract document,

The name of the Employer's Agent will be stated in the Works Project contract document(s) and who may be an employee of the Employer or, alternatively, may be an independent agent appointed by the Employer.

Clause 1.1.1.20

Add the following after "Contract":

and also includes the Form of Offer and Acceptance applicable in each Works Project contract document.

Clause 1.1.1.26:

The Pricing Strategy is a Re-measurement Contract.

Clause 1.1.1.28:

The Scope of Work in this Framework Contract document is applicable, as relevant, together with the project specific Scope of Work in each Works Project contract document.

Clause 1.1.1.33:

The “Works” applies to the Works Projects individually or as a whole, as the context provides.

Add the following Clauses after Clause 1.1.1.34:

1.1.1.35 “**Drawings**” means all drawings, calculations and technical information forming part of the Contract documents and any modifications thereof or additions thereto from time to time approved in writing by the Employer’s Agent or delivered to the Contractor by the Employer’s Agent.

1.1.1.36 “**Framework Contract**” means the Contract as defined in Clause 1.1.1.7; and “**Framework Contract Period**” means the period stated in the Contract Data, during which Works Projects may be allocated to the Contractor and for which Purchase Orders may be raised (issued) provided that such orders be completed prior to the expiry of the period; provided that the Framework Contract shall continue to remain in force after the expiration of the Framework Contract Period until the Final Approval Certificate has been issued by the Employer’s Agent for the last outstanding Works Project at the expiration of the Defects Liability Period of that Works Project.

1.1.1.37 “**Framework Contract Manager**” means the person named as the Framework Contract Manager in the Contract Data or any other person appointed from time to time by the Employer and of whom the Contractor is notified, in writing, to act as Framework Contract Manager for the purposes of the Contract as substitute for the Framework Contractor Manager so named.

The function of the Framework Contract Manager is to administer the Framework Contract, and such functions as would normally fall to the Employer’s Agent in accordance with the provisions of the Framework Contract, shall be undertaken by the Framework Contract Manager in this regard.

The Framework Contract Manager shall be an employee of the Employer, authorised as its representative to administer the Framework Contract, and all references to “Employer’s Agent” in the Contract shall apply to the Framework Contract Manager in respect of his/her administering the Framework Contract.

The Framework Contract Manager is:

Name: Mr M Woodman (Bulk Water Branch – WATER AND SANITATION)
Address: City of Cape Town
Water and Sanitation Head office
Cnr Mike Pienaar Boulevard & Voortrekker Road
BELLVILLE
7535
Tel: 021 400 6633
E-mail: Marcel.Woodman@capetown.gov.za

1.1.1.38 “**Letter of Notification**” means the letters of formal notification, signed by the Employer, of the decision of the Supply Chain Management Bid Adjudication Committee sent to all tenderers. The notification of the decision does not form part of the Employer’s Acceptance of a successful tenderer’s Offer and no rights shall accrue.

1.1.1.39 “**Panel**” means a number of contractors, of which the Contractor is one, appointed by the Employer under the Framework Contract to be available to execute Works Projects as and when they arise.

1.1.1.40 “**Purchase Order**” means the official purchase order created and released on the City of Cape Town’s SAP System.

1.1.1.41 “**Schedules of Rates**” means, in this Framework Contract document, the document so designated in the Pricing Data, and which will be used to compile Bills of Quantities in the Works Project contract document(s).

1.1.1.42 “**Works Project**” means a part of the Works to be performed (task) by a Contractor under the Contract, the specific terms, conditions and scope of the Works Project contract being specified in a Works Project contract document.

1.1.1.43 “**Works Project Acceptance/Refusal Notice**” means the formal notification, signed by the successful tenderer/prospective Contractor and sent to the Employer, of his decision to accept/ refuse the

opportunity afforded to participate further in the Contractor appointment procedure for a Works Project as specified in the Contract.

- 1.1.1.44 **"Intellectual Property"** means any and all intellectual property rights of any nature anywhere in the world whether registered, registerable or otherwise, including patents, trademarks, registered designs and domain names, applications for any of the foregoing, trade or business names, copyright and rights in the nature of copyright, design rights, rights in databases, know-how, trade secrets and any other intellectual property rights which subsist in computer software, computer programs, websites, documents, information, techniques, business methods, drawings, logos, instruction manuals, lists and procedures and particulars of customers, marketing methods and procedures and advertising literature, including the "look and feel" of any websites

Clause 1.2.1.2:

The address of the Employer is:

Physical address: Water and Sanitation Head office
Cnr Mike Pienaar Boulevard & Voortrekker Road
BELLVILLE
7535

Postal address: P O Box 298
BELLVILLE
7530

E-mail address: Michael.Killick@capetown.gov.za

The address of the Employer's Agent will be stated in the Works Project contract document(s).

Clause 1.3:

Delete Clause 1.3.5 in its entirety and replace with the following:

- 1.3.5 Intellectual Property
- 1.3.5.1 The Contractor acknowledges that it shall not acquire any right, title or interest in or to the Intellectual Property of the Employer.
- 1.3.5.2 The Contractor hereby assigns to the Employer, all Intellectual Property created, developed or otherwise brought into existence by it for the purposes of the contract, unless the Parties expressly agree otherwise in writing.
- 1.3.5.3 The Contractor shall be deemed to have given the Employer a non-terminable, transferable, non-exclusive, royalty-free licence to copy, use and communicate the Contractor's documents, including making and using modifications of such documents for further work required to the Works.
- 1.3.5.4 The Contractor shall, and warrants that it shall:
- 1.3.5.4.1 not be entitled to use the Employer's Intellectual Property for any purpose other than as contemplated in this contract;
- 1.3.5.4.2 not modify, add to, change or alter the Employer's Intellectual Property, or any information or data related thereto, nor may the Contractor produce any product as a result of, including and/or arising from any such information, data and Intellectual Property, and in the event that it does produce any such product, the product shall be, and be deemed in law to be, owned by the Employer;
- 1.3.5.4.3 not apply for or obtain registration of any domain name, trademark or design which is similar to any Intellectual Property of the Employer;
- 1.3.5.4.4 comply with all reasonable directions or instructions given to it by the Employer in relation to the form and manner of use of the Employer Intellectual Property, including without limitation, any brand guidelines which the Employer may provide to the contractor from time to time;
- 1.3.5.4.5 procure that its employees, directors, members and contractors comply strictly with the provisions of clauses 1.3.5.4.1 to 1.3.5.4.3 above;

unless the Employer expressly agrees thereto in writing after obtaining due internal authority.

1.3.5.5 The Contractor represents and warrants to the Employer that, in providing goods, services or both, as the case may be, for the duration of the contract, it will not infringe or make unauthorised use of the Intellectual Property rights of any third party and hereby indemnifies the Employer from any claims, liability, loss, damages, costs, and expenses arising from the infringement or unauthorised use by the contractor of any third party's Intellectual Property rights.

1.3.5.6 In the event that the contract is cancelled, terminated, ended or is declared void, any and all of the Employer's Intellectual Property, and any and all information and data related thereto, shall be immediately handed over to the Employer by the contractor and no copies thereof shall be retained by the contractor unless the Employer expressly and in writing, after obtaining due internal authority, agrees otherwise.

Add the following Clause after Clause 1.3.6:

1.3.7 The parties agree that this contract shall also be subject to the Employer's Supply Chain Management Policy ('SCM Policy') that was applicable on the date the bid was advertised. Please refer to this document contained on the CCT's website.

1.3.8 Abuse of the supply chain management system is not permitted and may result in cancellation of the contract, restriction of the supplier, and/or the exercise by the Employer of any other rights and remedies available to it as described in the SCM Policy.

Clause 2:

Add the following Clause after Clause 2.5.1:

2.6 Procedures for the allocation of Works Projects

The Employer reserves the right to plan, allocate and effect individual Works Projects at its sole discretion and as described in this document.

The Employer will only order those quantities of work items which it actually requires for execution in a Works Project from time to time. The Employer reserves the right not to order any quantities at all depending on circumstances and subject to operational requirements.

The Works Projects in each section shall be executed in areas within the City of Cape Town municipal area as outlined in clause C.1.6.1 in Part T1.2 Tender Data.

The Works Projects shall be identified subject to availability of funding.

The procedures for the allocation of Works Projects are described in detail in **Clause 13** at the end of this Part 1: Contract Data provided by the Employer.

Clause 3.1

Delete clause

Clause 3.2.2

Add the following at the end of the clause:

If, in exercising any discretion, the result of such decision would be to utilise the contingency allowance, increase the contract value or granting of time for practical completion, the Employer's Agent must obtain approval from the Employer that such funding or time is available and granted by the Employer to be awarded prior to finalising such a decision.

Clause 3.2.3:

The Employer's Agent shall obtain the specific approval of the Employer before executing any of his functions or duties according to the following Clauses of the General Conditions of Contract or Contract Data:

- a) Clause 3.3.1 Nomination of Employer's Agent's Representative
- b) Clause 3.3.4 Employer's Agent's authority to delegate
- c) Clause 5.8.1 Non-working times
- d) Clause 5.11.1 Suspension of the Works
- e) Clause 5.12.4 Acceleration instead of extension of time

7Contract

C1.2

- f) Clause 6. All actions in terms of the clause, subject to 3.2.2 of the Contract Data
- g) Clause 6.4.1 Approval of rates for new items
- h) Clause 6.10.10 Advance payment, for items not listed in the Advance Payment Schedule
- j) Clause 10.1.5 All actions in terms of the clause, subject to 3.2.2 of the Contract Data

Clause 3.3.2.2.3:

Delete the words "oral or" from the clause

Clause 3.3.2.2.4:

Delete the words "oral or" from the clause

Clause 5.1:

Add the following Clause after Clause 5.1.1.2:

5.1.2 Framework Contract Period

The Framework Contract Period is for a period of **36 months** calculated from the Commencement Date.

Clause 5.3:

Delete Clauses 5.3.1 to 5.3.3 in their entirety and replace with the following:

- 5.3.1 Upon appointment to the Panel or Panels the Contractor shall submit the required documentation, for approval by the Framework Contract Manager, as set out below. If the documentation is not submitted with 14 days from the Commencement Date, or is found to be unacceptable, the Employer may terminate the Framework Contract in terms of Clause 9.2.

The documentation required is:

- a) Approved framework Health and Safety Plan (Refer to applicable clause in the Health and Safety Specification in Part C3.5 in the Scope of Work)
- b) Security (Refer to Clause 6.2)
- c) Evidence of Insurance (Refer to Clause 8.6)
- d) Occupational Health and Safety Agreement (Part C1.5 in Agreements and contract Data)
- e) Letter of Good Standing from the Compensation Commissioner (if not insured with a Licensed Compensation Insurer) (Refer to Clause 4.3)
- f) Protection of the Environment Declaration (Part C1.6 in Agreements and Contract Data)

- 5.3.2 The Contractor shall, save as may be otherwise provided in the Contract or be legally or physically impossible, commence executing the Works on the date specified in the Works Project contract; subject to the submission by the Contractor, and approval by the Employer's Agent, of any documentation required before commencement with Works execution, as set out in the Works Project contract.

The following documentation shall be submitted for **each Works Project** by the highest ranked contractor on a Panel as part of the Works Project submission:

- a) Approved site specific Health and Safety plan (Refer to Health and Safety Specification in Part C3.5 Management and any other specific requirements stated in the Works Project contract document)
- b) Initial Programme (Refer to Clause 5.6)
- c) Evidence of Insurance (Refer to Clause 8.6)
- d) Proof of Registration / Letter of Good Standing with the Bargaining Council for the Civil Engineering Industry (BCCEI) or applicable legislated bargaining council.

The time to submit any documentation required before commencement with Works execution of **each Works Project** shall be within the number of days from the Commencement Date of the Works Project as specified in the Works Project contract. Such documentation may include:

- e) Method Statement (Refer to Environmental Management Specification in Part C3.5 Management)

- 5.3.3 Notwithstanding the provisions of Clause 5.3.2, where a construction work permit from the Provincial Director of the Department of Labour is required for a Works Project, commencement of the Works Project shall not be deemed to take place until such construction work permit has been issued by the Provincial Director.

- 5.3.4 Application for Construction Work Permit

Where the Employer is required to apply to the Provincial Director of the Department of Labour for a construction work permit to perform the intended construction work for a Works Project, the employer shall do so as soon as the Contractor has been appointed to execute the Works for the specific Works Project in terms of the Framework Contract.

Should the issuing of a construction work permit delay the Employer's Agent's instruction to commence executing the Works Projects and this in turn causes a delay to Practical Completion of more than 60 days, then the Contractor shall be entitled to make a claim in accordance with Clause 10.1. Should, however, the issuing of a construction work permit be delayed by the submission of an unacceptable draft Health and Safety Plan, in the opinion of either the Employer's Health and Safety Agent, or the Provincial Director of the Department of Labour, no claim for an extension of time will be entertained.

Clause 5.4.2:

Access to and possession of the Site shall not be exclusive to the Contractor insofar as the provisions of Clause 4.8 apply, and where ongoing use by the general public is required.

Add the following Clause after Clause 5.4.3:

5.4.4 The Contractor shall bear all costs and charges for special and temporary rights of way required by him in connection with access to the Site.

Clause 5.6.2.3:

Insert the following after "...approvals,":

... permits,

Clause 5.8.1:

The non-working days are Sundays.

The special non-working days are:

- a) All gazetted public holidays.
- b) Year-end break(s) not exceeding 15 working days in duration.

Clause 5.10.1

Add the following Clause after Clause 5.10.1:

5.10.2 Standing time

Should the Contractor at any time during the Contract period be required to discontinue work on instruction of the Engineer pending the issue of instructions, approval or decisions by the Engineer, and to the extent that the Contractor's workers and equipment cannot be otherwise usefully employed, he shall be entitled to compensation for such time loss during normal working hours. Standing time shall only be in respect of major units of equipment such as drill or testing rigs.

It is stressed that standing time during normal working hours is only applicable should the work be stopped on instruction of the Engineer for other work to continue (e.g. geophysical logging) or where decisions are being awaited from the Engineer (e.g. construction of the borehole based on the drill chips of downhole geophysics). Where this can be foreseen, it shall be expected of the Contractor to notify the Engineer one full working day ahead that he will require instructions, approval or other decisions at a certain time. Without such prior notice, no standing time compensation shall be considered. In emergency instances where a decision can only be made once the Engineer has visited the site, the Contractor will not be entitled to claim standing time for the first 12 working hours after notifying the Engineer. No claim will be permitted for standing time due to inclement/abnormal weather conditions, or for instructed stoppage of work due to poor performance or non-compliance with environmental, health or safety specifications.

Standing time does not include time when drilling is discontinued for the purposes of taking directional, angular or any other readings or activity in connection with the work.

For the purpose of calculating standing time, "normal working hours" shall be as defined in Clause 5.8. If the Contractor should find it necessary to extend normal working hours, he shall obtain the Engineer's approval at least 3 days prior to such additional time being required, and shall furnish reasons for his request.

Such approval shall only be given on a week-to-week basis and can be withdrawn at any time the Engineer thinks fit. Without the Engineer’s prior written approval, no standing time shall be paid for if outside the abovementioned normal working hours.

Clause 5.12.1:

Add the following:

The Contractor may not claim a delay on another Works Project as causing delay on the particular Works Project contract in question.

Clause 5.12.2.2:

No extension of time will be granted in respect of any delays attributed to normal climatic conditions. Normal climatic conditions shall be deemed to include normal rainfall and associated wet conditions and materials, strong winds and extremes of temperature. However, in the event that delays to critical activities exceed the number of working days listed below for each month, then abnormal climatic conditions shall be deemed to exist, and an extension of time may be claimed in accordance with the provisions of Clause 5.12.

The number of days quoted below shall be regarded as a fair estimate of the delays to be anticipated and allowed for under normal climatic conditions where inclement weather prevents or disrupts critical work.

January	2 days
February	2 days
March	2 days
April	2 days
May	2 days
June	4 days
July	4 days
August	4 days
September	4 days
October	2 days
November	2 days
December	2 days

Claims for delays for abnormal climatic conditions shall be accompanied by substantiating facts and evidence, which shall be submitted timeously as each day or half-day delay is experienced.

It shall be further noted that where the critical path is not affected, no extension of time for abnormal climatic conditions or for any other reason will be entertained.

Clause 5.12.3:

Add the following:

Should the scheduled work in an issued works project not be completed by the contractor in the allocated time due the contractor not being able to start the work on site due to delays in the employer confirming access or delays in the issuing of wayleaves; then the contractor may be entitled to an extension of time where claims can only be made for scheduled work done on site and no P&G’s can be claimed whilst not on site undertaking the prescribed work listed in the schedule of rates.

Clause 5.13.1:

The penalty for failing to complete the Works of each Works Project within the time referred to in Clause 1.1.1.14 is:

Section 1	R4 000 per day
Section 2	R1 000 per day
Section 3	R2 000 per day

Insert the following after “actual date of Practical Completion”:

... or, in the case of termination by the Employer in terms of Clause 9.2.1, the actual date of termination,

Clause 5.16.3:

The latent defects period is **10** years.

Clause 6.2.1:

Within 14 days of commencement of the Framework Contract, the Contractor shall provide a security in the form of a performance guarantee of **R1 400 000 for Section 1, R500 000 for Section 2** and **R500 000 for Section 3**. These performance guarantees shall remain in place until the issue of the Certificate of Completion for the first works project per section or the end of the Framework Contract, whichever shall occur first.

Upon the issuing of each further works project (i.e. Works Project No 2 onwards), the Contractor shall provide a performance guarantee per Works Project of 7% of the Works Project value for Section 1 and 5% of the Works Project value for Section 2 and 3. These performance guarantees shall remain in place until the issue of the Certificate of Completion for the relevant works project.

Each performance guarantee shall contain the precise wording of the document included in Part C1.3 of the Contract Data: **Form of Performance Guarantee**, and it shall be issued by a financial institution approved by the Employer at the date when the guarantee is issued. The list of approved financial institutions current at the date of tender is attached to the **Form of Performance Guarantee**.

Clause 6.2.2:

Delete Clause 6.2.2 in its entirety.

Clause 6.2.3:

Delete Clause 6.2.3 in its entirety and replace with the following:

The Contractor shall ensure that the performance guarantee remains valid and enforceable until the last Certificate of Completion of the Works for the Works Projects in a section is issued.

Clause 6.5.1.2.3:

The percentage allowance to cover overhead charges is **10%**

Clause 6.8.2:

Add the following to Clause 6.8.2:

The Contract Price shall be subject to contract price adjustment in accordance with Clause 6.8 of the General Conditions of Contract.

If special materials are specified in Part 2 of the Contract Data then the provisions of Clause 6.8.3 of the General Conditions of Contract shall apply to such special materials.

Where applicable, in terms of the foregoing, the value of the certificates issued shall be adjusted in accordance with the Contract Price Adjustment Schedule with the following values:

The value of "x" is 0,10.

The values of the coefficients are:

a = 0,20 b = 0,30 c = 0,45 d = 0,05

The base month is one month prior to the month in which the tender closed.

Furthermore, the Contract Price Adjustment Schedule shall be amended as follows:

"L" is the "Labour Index" and shall be the Consumer Price Index (CPI) for "All items (CPI Headline)", as published in the Statistical News Release, P0141: Table A – Consumer Price Index: Main Indices of Statistics South Africa

"P" is the "Plant Index" and shall be the Construction Materials Price Index for "Plant and Equipment" as published in the Statistical News Release P0151.1, Table 4 – Mining and construction plant and equipment price index of Statistics South Africa.

"M" is the "Materials Index" and shall be the Construction Materials Price Index for selected materials, Materials for "Civil Engineering material (**excluding reinforcing metal work bitumen**)," as published in the Statistical News Release P0151.1, Table 6 – Civil engineering material price indices of Statistics South Africa

“F” is the “Fuel Index” and shall be the Producer Price Index (PPI) for “Coal and Petroleum Products - Diesel”, as published in the Statistical News Release P0142.1: Table 1 –PPI for final manufactured goods of Statistics South Africa

Clause 6.8.3: Variation in the cost of special materials

Price adjustment for variations in the cost of special materials is provided for in the Special Materials Schedule below.

SPECIAL MATERIALS SCHEDULE			
Each material dealt with as a special material in terms of Clause 4.1 of the Contract Price Adjustment Schedule of the General Conditions of Contract is stated in the list below. The provisions of Clause 6.8.3 of the General Conditions of Contract shall apply to such special materials. The base prices for the special materials (current at the time of tender) shall be as stated in the schedule below, or where required, shall be furnished by the tenderer/contractor. Only those materials listed by the Employer below shall be considered as special materials.			
Special Material	Unit	Indices	Base Price
Steel Products			The Steel and Engineering Industries Federation of South Africa (SEIFSA) Price and Index Pages (PIPS) prices, as published in their official price lists, current at the time of tender closing, will be used as the base prices/indices for determining the adjustment in steel/stainless steel prices.
Stainless steel casing (plain, screen, wedge wire screen)	t	Table Q-(A) Column E	
Steel used in the manufacture of pipes/casings (plain and screen)	t	Table E-A Column E	
<p>Conditions:</p> <ol style="list-style-type: none"> 1) Monthly indices are applied to the supply of material only; installation is subject to annual Contract Price Adjustment 2) When called upon to do so, the contractor shall substantiate the prices to be used to determine the adjustment in respect of the special materials listed above with acceptable documentary evidence. 3) Where an adjustment for the variation in the price of steel/stainless steel products is claimed, the claim must be substantiated by a declaration from the manufacturer, confirming the source of steel/stainless steel used in such products at the time of purchase. 4) Where the source of steel/stainless steel is located in the Republic of South Africa, or where steel/stainless steel sourced from abroad is landed at a port in the Republic of South Africa, the cost of transporting such steel/stainless steel within the boundaries of the Republic of South Africa shall be included in the rate for steel/stainless steel products. 			

Clause 4.2 of the Contract Price Adjustment Schedule

Delete the words “by the Contractor” that appear after “.... entered in the Contract Data”

Clause 6.8.4:

Add the following to Clause 6.8.4:

Notwithstanding the above, in the event that a public holiday is proclaimed after 7 days before the closing date for an offer on a Works Project, no costs other than those that can be claimed under Clause 5.12.3 shall be added to the Contract Price.

Add the following after Clause 6.8.4:

6.8.5. If price adjustment for variations in the cost of plant and materials imported from outside of South Africa is provided for in the contract data, such adjustment shall be based on the information contained on the schedule titled “**Price Basis for Imported Resources**” and as below. For the purposes of this clause the Rand value of imported Plant and Materials inserted on the schedule titled “**Price Basis for Imported Resources**” (column (F)) shall be the value in foreign currency (column (A)) converted to South African Rand (column (C)) by using the closing spot selling rate quoted by **Employer’s** main banker, NEDBANK, on the Base Date (seven calendar days before tender closing date) rounded to the second decimal place (column(B)), to which shall be added any Customs Surcharge and Customs Duty applicable at that date (columns (D) and (E)).

6.8.5.1 Adjustment for variations in rates of exchange:

- (a) The value in foreign currency inserted in column (A) shall be subject to clause (h) below when recalculating the Rand value.
- (b) The rate of exchange inserted in column (B) shall be the closing spot selling rate quoted by **Employer's** main banker, NEDBANK, on the Base Date, rounded to the second decimal place, subject to sub-paragraph (c) below.
- (c) If the rate of exchange inserted by the Tenderer differs from the NEDBANK rate referred to above, then the NEDBANK rate shall apply and the Rand value in columns (C) and (F) shall be recalculated accordingly, without altering the price in the Schedules of Quantities for the relevant items.
- (d) If a tender from a supplier or sub-contractor provides for variations in rates of exchange, the Contractor may **only** claim for variations in rates of exchange if he binds the supplier or sub-contractor to the same provision to take out forward cover as described in sub-paragraph (e) below.
- (e) The Contractor (or supplier or sub-contractor) shall within five working days from the date of placing a firm order on an overseas supplier, cover or recover forward by way of a contract with a bank which is an authorised foreign exchange dealer, the foreign exchange component of the cost of any imported Plant and Materials inserted by the Tenderer on the schedule titled "**Price Basis for Imported Resources**".
- (f) When the Contractor (or supplier or sub-contractor) so obtains forward cover, the Contractor shall immediately notify the Employer of the rate obtained and furnish the Employer with a copy of the foreign exchange contract note.
- (g) Based on the evidence provided in sub-paragraph (f) above, the value in Rand inserted in column (C) on the schedule titled "**Price Basis for Imported Resources**" shall be recalculated using the forward cover rate obtained, and any increase or decrease in the Rand value defined in this clause shall be adjusted accordingly, subject to sub-paragraph (h) below. Failure to provide such evidence shall result in no such recalculation shall be considered by the Employer.
- (h) The adjustments shall be calculated upon the value in foreign currency in the Contractor's (or supplier's or sub-contractor's) **forward cover contract**, provided that, should this value exceed the value in foreign currency inserted in column (A) of the schedule titled "**Price Basis for Imported Resources**", then the value in column (A) shall be used.

6.8.5.2 Adjustment for variations in customs surcharge and customs duty

- (a) Any increase or decrease in the Rand value between the amounts of Customs Surcharge and Customs Duty inserted on the schedule titled "**Price Basis for Imported Resources**" and those amounts actually paid to the Customs and Excise Authorities, which are due to changes in the percentage rates applicable or to the foreign exchange rate used by the authorities, shall be adjusted accordingly.
- (b) The Tenderer shall state the Customs Duty Tariff Reference applicable to each item and the Contractor shall advise the Employer's Agent of any changes which occur.

6.8.5.3 Adjustment for variation in labour and material Costs

If the prices for imported Plant and Materials are not fixed, the Contractor shall in his Tender specify the formula for calculating Contract Price Adjustments normally used in the country of manufacture and the indices and relative proportions of labour and material on which his Tender prices are based. Evidence of the indices applicable shall be provided with each claim. The indices applicable 42 days before contractual dispatch date from the factory will be used for the purposes of Contract Price Adjustment.

Failure to specify a formula in the Tender shall mean that the prices are fixed or shall be deemed to be fixed.

Clause 6.10.1.5:

Delete Clause 6.10.1.5 in its entirety and replace with the following:

6.10.1.5 The value of Plant and materials:

6.10.1.5.1 up to a percentage limit of **80%** for the Plant and materials referred to in Clause 6.9.1.1 brought on to the Site but not yet built into the Permanent Works;

Provided that the Contractor has produced documentary evidence of ownership of such Plant and/or materials and has delivered to the Employer an indemnity, approved in writing by the Employer, against any claim to or in respect of such Plant and/or materials by reason of the Contractor's sequestration or liquidation, or of any defect in the Contractor's title to the Plant and/or materials;

6.10.1.5.2 which have been manufactured and are stored at places other than the Site, in respect of which the Employer has indicated, on the Advance Payment Schedule, that advance payment will be permitted;

6.10.1.5.3 for which a deposit with order is required from the Contractor by a manufacturer/supplier, only in respect of which the Employer has indicated, on the Advance Payment Schedule, that advance payment will be permitted;

The terms and conditions for advance payment are set out in Clause 6.10.10 and in the Advance Payment Schedule at the end of this Part 1: Contract Data provided by the Employer.

Clause 6.10.1.7:

Add the following after the words "Clause 5.13":

or any other fines or penalties that become due under the Contract.

Clause 6.10.3:

Add the following to Clause 6.10.3:

Notwithstanding the provision of a performance guarantee in terms of Clause 6.2.1, interim payments to the Contractor shall be subject to a retention by the Employer of an amount of **5%** of the said amounts due to the Contractor, with no limit per Works Project. A guarantee in lieu of retention is not permitted.

Clause 6.10.4:

Add the following to the last sentence of Clause 6.10.4:

..., dated as at the date of delivery of the Contractor's statement to the Employer's Agent.

Add the following to Clause 6.10.4:

Notwithstanding the above, the Employer's Agent shall be empowered to withhold the delivery of the payment certificate until the Contractor has complied with his obligations to report in terms of Clause 4.10.2 and as described in the Scope of Work.

The Contractor may submit a fully motivated application regarding more frequent payment to the Employer's Agent to be submitted to the Employer for consideration. Requests for more frequent payments will be considered at the sole discretion of the Employer and is not a right in terms of this contract.

Clause 6.10.10:

Add the following Clause after Clause 6.10.9:

6.10.10 Advance payment

Subject to Clauses 6.10.1.5.2 and 6.10.1.5.3, and the Advance Payment Schedule, the Employer shall make an advance payment for Plant and materials stored at places other than the Site, or in respect of which a deposit with order is required, only once the Contractor has submitted an advance payment guarantee in accordance with this Clause, the authenticity of which has been verified by the City's Treasury Department.

Unless and until the Employer receives this guarantee, the following paragraphs shall not apply.

The Employer's Agent shall issue an Interim Payment Certificate for, or including, advance payment after receiving a statement under Clause 6.10.1 and after the Employer has received a guarantee in an amount equal to the advance payment requested. This guarantee shall be issued by a financial institution approved by the Employer, as listed in the Annexure in Part C1.3 of the Contract Data, and shall be in the form of and shall contain the precise wording of the document included in Part C1.4: **Form of Advance Payment Guarantee** and shall come into force, be administered and expire in terms thereof.

The Employer shall return the guarantee to the Contractor within 14 days after the expiry date.

The provision of the Advanced Payment Guarantee shall be at the Contractor's cost.

The term "deposit" or "deposit with order" used in the context of this Clause and elsewhere by reference to this Clause, means a sum payable by the Contractor to a manufacturer/supplier prior to the manufacture of an item of Plant or material, required at the time of placing an order, the balance of the value of the item being payable later.

ADVANCE PAYMENT SCHEDULE	
<p>This Advance Payment Schedule is to be read in conjunction with Clauses 6.10.1.5.2, 6.10.1.5.3 and 6.10.10 in the Contract Specific Data. The purpose of this schedule is to itemise specific Plant and materials not yet brought on to the Site for building into the Permanent Works and for which the Employer is prepared to make advance payments to the Contractor, subject to the conditions below.</p> <p>The items of Plant and materials which have been identified by the Employer as being suitable for advance payment in terms of the Contract are listed in the table below. Should an item or items be added to the list at tender stage by a tenderer, such item(s) will not be binding on the Employer.</p>	
Plant and materials which have been manufactured and are stored at places other than the Site:	Plant and materials yet to be manufactured and for which a deposit with order is required from the Contractor by a manufacturer/supplier, and which may be stored at places other than the Site after manufacture:
	Stainless Steel Wedge Wire Screens
<p>Conditions:</p> <ol style="list-style-type: none"> 1) The Contractor can only rely on advance payment being permitted by the Employer in respect of the Plant and materials listed in the table above. The Employer may, however, permit advance payment for other Plant and materials in exceptional circumstances and at its sole discretion, during the course of the Contract, and upon reasonable request from the Contractor. 2) Advance payment for the purposes of deposits will only be provided up to a limit of 50% of the value of any one item being claimed. 3) The Contractor shall provide the Employer with documentary evidence of the terms and conditions for which a deposit with order is required by a manufacturer/supplier, together with the advance payment guarantee. 4) The Contractor will also be permitted to obtain advance payment for the balance of the value of the Plant and materials in respect of which he has paid a deposit, for an item which after manufacture is stored at a place other than the Site. The Contractor shall, in respect of such payment, provide an advance payment guarantee, either for such balance or, if the advance payment guarantee in respect of the deposit is to be returned by the Employer upon request, for the whole value of the item. 	

Clause 8.6.1:

The insurances to be effected and maintained by the Contractor shall be in the form of a blanket/umbrella policy per section for this term tender contract. This policy shall be endorsed as and when required to reflect each Works Project that may be allocated to the Contractor.

Clause 8.6.1.1.1:

The Contract Price shall, for insurance purposes, include for individual Contract Sums of up to:

15Contract

C1.2

Section 1	R20 000 000
Section 2	R10 000 000
Section 3	R10 000 000

Clause 8.6.1.1.2:

The value of Plant and materials supplied by the Employer to be included in the insurance sum is **R 0.00 (Nil)**.

Clause 8.6.1.1.3:

The amount to cover professional fees for repairing damage and loss to be included in the insurance sum is **R0.00 (Nil)**.

Clause 8.6.1.3:

The limit of indemnity for liability insurance is R20 000 000.00 for any single claim – the number of claims to be unlimited during the construction and defects liability periods.

Clause 8.6.1.5:

In addition to the insurances required in terms of General Conditions of Contract Clauses 8.6.1.1 to 8.6.1.4 the following insurance is also required:

- a) Insurance of Construction Equipment (including tools, offices and other temporary structures and contents) and other things (except those intended for incorporation into the Works) brought onto the site for a sum sufficient to provide for their replacement.
- b) Insurance in terms of the provisions of the Compensation for Occupational Injuries and Diseases Act, 130 of 1993.
- c) Motor Vehicle Liability Insurance comprising (as a minimum) “Balance of Third Party” Risks including Passenger Liability Indemnity.
- d) Where the contract involves manufacturing and/or fabrication of the works or part thereof at premises other than the Site, the Contractor shall satisfy the Employer that all materials and equipment for incorporation in the works are adequately insured during manufacture and/or fabrication. In the event of the Employer having an insurable interest in such works during manufacture or fabrication then such interest shall be noted by endorsement to the Contractor’s Policies of Insurance.

Clause 8.6.5:

Delete the following from Clause 8.6.5:

“and the terms thereof shall be subject to the approval of the Employer’s Agent, which approval shall not be unreasonably withheld.”

Clause 8.6.6:

Replace clause 8.6.6 with the following:

The evidence that the insurances have been effected in terms of Clause 8.6.1, shall be in the form of an insurance broker’s warranty per section worded precisely as given in Part C1.7 Insurance Broker’s Warranty.

In addition, an insurance broker’s warranty will be required for every Works Project as and when the contractor submits an offer for a Works Project contract. This warranty shall, *inter alia*, confirm that the applicable blanket/umbrella policy per section for the term tender contract has been endorsed to reflect the Works Project contract and that all premiums have been paid.

Clause 8.6.7:

Add the following to the end of this Clause:

; and/or the Employer shall be entitled to exclude the Contractor from participating in any future Works Project processes until such time as satisfactory evidence has been provided.

Clause 9.1:

In Clause 9.1.6 replace “and 9.1.3” with:

, 9.1.3 and 9.1.7

Add the following Clause after Clause 9.1.6:

9.1.7 Death of Sole Proprietor/Member

Upon the death of the Contractor who was a Sole Proprietor, or a sole member of a Close Corporation, the Contract will terminate forthwith. The Employer shall pay to the Contractor’s estate any money which it considers due under the Contract in terms of Clause 9.1.5, in full and final settlement thereof.

9.1.8 Material Irregularity during procurement process

The Employer may terminate the contract if a material irregularity vitiates the procurement process leading to the conclusion of the contract, rendering the procurement process and the conclusion of the resulting contract unfair, inequitable, non-transparent, uncompetitive or not cost-effective, provided the Employer follows the processes as described in its SCM Policy.

9.1.9 Reputational risk or harm to the Employer

The Employer, without prejudice to any other remedy for breach of contract, by written notice of default sent to the supplier, may terminate the contract if the implementation of the contract may result in reputational risk or harm to the City as a result of (inter alia):

- 9.1.9.1 reports of poor governance and/or unethical behaviour;
- 9.1.9.2 association with known family of notorious individuals;
- 9.1.9.3 poor performance issues, known to the Employer;
- 9.1.9.4 negative social media reports; or
- 9.1.9.5 adverse assurance (e.g. due diligence) report outcomes.

Clause 9.2.1:

Delete “or” at the end of Clause 9.2.1.3.6 and add the following Clause after Clause 9.2.1.3.7:

9.2.1.3.8 Has failed to provide the required insurances within the prescribed time,

Add the following Clause after Clause 9.2.3:

9.2.4 Employer’s Elections in case of Insolvency

In addition to anything else contained in this contract, the Employer may make either of the following elections to ensure its rights are protected and any negative impact on service delivery is mitigated:

- 9.2.4.1 accept a contractor’s proposal (via the trustee / liquidator) to render delivery utilising the appropriate contractual mechanisms; or
- 9.2.4.2 terminate the contract, as the liquidator proposed contractor is deemed unacceptable to the employer, at any time by giving written notice to the contractor (via the trustee / liquidator).

Clause 10.5.3:

The number of ad-hoc Adjudication Board Members to be appointed is 1 (one).

ADDITIONAL CONDITIONS OF CONTRACT

Add the following clauses after Clause 10:

Clause 11 Details to be confidential

The Contractor shall treat the details of the Works comprised in this Contract as private and confidential (save in so far as may be necessary for the purposes hereof) and shall not publish or disclose the same or any particulars thereof in any trade or technical paper elsewhere without the prior written consent of the Employer’s Agent.

Clause 12 Subcontracting

The contractor shall not subcontract the main components of the works, viz. drilling and borehole construction.

Clause 13 Procedure for the allocation of works projects

PROCEDURES FOR THE ALLOCATION OF WORKS PROJECTS

The procedures for the allocation of Works Projects, given below, are to be read in conjunction with clause C.1.6.1 in Part T1.2 Tender Data and Clause 2.6 in the Contract Data. These procedures include the development of Works Project contract documents, applying the tendered rates in order to arrive at financial offers, calculating works project evaluation points, ranking the panel of contractors, and allocating the Works Project to the highest ranked contractor.

The procedures are summarised under the stages below, wherein the Employer (acting through his agent) shall

Stage 1: Employer prepares Works Project contract document, prices bills of quantities using each contractor's rates and prepares a works project evaluation ranking for all contractors in Section

- a) select a Section for the execution of the Works Project;
- b) prepare a Works Project contract document, including Bills of Quantities and Scope Work therein;
- c) compile priced bills of quantities for all contractors appointed, using their respective framework contract rates; and
- d) award works project evaluation points for each contractor, based on the financial offer and B-BBEE preference, and prepare a works project evaluation ranking of all contractors

Stage 2: Contractors collect copy of Works Project contract document and works project evaluation ranking, attend compulsory Works Project meeting and submit acceptance/refusal notices

- e) make available to the contractors a copy of the Works Project contract document with the Bills of Quantities priced by the Employer;
- f) simultaneously, invite the contractors to attend a compulsory Works Project meeting;
- g) conduct the Works Project meeting, including discussing any issues the contractors may have (this may result in changes being made to the Works Project contract document and its being re-issued; and
- h) receive acceptance/refusal notices from contractors timeously after the meeting;

Stage 3: Contractors submit completed Works Project contract document and Employer allocates Works Project

- i) request the contractors, who attended the Works Project meeting and accepted the work opportunity, to complete the Returnable Schedules, Form of Offer, Works Project Acceptance/Refusal Notice, etc. in the Works Project contract document and submit the completed document to the Employer; and
- j) test submissions for completeness and allocate the Works Project to the highest scoring responsive contractor.

Further details of the procedures under the above stages are given below.

Stage 1

As and when the Employer requires work to be executed in a Works Project under the framework contract, the Employer shall specify, *inter alia*, the nature, location(s), extent, scope of work, proposed programme and contract period for the work required, in a **Works Project contract document** comprising, as relevant, Work Allocation Procedures, Returnable Schedules, Agreements and Contract Data, Bills of Quantities and Scope of Work.

In the Bills of Quantities the Employer shall assign quantities to the work items relating to the specific Scope of Work in the Works Project. The assigned quantities shall be multiplied by the framework contract rates to constitute amounts that will be totalled to provide a **financial offer** for each contractor for this specific Works Project.

The Employer shall evaluate the financial offers so constituted, together with the contractor's **B-BBEE status** as at the time of the framework tender closing date, in accordance with clause P.3.4 in Part A1.2 Work Allocation Procedures in the Works Project contract document, and prepare a **works project evaluation ranking** for the Works Project.

Stage 2

The Employer shall invite the contractors to attend a compulsory **Works Project meeting** at a time and venue disclosed in writing by the Employer.

The Employer shall issue the invitation **seven (7)** days prior to the meeting date, and simultaneously make available to the contractors their individually priced Works Project contract documents.

The Employer shall conduct the compulsory Works Project meeting on the date specified. The purpose of this meeting is to inform the contractors of the Scope of Work required in the Works Project. The meeting shall furthermore serve to answer any queries the contractors may have in respect of the required work, billed items and quantities, etc. (this may result in changes being made to the Works Project contract document and its being re-issued). A contractor who fails

to attend the compulsory Works Project meeting will be **excluded** from further participation in the Works Project allocation process.

Included in the Works Project contract document is a Works Project **Acceptance/Refusal Notice** (Form C1.9) requesting the contractor to state in writing whether he accepts/refuses the opportunity afforded to participate further in the work allocation procedure (i.e. that he is willing/not willing to undertake the work specified in the Scope of Work and Bills of Quantities and has/has not the necessary resources, available to complete the work within the required Works Project contract period should he be allocated the work).

Contractors will be required to complete and return the Works Project Acceptance/Refusal Notice, either by fax or email, to the Employer prior to the closing date for receipt of Works Project Acceptance/Refusal Notices (non-submission will be regarded as a refusal), including, for those who accept, declaring whether their declarations in respect of sub-contractors made in the Preferencing Schedule in the Framework Contract document stand for the Works Project, or not - refer to Form C1.9 in this regard. The Employer will finalise the ranking of the contractors who accept, after taking their declarations into account.

Stage 3

Upon request of the Employer, the Works Project contract document shall be completed, signed and returned by the contractors who has accepted to the Employer's agent's offices no later than the date stated in such request.

The Employer will specify the proposed Works Project construction time period (time from the date specified for commencement with Works execution to Due Completion Date) for completing the specified Works in the Scope of Work in the Works Project contract document.

The submission of a fully completed and signed Works Project contract document is mandatory for the contractors who has been requested by the Employer to submit offers, and the contractors may be requested by the Employer to complete and/or sign their submission, if necessary, should they have not already done so.

A contractor whose offer is non-responsive, or who failed to return the completed, signed Works Project contract document (the offer) by the date stated in the Employer's request, will be **excluded** from further participation in the Works Project allocation process.

Acceptance of the successful contractor's offer takes place on the date the contractor (now Contractor in terms of the Contract) receives the City of Cape Town's official **purchase order**, such date being the Commencement Date of the Works Project contract.

Each Works Project shall be in the **value range** of above R0 up to R20 000 000 for Section 1, R0 up to R10 000 000 for Section 2 and R0 up to R10 000 000 for Section 3 (both including contingencies and VAT, but excluding contract price adjustment, if applicable).

Working days for these procedures are Mondays to Fridays.

Part 2: Data provided by the Contractor

Clause 1.1.1.9:

The name of the Contractor is

Clause 1.2.1.2:

The address of the Contractor is

Physical : Postal :
Address Address

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

Telephone : Fax:

email :

CITY OF CAPE TOWN

**WATER AND SANITATION
CONTRACT NO. 4Q/2021/22**

**TERM TENDER FOR DRILLING, TESTING AND REHABILITATION OF BOREHOLES IN PRIMARY
AQUIFERS IN CAPE TOWN**

C1.3 Form of Performance Guarantee

PERFORMANCE GUARANTEE

For use with the Conditions of Contract as described in C1.2 Contract Data Part 1: Contract Data provided by the Employer.

GUARANTOR DETAILS AND DEFINITIONS

"Guarantor" means:

"Physical address:

"Employer" means: The City of Cape Town, WATER AND SANITATION .

"Contractor" means: The Contractor named in an individual Works Project Contract.

"Employer's Agent" means: The Employer's Agent named in an individual Works Project Contract.

"Works" means: Works Projects which may be allocated in Sections 1, 2 or 3, individually or as a whole as the context provides, under Framework Contract No. 4Q/2021/22: TERM TENDER FOR THE DRILLING, TESTING AND REHABILITATION OF BOREHOLES IN PRIMARY AQUIFERS IN CAPE TOWN.

"Site" means: The site as defined in the Contract Data.

"Contract" means: The Agreement made in terms of the Form of Offer and Acceptance and such amendments or additions to the Contract as may be agreed in writing between the parties, and includes the Works Project Agreement.

"Guaranteed Sum" means: The maximum aggregate amount for:
Section 1, 1st guarantee: R1 400 000.00
Section 2, 1st guarantee: R500 000.00
Section 3, 1st guarantee: R500 000.00

Section 1, 2nd and onwards guarantee: 7% of works project value
Section 2, 2nd and onwards guarantee: 5% of works project value
Section 3, 2nd and onwards guarantee: 5% of works project value

Amount in words for: Section 1, 1st guarantee: One Million and Four Hundred Thousand Rand
Section 2, 1st guarantee: Five Hundred Thousand Rand
Section 3, 1st guarantee: Five Hundred Thousand Rand

"Expiry Date" means: The date of issue by the Employer's Agent of the last Certificate of Completion of the Works for the Works Projects in a section.

CONTRACT DETAILS

Employer's Agent issues: Interim Payment Certificates, Final Payment Certificates and the Certificates of Completion of the Works, in respect of individual Works Projects, as defined in the Contract.

PERFORMANCE GUARANTEE

- 1. The Guarantor's liability shall be limited to the amount of the Guaranteed Sum.
- 2. The Guarantor's period of liability shall be from and including the date of issue of this Performance Guarantee and up to and including the Expiry Date or the date of payment in full of the Guaranteed Sum, whichever occurs first. The Employer's Agent and/or the Employer shall advise the Guarantor in writing of

the date on which the last Certificate of Completion of the Works for the Works Projects in a section has been issued.

3. The Guarantor hereby acknowledges that:
 - 3.1 any reference in this Performance Guarantee to the Contract is made for the purpose of convenience and shall not be construed as any intention whatsoever to create an accessory obligation or any intention whatsoever to create a suretyship;
 - 3.2 its obligation under this Performance Guarantee is restricted to the payment of money.
4. Subject to the Guarantor's maximum liability referred to in 1, the Guarantor hereby undertakes to pay the Employer the sum certified upon receipt of the documents identified in 4.1 to 4.3:
 - 4.1 A copy of a first written demand issued by the Employer to the Contractor stating that payment of a sum certified by the Employer's Agent in an Interim or Final Payment Certificate has not been made in terms of the Contract and failing such payment within seven (7) calendar days, the Employer intends to call upon the Guarantor to make payment in terms of 4.2;
 - 4.2 A first written demand issued by the Employer to the Guarantor at the Guarantor's physical address with a copy to the Contractor stating that a period of seven (7) days has elapsed since the first written demand in terms of 4.1 and the sum certified has still not been paid;
 - 4.3 A copy of the aforesaid payment certificate which entitles the Employer to receive payment in terms of the Contract of the sum certified in 4.
5. Subject to the Guarantor's maximum liability referred to in 1, the Guarantor undertakes to pay to the Employer the Guaranteed Sum or the full outstanding balance upon receipt of a first written demand from the Employer to the Guarantor at the Guarantor's physical address calling up this Performance Guarantee, such demand stating that:
 - 5.1 the Contract has been terminated due to the Contractor's default and that this Performance Guarantee is called up in terms of 5; or
 - 5.2 a provisional or final sequestration or liquidation court order has been granted against the Contractor and that the Performance Guarantee is called up in terms of 5; and
 - 5.3 the aforesaid written demand is accompanied by a copy of the notice of termination and/or the provisional/final sequestration and/or the provisional liquidation court order.
6. It is recorded that the aggregate amount of payments required to be made by the Guarantor in terms of 4 and 5 shall not exceed the Guarantor's maximum liability in terms of 1.
7. Where the Guarantor has made payment in terms of 5, the Employer shall upon the date of issue of the Final Payment Certificate submit an expense account to the Guarantor showing how all monies received in terms of this Performance Guarantee have been expended and shall refund to the Guarantor any resulting surplus. All monies refunded to the Guarantor in terms of this Performance Guarantee shall bear interest at the prime overdraft rate of the Employer's bank compounded monthly and calculated from the date payment was made by the Guarantor to the Employer until the date of refund.
8. Payment by the Guarantor in terms of 4 or 5 shall be made within seven (7) calendar days upon receipt of the first written demand to the Guarantor.
9. The Employer shall have the absolute right to arrange his affairs with the Contractor in any manner which the Employer may deem fit and the Guarantor shall not have the right to claim his release from this Performance Guarantee on account of any conduct alleged to be prejudicial to the Guarantor.
10. The Guarantor chooses the physical address as stated above for the service of all notices for all purposes in connection herewith.
11. This Performance Guarantee is neither negotiable nor transferable and shall expire in terms of 2, where after no claims will be considered by the Guarantor. The original of this Guarantee shall be returned to the Guarantor after it has expired.
12. This Performance Guarantee, with the required demand notices in terms of 4 or 5, shall be regarded as a liquid document for the purposes of obtaining a court order.

13. Where this Performance Guarantee is issued in the Republic of South Africa the Guarantor hereby consents in terms of Section 45 of the Magistrate's Courts Act No 32 of 1944, as amended, to the jurisdiction of the Magistrate's Court of any district having jurisdiction in terms of Section 28 of the said Act, notwithstanding that the amount of the claim may exceed the jurisdiction of the Magistrate's Court.

Signed at

Date

Guarantor's signatory (1)

Capacity

Guarantor's signatory (2)

Capacity

Witness signatory (1)

Witness signatory (2)

ANNEXURE

LIST OF APPROVED FINANCIAL INSTITUTIONS

The following financial institutions are currently (as at 7 February 2021) approved for issue of contract guarantees to the City:

National Banks:

ABSA Bank Ltd.
FirstRand Bank Ltd.
Investec Bank Ltd.
Nedbank Ltd.
Standard Bank of SA Ltd.

International Banks (with branches in SA):

Barclays Bank plc.
Citibank n.a.
Credit Agricole Corporate and Investment Bank
HSBC Bank plc.
JP Morgan Chase Bank
Societe Generale
Standard Chartered Bank

Insurance companies:

Bryte Insurance Co. (Previously Zurich Insurance Co.)
Coface SA
Compass Insurance Co.
Constantia Insurance Co.
Credit Guarantee Insurance Corporation of Africa
Guardrisk Insurance Co.
Hollard Insurance Company Ltd.
Infiniti Insurance Limited
Lombard Insurance
New National Assurance Co.
PSG Konsult Ltd (Previously Absa Insurance)
Regent Insurance Co.
Renasas Insurance Company Ltd.
Santam Limited

CITY OF CAPE TOWN

**WATER AND SANITATION
CONTRACT NO. 4Q/2021/22**

**TERM TENDER FOR DRILLING, TESTING AND REHABILITATION OF BOREHOLES IN PRIMARY
AQUIFERS IN CAPE TOWN**

C1.4 Form of Advance Payment Guarantee

ADVANCE PAYMENT GUARANTEE

For use with the Conditions of Contract as described in C1.2: Contract Data Part 1: Contract Data provided by the Employer.

GUARANTOR DETAILS AND DEFINITIONS

"Guarantor" means:

"Physical address:

"Employer" means: The City of Cape Town, WATER AND SANITATION .

"Contractor" means:

"Employer's Agent" means:

"Works" means: Works Projects which may be allocated in Sections 1, 2 or 3 (delete which is not applicable, individually or as a whole as the context provides, under Framework Contract No. 4Q/2021/22: TERM TENDER FOR THE DRILLING, TESTING AND REHABILITATION OF BOREHOLES IN PRIMARY AQUIFERS IN CAPE TOWN

"Site" means: The site as defined in the Contract Data.

"Contract" means: The Agreement made in terms of the Form of Offer and Acceptance and such amendments or additions to the Contract as may be agreed in writing between the parties, and includes the Works Project Agreement.

"Plant and materials" means: The Plant and materials stored at places other than the Site, or in respect of which an advance payment prior to manufacture is required, which the Employer has agreed may be subject to advance payment, such Plant and materials being listed in the Schedule of Plant and materials.

"Schedule of Plant and materials" means: A list of Plant and materials which shows the value thereof to be included in the Guaranteed Advance Payment Sum.

"Guaranteed Advance Payment Sum" means: The maximum aggregate amount of R.....

Amount in words:

"Expiry Date" means: The date of the payment certificate wherein the Plant and materials have been certified by the Employer's Agent as having been built into the Permanent Works.

CONTRACT DETAILS

Employer's Agent issues: Interim Payment Certificates and Final Payment Certificate for each Works Project.

ADVANCE PAYMENT GUARANTEE

1. The Guarantor's liability shall be limited to the amount of the Guaranteed Advance Payment Sum.
2. The Guarantor's period of liability shall be from and including the date of issue of this Advance Payment Guarantee and up to and including the Expiry Date or the date of payment in full of the Guaranteed Advanced Payment Sum, whichever occurs first.

3. The Guarantor hereby acknowledges that:
 - 3.1 any reference in this Advance Payment Guarantee to the Contract is made for the purpose of convenience and shall not be construed as any intention whatsoever to create an accessory obligation or any intention whatsoever to create a suretyship;
 - 3.2 its obligation under this Advance Payment Guarantee is restricted to the payment of money.
4. Subject to the Guarantor's maximum liability referred to in 1, the Guarantor hereby undertakes to pay the Employer the sum certified upon receipt of the documents identified in 4.1 to 4.3:
 - 4.1 A copy of a first written demand issued by the Employer to the Contractor stating that payment of a sum certified by the Employer's Agent in an Interim or Final Payment Certificate has not been made in terms of the Contract and failing such payment within seven (7) calendar days, the Employer intends to call upon the Guarantor to make payment in terms of 4.2;
 - 4.2 A first written demand issued by the Employer to the Guarantor at the Guarantor's physical address with a copy to the Contractor stating that a period of seven (7) calendar days has elapsed since the first written demand in terms of 4.1 and the sum certified has still not been paid;
 - 4.3 A copy of the aforesaid payment certificate which entitles the Employer to receive payment in terms of the Contract of the sum certified in 4.
5. Subject to the Guarantor's maximum liability referred to in 1, the Guarantor undertakes to pay to the Employer the Guaranteed Advance Payment Sum or the full outstanding balance upon receipt of a first written demand from the Employer to the Guarantor at the Guarantor's physical address calling up this Advance Payment Guarantee, such demand stating that:
 - 5.1 the Contract has been terminated due to the Contractor's default and that this Advance Payment Guarantee is called up in terms of 5; or
 - 5.2 a provisional or final sequestration or liquidation court order has been granted against the Contractor and that the Advance Payment Guarantee is called up in terms of 5; and
 - 5.3 the aforesaid written demand is accompanied by a copy of the notice of termination and/or the provisional/final sequestration and/or the provisional liquidation court order.
6. It is recorded that the aggregate amount of payments required to be made by the Guarantor in terms of 4 and 5 shall not exceed the Guarantor's maximum liability in terms of 1.
7. Payment by the Guarantor in terms of 4 or 5 shall be made within seven (7) calendar days upon receipt of the first written demand to the Guarantor.
8. The Employer shall have the absolute right to arrange his affairs with the Contractor in any manner which the Employer may deem fit and the Guarantor shall not have the right to claim his release from this Advance Payment Guarantee on account of any conduct alleged to be prejudicial to the Guarantor.
9. The Guarantor chooses the physical address as stated above for the service of all notices for all purposes in connection herewith.
10. This Advance Payment Guarantee is neither negotiable nor transferable and shall expire in terms of 2, whereafter no claims will be considered by the Guarantor. The original of this Guarantee shall be returned to the Guarantor after it has expired.
11. This Advance Payment Guarantee, with the required demand notices in terms of 4 or 5, shall be regarded as a liquid document for the purposes of obtaining a court order.
12. Where this Advance Payment Guarantee is issued in the Republic of South Africa the Guarantor hereby consents in terms of Section 45 of the Magistrate's Courts Act No 32 of 1944, as amended, to the jurisdiction of the Magistrate's Court of any district having jurisdiction in terms of Section 28 of the said Act, notwithstanding that the amount of the claim may exceed the jurisdiction of the Magistrate's Court.

Signed at

Date

Guarantor's signatory (1)

Capacity

Guarantor's signatory (2)

Capacity

Witness signatory (1)

Witness signatory (2)

.

Schedule of Plant and materials

For use with Advance Payment Guarantees on contracts using the General Conditions of Contract for Construction Works, Third Edition, 2015.

Employer The City of Cape Town, WATER AND SANITATION

Contractor

Works Works Project No. 4Q/2021/22 WP-S1-01: Drilling of production boreholes in primary aquifers under Framework Contract No. 4Q/2021/22: TERM TENDER FOR THE DRILLING, TESTING AND REHABILITATION OF BOREHOLES IN PRIMARY AQUIFERS IN CAPE TOWN

Payment Certificate No.

Advance payment is requested in respect of the following items of Plant and materials, which have been manufactured and are stored at places other than the Site, or in respect of which a deposit with order is required from the Contractor by a manufacturer/supplier:

Schedule of Rates item no.	Description of Plant and materials	Deposit with order required (Y/N)	Place of storage (or manufacture, if deposit with order is required)	Unit	Quantity	Unit price R c	Total Price R c
Total Value of Plant and materials to be included in Guaranteed Advance Payment Sum							R

Signed at on theday of.....20.....

.....
for the Contractor

.....
As witness

.....
Approved by Employer's Agent

CITY OF CAPE TOWN

WATER AND SANITATION
CONTRACT NO. 4Q/2021/22

TERM TENDER FOR DRILLING, TESTING AND REHABILITATION OF BOREHOLES IN PRIMARY
AQUIFERS IN CAPE TOWN

C1.5 Occupational Health and Safety Agreement

AGREEMENT MADE AND ENTERED INTO BETWEEN THE CITY OF CAPE TOWN (HEREINAFTER CALLED THE "EMPLOYER") AND

..... ,
(Contractor/Mandatory/Company/CC Name)

IN TERMS OF SECTION 37(2) OF THE OCCUPATIONAL HEALTH AND SAFETY ACT, 85 OF 1993 AS AMENDED.

I,, representing

..... , as an employer
in its own right, do hereby undertake to ensure, as far as is reasonably practicable, that all work will be performed, and all equipment, machinery or plant used in such a manner as to comply with the provisions of the Occupational Health and Safety Act (OHSA) and the Regulations promulgated thereunder.

I furthermore confirm that I am/we are registered with the Compensation Commissioner and that all registration and assessment monies due to the Compensation Commissioner have been fully paid or that I/We are insured with an approved licensed compensation insurer.

COID ACT Registration Number:

OR Compensation Insurer: Policy No.:

I undertake to appoint, where required, suitable competent persons, in writing, in terms of the requirements of OHSA and the Regulations and to charge him/them with the duty of ensuring that the provisions of OHSA and Regulations as well as the Council's Special Conditions of Contract, Way Leave, Lock-Out and Work Permit Procedures are adhered to as far as reasonably practicable.

I further undertake to ensure that any subcontractors employed by me will enter into an occupational health and safety agreement separately, and that such subcontractors comply with the conditions set.

I hereby declare that I have read and understand the Occupational Health and Safety Specifications contained in this tender and undertake to comply therewith at all times.

I hereby also undertake to comply with the Occupational Health and Safety Specification and Plan submitted and approved in terms thereof.

Signed at on the day of 20....

Witness

Mandatory

Signed at on the day of 20

Witness

for and on behalf of
City of Cape Town

CITY OF CAPE TOWN

WATER AND SANITATION
CONTRACT NO. 4Q/2021/22

TERM TENDER FOR DRILLING, TESTING AND REHABILITATION OF BOREHOLES IN PRIMARY
AQUIFERS IN CAPE TOWN

C1.6 Protection of the Environment Declaration

PROTECTION OF THE ENVIRONMENT DECLARATION

The Contractor will not be given right of access to the Site until this form has been signed

CONTRACT NO.: 4Q/2021/22

CONTRACT TITLE: TERM TENDER FOR THE DRILLING, TESTING AND REHABILITATION OF
BOREHOLES IN PRIMARY AQUIFERS IN CAPE TOWN

I/ we,.....{Contractor} record as follows:

1. I/ we, the undersigned, do hereby declare that I/ we am/ are aware of the increasing requirement by society that construction activities shall be carried out with due regard to their impact on the environment.
2. In view of this requirement of society and a corresponding requirement by the Employer with regard to this Contract, I/ we will, in addition to complying with the letter of the terms of the Contract dealing with protection of the environment, also take into consideration the spirit of such requirements and will, in selecting appropriate employees, plant, materials and methods of construction, in-so-far as I/ we have the choice, include in the analysis not only the technical and economic (both financial and with regard to time) aspects but also the impact on the environment of the options. In this regard, I/ we recognise and accept the need to abide by the "precautionary principle" which aims to ensure the protection of the environment by the adoption of the most environmentally sensitive construction approach in the face of uncertainty with regard to the environmental implications of construction.
3. I/ we declare that I/ we have read and understood the contents of the Environmental Management Programme (which is comprised of the Environmental Management Specification and its Annexures) for this Contract, and that I/ we understand my/our responsibilities in terms of enforcing and implementing the Environmental Management Programme. I/ we also declare that I/ we have made appropriate provision in my/ our pricing of the Schedules of Rates items for the Environmental Management Programme.
4. I/ we acknowledge and accept the right of the Employer to deduct, should he so wish, from any amounts due to me/ us, such amounts (hereinafter referred to as fines) as the Employer's Agent shall certify as being warranted in view of my/ our failure to comply with the terms of the Contract dealing with protection of the environment, subject to the following:
 - 4.1 The Employer's Agent, in determining the amount of such fine, shall take into account, *inter alia*, the nature of the offence, the seriousness of its impact on the environment, the degree of prior compliance/non-compliance, the extent of the Contractor's overall compliance with environmental protection requirements and, in particular, the extent to which he considers it necessary to impose a sanction in order to eliminate/reduce future occurrences
 - 4.2 The Employer's Agent shall, with respect to any fine imposed, provide me/ us with a written statement giving details of the offence, the facts on which the Employer's Agent has based his assessment and the terms of the Contract (by reference to the specific clause) which has been contravened.

Signed Date.....
CONTRACTOR

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CITY OF CAPE TOWN

WATER AND SANITATION
CONTRACT NO. 4Q/2021/22

TERM TENDER FOR DRILLING, TESTING AND REHABILITATION OF BOREHOLES IN PRIMARY
AQUIFERS IN CAPE TOWN

C1.7 Insurance Broker's Warranty

Pro Forma



Letterhead of Contractor's Insurance Broker

Date _____

CITY OF CAPE TOWN
City Manager
Civic Centre
12 Hertzog Boulevard
Cape Town
8001

Dear Sir

CONTRACT NO.: 4Q/2021/22

CONTRACT TITLE: TERM TENDER FOR THE DRILLING, TESTING AND REHABILITATION OF
BOREHOLES IN PRIMARY AQUIFERS IN CAPE TOWN

NAME OF CONTRACTOR: _____

I, the undersigned, do hereby confirm and warrant that all the insurances required in terms of the abovementioned term tender contract have been issued and, in the case of blanket/umbrella policies, will be endorsed to reflect the interests of the CITY OF CAPE TOWN with regard to each Works Project contract, and that all the insurances and endorsements, etc., are all in accordance with the requirements of the contract.

I furthermore confirm that all premiums in the above regard have been paid.

Yours faithfully

Signed: _____

For: _____

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CITY OF CAPE TOWN

WATER AND SANITATION
CONTRACT NO. 4Q/2021/22

TERM TENDER FOR DRILLING, TESTING AND REHABILITATION OF BOREHOLES IN PRIMARY
AQUIFERS IN CAPE TOWN

C1.8 Contract of Temporary Employment as Community Liaison Officer

Not applicable for this contract.

CITY OF CAPE TOWN

WATER AND SANITATION
CONTRACT NO. 4Q/2021/22

TERM TENDER FOR DRILLING, TESTING AND REHABILITATION OF BOREHOLES IN PRIMARY
AQUIFERS IN CAPE TOWN

C1.9 Works Project Acceptance/Refusal Notice

This form must be returned to the offices of the Employer's agent by no later than the closing date and time for receipt of Works Project Acceptance/Refusal Notices stated in the Works Project contract document.

I/We herewith

Accept }
Refuse } Tick applicable box

the opportunity afforded to me/us by the City of Cape Town to participate in the work allocation process as set out in the Work Allocation Procedures for the work specified in the Works Project contract document.

I/We accept that no contractor will be allocated work unless the contractor has demonstrated to the satisfaction of the Employer that he has the resources, including a site specific construction manager, required for this Works Project.

I/We agree to the construction time period specified in the Scope of Work.

Declaration (to be completed by a contractor who accepts):

With reference to condition 8 in Section 2 in Schedule 19 Preferencing Schedule in Part 2.2 Returnable Schedules in the framework contract document, I/we declare that I/we **DO** / **DO NOT** (tick one box as applicable) intend sub-contracting more than 25% of the value of the Works Project contract to sub-contractors that do not qualify for at least the points that I/we as prime contractor qualified for in my/our framework contract.

CONTRACTOR'S NAME:

AUTHORISED CONTACT PERSON (NAME):

SIGNATURE:

DATE:.....

Part C2: Pricing Data

	Pages
C2.1 Pricing Assumptions.....	224 – 226
C2.2 Schedules of Rates	44 – 110

CITY OF CAPE TOWN

**WATER AND SANITATION
CONTRACT NO. 4Q/2021/22**

**TERM TENDER FOR DRILLING, TESTING AND REHABILITATION OF BOREHOLES IN PRIMARY
AQUIFERS IN CAPE TOWN**

C2.1 Pricing Assumptions

Pricing Assumptions mean the criteria as set out below, read together with all Parts of this framework contract document, which it will be assumed in the contract, that the tenderer has taken into account when developing his prices (rates).

These Pricing Assumptions are applicable to the Schedules of Rates in this document. Pricing Assumptions applicable to the Bills of Quantities in Works Project contract documents are provided in such documents.

These Pricing Assumptions are applicable to the Schedules of Rates in this document. Pricing Assumptions applicable to the Bills of Quantities in Works Project contract documents are provided in such documents.

1. The method of measurement published by the South African Bureau of Standards in clause 8 of the Standardised Specifications for Civil Engineering Construction is applicable, subject to the variations and amendments contained in the section "Applicable SANS 1200 standardised specifications".
2. Descriptions in the Schedules of Rates are abbreviated and comply generally with those in the Standardised Specifications. The measurement and payment clauses of each Standardised Specification, read together with the relevant clauses of the Scope of Work, set out what ancillary or associated activities are included in the rates for the operations specified. Should any requirements of the measurement and payment clause of the applicable Standardised Specification, or the Scope of Work, conflict with the terms of the Schedules of Rates, the requirements of the Standardised Specification or Scope of Work, as applicable, shall prevail.
3. The measurement and payment clauses in a specification in which further information regarding the scheduled items is given, are referenced under "Item" (pay items) in the Schedules of Rates. The referenced clauses are not necessarily the only sources of information in respect of scheduled items. Further information and specifications may be found elsewhere in the Contract Documents. Standardised Specifications are identified by the digits which follow SANS in the SANS 1200 series of specifications, e.g. G for SANS 1200 G.
4. Unless otherwise stated, items are measured net in accordance with the drawings, and no allowance is made for waste.
5. No quantities are set out in the Schedules of Rates and the Contractor will be required to undertake whatever quantities may be directed by the Employer's Agent from time to time in the relevant Works Project. The final Contract Price for each completed Works Project shall be computed from the actual quantities of work done, valued at the relevant rates (refer to Clause 10 in these Pricing Assumptions in this regard).
6. Rates inserted in the Schedules of Rates are deemed to be based on Acts, Ordinances, Regulations, By-laws, International Standards and National Standards that were published 28 days before the closing date for tenders. (Refer to www.stanza.org.za or www.iso.org for information on standards).
7. The rates (excluding VAT) inserted in the Schedules of Rates shall be the full inclusive rates for the work described under the several items. Such rates shall cover all costs and expenses that may be required in and for the execution of the work described, and shall cover the cost of all general risks, liabilities, and obligations set forth or implied in the documents on which the tender is based, as well as overhead charges and profit. Reasonable rates shall be inserted as these will be used as a basis for assessment of payment for additional work that may have to be carried out.

Where the Scope of Work requires detailed drawings and designs or other information to be provided, all costs associated therewith shall be provided for and included in the rates tendered for such items.

8. A rate is to be entered against each item in the Schedules of Rates for the sections selected by the Tenderer. If a nil rate (i.e. "nil" or "0.00") is entered against an item, it will be considered that there is no charge for that item. **An item against which no rate (or rates, in the case of rate categories if provided) is/are entered, or if anything other than a rate or a nil rate (for example, a zero, a dash or the word "included" or**

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abbreviations thereof) is entered against an item, it will also be regarded as a nil rate having been entered against that item, i.e. that there is no charge for that item. The Tenderer may be requested to clarify nil rates, or items regarded as having nil rates; and the Employer may also perform a risk analysis with regard to the reasonable of such rates.

9. The units of measurement described in the Schedules of Rates are metric units. Abbreviations which may be used in these Schedules of Rates are as follows:

mm	=	Millimetre	h	=	hour
m	=	Metre	kg	=	kilogram
km	=	Kilometre	t	=	ton (1000 kg)
km-pass	=	kilometre-pass	No.	=	number
m ²	=	square metre	sum	=	lump sum
m ² .pass	=	square metre-pass	MN	=	meganewton
ha	=	Hectare	MN.m	=	meganewton-metre
m ³	=	cubic metre	P C sum	=	Prime Cost sum
m ³ .km	=	cubic metre-kilometre	Prov sum	=	Provisional sum
l	=	Litre	%	=	per cent
kl	=	Kilolitre	kW	=	kilowatt
MPa	=	Megapascal	day	=	Working day
kPa	=	Kilopascal	Each	=	Per site/item

10. **Tenderers are only to price their Sections of Preference as they have indicated on the relevant returnable schedule, in accordance with clauses C.1.6.1 and C.2.10.5 in Part T1.2 Tender Data.**

11. Tenderers shall provide rates for the execution of items as specified in the Schedules of Rates. Unless otherwise described in the items in the Schedules of Rates, all rates (sums in particular) apply to individual Works Project contracts. Framework Contract pay items shall be initial one-off payments in the Framework Contract.

The rates provided in the Schedules of Rates shall be used in representative Works Projects for tender evaluation purposes in accordance with clause C.3.11.1 in Part T1.2 Tender Data, as well as in the allocation of individual Works Projects in accordance with Clause 2.6 in Part C1.2 Contract Data and the Procedures for the allocation of Works Projects referred to therein.

12. Tenderers shall provide rates (excluding VAT) for each required rate category (if provided) for each item specified in every schedule in the Schedules of Rates applicable to the section(s) tendered for (refer to clause C.2.10.5 in Part T1.2 Tender Data). Prime Cost and Provisional Sums will be multiplied by a factor (quantity) to be provided by the Employer at Works Project stage only.

13. Tenderers are referred to clause C.1.6.1 in Part T1.2 Tender Data with regard to working within the City of Cape Town municipal area, as shown on the drawings and as tabled therein.

Rates submitted in the respective Schedules of Rates shall apply to Works Projects executed anywhere within the City of Cape Town municipal boundary.

14. The Employer will only order those quantities of work items, which it actually requires for execution in a Works Project from time to time. The Employer reserves the right not to order any quantities at all depending on circumstances and subject to operational requirements.

15. The procedures for allocation of Works Projects are specified in Part C1.2 Contract Data (refer to Clause 2.6).

16. Clause C.2.13.11 c) in Part T1.2 Tender Data shall be applicable to the submission of Schedules of Rates which have been priced electronically, and which the Tenderer wishes to submit as a printed version with his tender in the place of handwritten priced Schedules of Rates.

If there is found to be any variance between the printed version and the original issued document, the original shall stand. However, where Addenda have been issued which amend the Schedules of Rates, then the printed Schedules of Rates shall take these into account.

The pages of the issued Schedules of Rates should not be removed from the tender document.

17. Tenderers are referred to Clause E8 Measurement and Payment in the Environmental Management (EM) Specification in Part C3.5 in the Scope of Work for the basic principles of measurement and pricing of the

EM Specification.

18. Tenderers are referred to Clause 6.8.2 in Part C1.2 Contract Data regarding contract price adjustment.

The schedules in Part C2.2 Schedule of Rates are deemed applicable for the purposes of Contract Price

19. For the purpose of uniformity, tenderers are requested to base their Preliminary and General rates for fixed-charged items on the total value of the Works Project, and provide separate rates for the stipulated ranges of Works Project value, as shown in the Schedule of Rates and below,

Section 1

- Works Project value of up to R3 million (excl. VAT)
- Works Project value of up to R6 million (excl. VAT)
- Works Project value of up to R10 million (excl. VAT)
- Works Project value of up to R20 million (excl. VAT)

Section 2

- Works Project value of up to R3 million (excl. VAT)
- Works Project value of up to R6 million (excl. VAT)
- Works Project value of up to R10 million (excl. VAT)

Section 3

- Works Project value of up to R3 million (excl. VAT)
- Works Project value of up to R6 million (excl. VAT)
- Works Project value of up to R10 million (excl. VAT)

Part C3: Scope of Work

	Pages
C3.1 Description of the Works	228 – 232
C3.2 Engineering.....	233 – 234
C3.3 Procurement	235 – 236
C3.4 Construction	237 – 241
C3.5 Management.....	242 – 286
C3.6 Specifications	287 – 349
C3.7 Annexes.....	350 – 356

Status

Should any requirement or provision in the parts of the Scope of Work conflict with any requirement of any Standardised Specification, particular specification or any drawings, the order of precedence, unless otherwise specified, is:

Drawings
Scope of Work (Parts C3.1, C3.4, C3.5 and C3.6)
Particular Specifications
Standardised Specifications

C3.1 Description of the Works

CONTENTS

- 3.1.1 EMPLOYER'S OBJECTIVES
- 3.1.2 OVERVIEW OF THE WORKS
- 3.1.3 EXTENT OF THE WORKS
- 3.1.4 LOCATION OF THE WORKS
- 3.1.5 TEMPORARY WORKS

3.1.1 EMPLOYER'S OBJECTIVES

The City of Cape Town intends to develop the groundwater in primary aquifers in several areas across the metropolitan area as an additional water resource for the bulk water supply to the City. To build resilience against future droughts, the exploration and development of these aquifers is considered essential in diversifying bulk water supply, hence reducing water supply risk to drought (as outlined in Cape Town's Water Strategy).

In addition, the City of Cape Town also intends to make use of this framework contract for other drilling objectives and requirements within the municipal boundaries, if and when required.

3.1.2. OVERVIEW OF THE WORKS

This Contract is for drilling and testing of exploration, monitoring, production and injection boreholes as well as the rehabilitation of boreholes associated with several projects and areas, as will be detailed in subsequent work orders. The contract will be valid for 36 months from date of award and the works will be executed in accordance with detailed works projects based on the rates provided for in the Schedule of Rates in this tender document.

3.1.3. EXTENT OF THE WORKS

3.1.3.1 General Scope of the Works

The Works carried out by the Contractor under this Contract comprise mainly of the following:

- (a) Exploration drilling and establishment of monitoring boreholes in sedimentary rock and basement environments in several areas marked by the Engineer, using sonic, auger, core, rotary mud or percussion drilling technology. The final number of boreholes, drilling methodology and drilling depths of each site will depend on the hydrogeological conditions encountered.
- (b) Rotary mud drilling in sedimentary rock environments in several areas to establish standard and wide diameter production and MAR boreholes. The final number of boreholes and drilling depths at each site will depend on the results of the exploration boreholes and the hydrogeological conditions encountered.
- (c) The supply and installation of casings, well screens, couplings, end caps and all other materials such as specified and required for the work.
- (d) The placing of gravel packs around screens, installation of grout seals, plinths, etc.
- (e) Construction of concrete plinths and manholes to secure the boreholes.
- (f) Test pumping of the boreholes.
- (g) Injection testing under pressure and gravity of MAR boreholes
- (h) Cleaning and rehabilitation of existing boreholes (where required).
- (i) Downhole geophysical surveys of boreholes (where possible, as indicated by the Engineer).
- (j) Tracer testing (where possible, as indicated by the Engineer).
- (k) Environmental management of the drilling areas during construction.
- (l) Compliance with the requirements of the OHS Act.

The Works that are to be carried out will be specified in Works Project contract documents as and when required and as provided for in the Schedule of Rates therein. However, if during the course of construction conditions are found to differ from those anticipated, the Employer's Agent may modify the scope of the work to suit the prevailing conditions and circumstances.

The summarised technical requirements associated with the above are described in more detail below.

Section 1: Standard Drilling

Exploration Drilling – sedimentary rock environments

In general, all exploration drilling shall be at least 125 mm ID. By standard rotary mud drilling technology, as approved by the Engineer.

- (a) The drilling size may only be altered with the approval of the Engineer.
- (b) The drilling operation shall secure continuous geological profile whenever possible.

Exploration Drilling – basement rock environments

In general, all exploration drilling shall be at least 75 mm ID using standard percussion technology, as approved by the Engineer.

- (a) The drilling size may only be altered with the approval of the Engineer.
- (b) The drilling operation shall secure continuous geological profile whenever possible.

Production/MAR Drilling – sedimentary rock environments

- (a) This will entail the drilling of production/MAR boreholes into the primary aquifer within the Cape Flats and Atlantis/Silwerstroom area for production and injection purposes.
 - a. Standard production/MAR boreholes will be completed at a minimum end-diameter of at least 305 mm ID, or as specified by the Engineer;
- (b) All boreholes to have starter casing installed as specified by the Engineer;
- (c) All boreholes shall be drilled and cased straight and vertical using centralisers and all casing and liners shall be set round, plumb and true in line. Plumbness and alignment must be tested by lowering into the boreholes, to a depth directed by the Engineer, a section of pipe 10 m long or a dummy of the same length. The outer diameter of the plumb shall not be more than 10 mm smaller than the diameter of that part of the casing or borehole being tested.
- (d) All boreholes should have gravel installed t

General

- (a) The Engineer shall be kept informed of the progress made and of changes in drilling formations, drill rate and the occurrence of water strikes and their associated yields by means of meticulous written records kept by the Contractor.
- (b) The Contractor will be responsible for the construction of boreholes, including decisions on aspects such as the required drilling diameter and the reduction thereof, and the installation and placement of casing. All decisions in this regard must, however, be communicated to the Engineer for agreement, and may be modified as dictated by geological conditions and the interests of the project, after consultation with the Engineer.

Section 1: Borehole Cleaning and Rehabilitation

The services to be rendered are the mechanical cleaning of existing boreholes.

The Contractor shall undertake a situation assessment prior to the works (borehole camera) and final measurements after rehabilitation (borehole camera, profiling and or hydraulic testing). The Contractor must ensure that all the required equipment to undertake the measurements, as specified below, is readily available on site when required.

The following methods are anticipated for cleaning and rehabilitation:

- Mechanical cleaning through re-drilling
- Mechanical cleaning through brushing

- Mechanical cleaning through high-pressure water spray

Section 1: Borehole Completion

- Completed boreholes must be fitted with tamper-proof, lockable steel lids, plinths and manhole covers as instructed by the Engineer.
- The monitoring and exploration boreholes shall, if required by the Engineer, be equipped with concrete plinths of at least 1.5 m x 1.5 m x 0.3 m.
- The borehole casing shall extend not higher than 300 mm above the concrete plinth.
- A suitably sized manhole cover or similar shall be erected on top of the plinth to protect the borehole and equipment from vandalism and weather conditions.
- A borehole number allocated by the Engineer must be inscribed, together with the total depth of the borehole, on a metal plate fixed to both the concrete plinth and the casing of all completed boreholes.
- If required by the Engineer, a yellow painted steel pipe (± 75 mm diameter) standing 1.8 m tall above ground shall be erected a distance of 10 m north of the borehole. The pipe shall be set a depth of at least 500 mm in a concrete block firmly embedded in the ground.
- Special pillars and mounts for geodetic monitoring shall be installed at selected existing and new boreholes.

Section 2: Test pumping and injection testing

After completion of the pilot production and MAR boreholes, hydraulic testing shall be undertaken at these boreholes. These shall comprise step drawdown, constant discharge, constant head or gravity injection and recovery tests per selected borehole as described below.

- Step drawdown tests** shall be conducted on each of the boreholes as part of the test pumping. Unless otherwise stated or instructed by the Engineer, step tests will comprise between 4 and 8 steps of 60 minutes duration each with increasing discharge, continuously executed with no recovery in between. A recovery test, if so decided upon by the Engineer, may be undertaken at the end of the Step Test.
- Constant Discharge tests** shall be conducted on selected boreholes and shall be executed according to BS 6316. The Constant Discharge Tests shall be at least for 72 hours (SABS standard), but preferably for about 2 weeks. For these tests, the Contractor must be in possession of at least two pumps for the execution of the work. At least one pump must be capable of delivering at least 50 l/s from 50 m depth below ground level.
- Constant Head tests** shall be conducted on selected MAR boreholes and shall be executed as directed by the Employer's Agent. The Constant Head Tests shall be at least for 72 hours (SABS standard), but preferably for about 2 weeks. For these tests, the Contractor must be in possession of at least two pumps for the execution of the work. The pumps should be able to inject at a pressure of up to 0.5 bar. Capability must be available to conduct injection tests under gravity.
- A full **recovery test** must be undertaken at the cessation of each Constant Discharge/Head Test. The duration of this test should be long enough to allow the static water level to return to within at least 95% of the original static water level of the borehole. Recovery tests should end only after the Engineer has given permission for such.
- In addition to these standard tests, it is expected to undertake a **long-term constant discharge test**.
- In addition to these standard tests, a wellfield test (approximately 2 to 4 weeks), where multiple boreholes are pumped simultaneously to determine their impact on each other. The number of boreholes and their individual discharge rates will be given by the Engineer prior to commencing the wellfield test.
- Unless otherwise stated or instructed by the Engineer, all the water level readings, water flow measurements, etc., will be taken by the Contractor under supervision by the Engineer. Water level measurements shall be taken in the abstraction borehole and selected monitoring boreholes in the vicinity of the abstraction borehole with an electrical contact gauge accurate to 5 mm, or an automatic digital recording device. All flow measurements shall be done by a totalising meter and/or induced flow meter, installed in the discharge pipe close to the abstraction borehole, as well as volumetrically using preferably an orifice weir or, alternatively, containers of appropriate capacity to accurately measure lower yields (< 40 l/s) with a stopwatch or higher yields (> 40 l/s) with a V-notch or U-notch.
- Unless otherwise stated or instructed by the Engineer, all water pumped during the test pumping operations must be properly piped away from the Site in a manner approved by the Engineer. To prevent recirculation and environmental damage to river reaches, the distance for the discharge of the water will vary between 200 and 500 metres depending on the hydrogeological and ecological conditions of the site and the duration of the test.

- (i) Injection tests done on MAR boreholes will include steps as instructed by the engineer, followed by constant rate or constant head injection tests of at least 72 hours duration. Step and constant injection tests can include pressures of up to 0.5 bar. All tests will be followed by recovery to allow the static water level to return to within at least 95% of the original static water level of the borehole. Recovery tests should end only after the Engineer has given permission for such. During the injection tests, observation boreholes should be monitored along with all injection volumes water levels within the MAR borehole or surrounding observation boreholes as with the standard hydraulic testing and pressure within the MAR borehole.

Section 2: Borehole Cleaning and Rehabilitation

The services to be rendered are the mechanical and or chemical cleaning of existing boreholes.

The Contractor shall undertake a situation assessment prior to the works (borehole camera) and final measurements after cleaning (borehole camera, profiling and or hydraulic testing). The Contractor must ensure that all the required equipment to undertake the measurements, as specified below, is readily available on site when required.

The following methods are anticipated for cleaning and rehabilitation:

- Mechanical cleaning through brushing
- Mechanical cleaning through high-pressure water spray
- Chemical cleaning

The Works that are to be carried out will be specified in Works Project contract documents as and when required and as provided for in the Bills of Quantities therein. However, if during the course of construction conditions are found to differ from those anticipated, the Employer's Agent may modify the scope of the work to suit the prevailing conditions and circumstances.

Section 3: Specialised Drilling

Specialised Exploration Drilling

In certain instances specialised drilling may be required for exploration purposes. Drilling shall be at least 75 mm ID. Either auger, sonic or core technology may be employed, as approved by the Engineer.

- (a) The drilling size may only be altered with the approval of the Engineer.
- (b) The drilling operation shall secure continuous geological profile whenever possible.

General

- (a) The Engineer shall be kept informed of the progress made and of changes in drilling formations, drill rate and the occurrence of water strikes and their associated yields by means of meticulous written records kept by the Contractor.
- (b) The Contractor will be responsible for the construction of boreholes, including decisions on aspects such as the required drilling diameter and the reduction thereof, and the installation and placement of casing. All decisions in this regard must, however, be communicated to the Engineer for agreement, and may be modified as dictated by geological conditions and the interests of the project, after consultation with the Engineer.

Section 3: Borehole Completion

- (a) Completed boreholes must be fitted with tamper-proof, lockable steel lids, plinths and manhole covers as instructed by the Engineer.
- (b) The monitoring and exploration boreholes shall, if required by the Engineer, be equipped with concrete plinths of at least 1.5 m x 1.5 m x 0.3 m.
- (c) The borehole casing shall extend not higher than 300 mm above the concrete plinth.
- (d) A suitably sized manhole cover or similar shall be erected on top of the plinth to protect the borehole and equipment from vandalism and weather conditions.
- (e) A borehole number allocated by the Engineer must be inscribed, together with the total depth of the borehole, on a metal plate fixed to both the concrete plinth and the casing of all completed boreholes.
- (f) If required by the Engineer, a yellow painted steel pipe (± 75 mm diameter) standing 1.8 m tall above ground shall be erected a distance of 10 m north of the borehole. The pipe shall be set a depth of at least 500 mm in a concrete block firmly embedded in the ground.

- (g) Special pillars and mounts for geodetic monitoring shall be installed at selected existing and new boreholes.

3.1.4. LOCATION OF THE WORKS

The works will be carried out in several areas across the metropolitan area as identified by the Engineer.

Access to the sites is generally along existing roads or dirt tracks. However, access to some sites could be problematic especially if wet conditions are encountered. Certain of the drill sites might not be located along access tracks and will require construction of access tracks to the sites. The new access tracks are generally shorter than 100 m. Furthermore, environmental considerations may restrict access of a standard truck-mounted drill rig to some drill sites.

Notwithstanding that access to the site is described above, the Contractor will be held responsible to have satisfied himself with regard to existing access roads, and shall make suitable provision for the accessibility to the sites.

3.1.5 TEMPORARY WORKS

Not envisaged

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C3.2 Engineering

CONTENTS

- 3.2.1 DESIGN SERVICES AND ACTIVITY MATRIX
- 3.2.2 EMPLOYER'S DESIGN
- 3.2.3 ALTERNATIVE OFFERS
- 3.2.4 DESIGN BRIEF
- 3.2.5 DRAWINGS
- 3.2.6 AS-BUILT RECORD

3.2.1 DESIGN SERVICES AND ACTIVITY MATRIX

- (a) The Employer is responsible for the design of the permanent Works as reflected in the Contract Documents unless otherwise stated.
- (b) The Contractor is responsible for the design of the temporary Works and their compatibility with the permanent Works.
- (c) The Contractor shall supply all details necessary to assist the Engineer in the compilation of the as-built drawings.

3.2.2 EMPLOYER'S DESIGN

The permanent works included in this contract have been planned and designed by the Employer. The detail of the works is indicated on the drawings (If any) and in the specifications.

The design provided shall not relieve the Contractor of any obligations or responsibilities with regard to quality and good practices on site, nor replace, take precedence over or detract from the standard good practice of drilling. The Contractor shall remain responsible for the execution of the works in a manner to achieve the objectives as stated in the Works Projects.

3.2.3 ALTERNATIVE OFFERS

The Tenderer may submit alternative offers for designs prepared by him subject to the conditions specified in the Contract Data.

3.2.4 DESIGN BRIEF

The Contractor shall be responsible for the design of the temporary Works as defined in C3.2.1(b). Where the Contractor is to supply the design of designated parts of the permanent Works or temporary Works he shall supply full working drawings supported by a professional engineer's design certificate.

3.2.5 DRAWINGS

Drawings of the manhole design are listed in C3.8.

Construction drawings will, in terms of the Conditions of Contract, be issued to the Contractor by the Employer's Agent, as appropriate, prior to the date for commencement with Works execution, and from time to time as required.

The Works shall be constructed in accordance with the issued design drawings, if any.

3.2.6 AS-BUILT RECORDS

The Contractor shall ensure that accurate as-built records are kept of all infrastructure installed or relocated during the Contract. The position of the infrastructure and all ancillary infrastructure (Underground or aboveground) shall be given either by co-ordinates, or stake value and offset. Where necessary, levels shall also be given. A marked-up set of drawings shall also be kept and updated by the Contractor.

All information in possession of the Contractor, required by the Engineer and/or the Engineer's Representative to complete the as-built/record drawings, must be submitted to the Engineer's Representative before a Certificate of Completion will be issued.

The drawings, if any, issued with this tender document are attached in order to give an overview of the term tender project. They are issued separately to this document and must be regarded as provisional and preliminary for Tenderers to generally assess the scope of work.

Construction drawings will, in terms of the Conditions of Contract, be issued to the Contractor by the Employer's Agent, as appropriate, prior to the date for commencement with Works execution, and from time to time as required.

The Works shall be constructed in accordance with the issued design drawings, if any.

C3.3 Procurement

CONTENTS

- 3.3.1 PREFERENTIAL PROCUREMENT
- 3.3.2 SUB-CONTRACTING PROCEDURES

3.3.1 PREFERENTIAL PROCUREMENT

The Works, and Works Projects, shall be executed in accordance with the conditions associated with the granting of preferences detailed in the **Preference Schedule** where preferences are granted in respect of B-BBEE contribution.

The declarations made in the **Preference Schedule** of the framework contract will be used in the evaluation of tender offers as described in clause C.3.11 in Part T1.2 Tender Data. Once appointed to a panel, Contractors will be required, as applicable, to complete the declaration in respect of sub-contractors in the Works Project Acceptance/Refusal Notice for the particular Works Project, in accordance with clauses P.2.1.4 and P.3.4 in Part A1.2 Work Allocation Procedures in the Works Project contract document.

Financial penalties, as described in the **Preference Schedule**, shall be applied in the event that the Contractor is found to have breached and of the conditions contained in the **Preference Schedule** (unless proven to be beyond the control of the Contractor)

Notwithstanding the application of penalties, the Contractor's attention is drawn to other sanctions that may be applied by the Employer (listed in the **Preference Schedule**) with due consideration to the circumstances.

3.3.2 SUB-CONTRACTING PROCEDURES

3.3.2.1 Monitoring the use of sub-contractors

Notwithstanding the restriction on sub-contracting as described on the **Preference Schedule**, it is recognised that sub-contracting is an integral part of construction, which the conditions of contract make provision for.

In order, however, to comply with the requirements of the **Preference Schedule**, the Contractor shall submit to the Employer's Agent, on a monthly basis, a **B-BBEE Sub-Contract Expenditure Report**. The format of this report is provided in Annex 2 attached.

The Contractor shall submit to the Employer's Agent documentary evidence in accordance with the applicable codes of good practise of the B-BBEE status level of every sub-contractor employed by the Contractor. Until such time as documentary evidence as described above has been submitted to the Employer's Agent, a sub-contractor shall be deemed to be a non-compliant contributor. The Contractor shall furthermore, on the written request of the Employer's Agent, provide documentary evidence showing the value of work sub-contracted to any or all of the sub-contractors employed by the Contractor.

3.3.2.2 Procedure for the selection of sub-contractors/suppliers

Where monetary allowances for provisional sums or prime cost items have been provided in the Bills of Quantities in the Works Project contract document, and where the work or items to which the allowances relate are to be executed/supplied by sub-contractors/suppliers, then the following selection process shall be followed in respect of the required sub-contractors/suppliers:

Where the monetary allowance is less than or equal to R300 000, the Contractor shall invite three quotations from suitably qualified sub-contractors/suppliers for the required work or items. The selection of the three sub-contractors/suppliers shall be in consultation with, and to the approval of the Employer's Agent. The evaluation of the quotations received must include a preference points system as described in C.3.11 of the Tender Data.

Where the monetary allowance is in excess of R300 000, an open competitive tender process shall be followed in respect of the selection of a sub-contractor/supplier for the required work or items. In such circumstances,

tender documentation will be prepared by the Employer's Agent in consultation with and to the approval of the Contractor, invitations to tender will be advertised in the media by the Employer's Agent on behalf of the Contractor, and a sub-contractor/supplier will be selected from the responses received, by the Contractor and Employer's Agent in consultation. The evaluation of the offers received must include a preference points system as described in C.3.11 of the Tender Data. The Contractor must satisfy him/herself that the selected sub-contractor/supplier can meet the requirements of the sub-contract /supply agreement and may, on reasonable grounds, elect not to employ a particular sub-contractor/supplier.

In both instances above (less than or equal to R300 000 or in excess of R300 000), the contractual relationship between the Contractor and sub-contractor/supplier shall be as described in Clause 4.4.3 of the General Conditions of Contract.

3.3.2.3 Payment of sub-contractors/suppliers

Before the Engineer, in terms of Clause 6.10.1 [Interim Payments] of the General Conditions of Contract for Construction Works (Third Edition, 2015), issues any certificate that includes any payment in respect of work done or goods supplied by any sub-contractor in terms of Clause 4.4 [Sub-Contracting] of the General Conditions of Contract for Construction Works (Third Edition, 2015), he shall be entitled to call upon the Contractor to furnish reasonable proof that all payments (less retention moneys) included in previous certificates in respect of the work or goods of such sub-contractors have been made or discharged by the Contractor, in default of which, unless the Contractor:

- Informs the Engineer in writing that he has reasonable cause for withholding or refusing such payment, and
- Submits to the Engineer reasonable proof that he has so informed such sub-contractor in writing,

The Employer shall be entitled to pay directly such sub-contractor (nominated or otherwise) on the Engineer's certificate all payments (less retention moneys) the Contractor has failed to make to such sub-contractor and to deduct, by way of settlement, the amount so paid by the Employer from any moneys owing to or that may become owing to the Contractor.

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C3.4 Construction

CONTENTS

- 3.4.1 TRADE NAMES OR PROPRIETARY PRODUCTS
- 3.4.2 APPLICABLE STANDARDISED SPECIFICATIONS
- 3.4.3 PARTICULAR / PROJECT SPECIFIC SPECIFICATIONS
- 3.4.4 WAYLEAVES, PERMISSIONS AND PERMITS
- 3.4.5 LOCAL PRODUCTION AND CONTENT
- 3.4.6 EMPLOYMENT OF SECURITY PERSONNEL
- 3.4.7 UNIVERSAL ACCESS
- 3.4.8 SITE ESTABLISHMENT
- 3.4.9 CONTRACTOR'S REPRESENTATIVE AND SUPERINTENDANCE
- 3.4.10 SITE MEETINGS

3.4.1. TRADE NAMES OR PROPRIETARY PRODUCTS

Bid specifications may not make any reference to any particular trade mark, name, patent, design, type, specific origin or producer, unless there is no other sufficiently precise or intelligible way of describing the characteristics of the work, in which case such reference must be accompanied by the words "or equivalent".

TENDERERS MUST NOTE THAT WHEREVER THIS DOCUMENT REFERS TO ANY PARTICULAR TRADE MARK, NAME, PATENT, DESIGN, TYPE, SPECIFIC ORIGIN OR PRODUCER, SUCH REFERENCE SHALL BE DEEMED TO BE ACCOMPANIED BY THE WORDS 'OR EQUIVALENT'

3.4.2 APPLICABLE STANDARDISED SPECIFICATIONS

The SANS 1200 Standardized Specifications applicable to this contract are the following and amendments are provided in C3.6.1:

SANS 1200 A	General
SANS 1200 C	Site Clearance
SANS 1200 D	Earthworks
SANS 1200 G	Concrete (Structural)

3.4.3 PARTICULAR / PROJECT SPECIFIC SPECIFICATIONS

The Particular Specifications that are for work not covered by the SANS 1200 Standardized Specifications are listed in C3.6.2.

3.4.4 WAYLEAVES, PERMISSIONS AND PERMITS

The Contractor shall be responsible for obtaining all of the necessary wayleaves, permissions or permits applicable to working near any existing services or other infrastructure on Site, and shall ensure that any wayleaves, permissions or permits obtained by the Employer's Agent prior to the award of the contract are transferred into the Contractor's name.

The Contractor shall abide by any conditions imposed by such wayleaves, permissions or permits.

The Contractor shall ensure that all wayleaves, permissions and permits are kept on site and are available for inspection by the relevant service authorities on demand.

The Contractor shall also ensure that any wayleaves in respect of electricity services are renewed timeously every three months.

No extra costs will be covered for this requirement, except for non-standard potential external costs, such as electrical survey by the Electrical Department. Allowance has been made for these external costs as Provisional Sum.

3.4.5 LOCAL PRODUCTION AND CONTENT

The Contractor will be required to comply with all requirements as stated in this document.

3.4.6 EMPLOYMENT OF SECURITY PERSONNEL

All security staff employed by the contractor on behalf of the CCT or at any CCT property must be registered with Private Security Industry Regulatory Authority (PSiRA). Proof of such registration must be made available to the employer's agent upon request.

3.4.7 UNIVERSAL ACCESS

In pursuit of becoming a fully accessible city, the City of Cape Town expects all Consultants and Service Providers to design and construct to SANS Standards for accessible Design, and any relevant City of Cape Town documents as may be relevant, and to exhibit a commitment to employing Universal Design Principles in their design, construction, service and product delivery of construction projects. This applies to all projects whether new, temporary, upgrades or rehabilitation works.

The contractor will engage with project representatives and the CCT's Universal Accessibility Department on how Universal Design Principles will enhance accessibility, within this project, that meets a variety of needs and creates a city that is accessible to everyone.

3.4.8. SITE ESTABLISHMENT

3.4.8.1 Services and facilities provided by the Employer

(a) Water sources

There is no reticulated water supply available in close proximity to the project area

The Contractor shall at his own cost, make all arrangements necessary for the supply and distribution of water required for construction purposes as well as for use in and about his site establishment and for human consumption.

(b) Electricity supply

There is no reticulated electrical power supply available in close proximity to the project area

The Contractor shall at his own cost, make all arrangements necessary for the supply and distribution of electrical power required for construction purposes as well as for use in and about his site establishment.

The Contractor shall comply with all prevailing legislation in respect of the generation and distribution of electricity and shall, when required by the Engineer, produce proof of such compliance.

(c) Sanitation

No water-borne sewage or other off-site excrement disposal systems are available in the vicinity of the Site.

The Contractor shall provide the necessary ablution facilities for his camp, depot and areas of work. Pit latrines shall not be allowed. Chemical toilets shall be provided and shall be adequately serviced. The Contractor's ablution facilities shall be approved by the CCT.

(d) Area for Contractor's camp site establishment

No area will be made available by the Employer. The Contractor will be required to operate from their own base.

(e) Security

Some of the drilling and construction sites are considered high risk and vulnerable to vandalism, theft and gangsterism. No security is provided by the Employer.

It is the responsibility of the Contractor to ensure the safety of equipment and personnel during construction; e.g. through provision of safety guards on site. It is recommended that security is made available by the contractor during all site work.

(f) Housing for the Contractor's workers

No housing is available for the Contractor's employees on the site. The Contractor shall make his own arrangements for housing his employees or transporting them to and from the Site. The Contractor is in all respects responsible for the housing and transporting of his employees, and for the arrangement thereof, and no extension of time due to delays resulting from this will be granted.

3.4.8.2 Facilities provided by the Contractor

(a) Facilities for the Employer's Agent

Not applicable

(b) Water

The Contractor shall, at his own expense, be responsible for obtaining and distributing all water as may be required for the purposes of executing the Contract, including water for both construction purposes and domestic use, as well as for making all arrangements in connection therewith. The Contractor shall further, at his own expense, be responsible for providing all necessaries for procuring, storing, transporting and applying water required for the execution of the Contract, including but not limited to all piping, valves, tanks, pumps, meters and other plant and equipment, as well as for all work and superintendence associated therewith.

The sources of all water utilised for the purposes of the Contract shall be subject to the prior approval of the Employer's Agent, which approval shall not be unreasonably withheld. However, the use of potable water is discouraged.

The Contractor shall comply with all prevailing legislation in respect of drawing water from natural and other sources and shall, when required by the Employer's Agent, produce proof of such compliance. The distribution of water shall be carried out by the Contractor strictly in accordance with the applicable laws and regulations.

All water provided by the Contractor for construction purposes shall be clean, free from undesirable concentrations of deleterious salts and other materials and shall comply with any further relevant specifications of the Contract. The Contractor shall, whenever reasonably required by the Employer's Agent, produce test results demonstrating such compliance. Water provided by the Contractor for human consumption shall be healthy and potable to the satisfaction of the health authorities in the area of the Site.

No separate payment will be made to the Contractor for the obtainment, distribution and consumption of water, the costs of which will be deemed to be included in the Contractor's tendered rates.

(c) Electricity

The Contractor shall, at his own expense, be responsible for obtaining and distributing all electricity as he may require for the purposes of executing the Contract, including electricity for both construction purposes and domestic use, as well as for making all arrangements in connection therewith.

The distribution of electricity shall be carried out by the Contractor strictly in accordance with the applicable laws and regulations.

No separate payment will be made to the Contractor for the obtainment, distribution and consumption of electricity, the costs of which will be deemed to be in the Contractor's tendered rates and prices.

(d) Sanitation

The Contractor shall, at his own expense, be responsible for safely and hygienically dealing with and disposing of all human excrement and similar matter generated on the Site during the course of the Contract, to the satisfaction of the Employer's Agent and the responsible health authorities in the area of the Site.

The Contractor shall provide the necessary ablution facilities for his camp, depot and areas of work. Pit latrines shall not be allowed. Chemical toilets shall be provided and shall be adequately serviced. The Contractor's ablution facilities shall be approved by the CCT.

The Contractor shall further comply with any other requirements in this regard as may be stated in the Contract.

No separate payment will be made to the Contractor in respect of discharging his obligations in terms of this subclause and the costs thereof shall be deemed to be included within the Contractor's tendered Preliminary and General Items.

3.4.8.3 Site usage

The Contractor's employees will not be allowed to stay on site except for the duration of a working day. A working day for test pumping works is considered 24 hours in this regard. The only person to be allowed on site for the duration of a calendar day will be the site security.

No housing is available for the Contractor's employees on the site. The Contractor shall make his own arrangements for housing his employees or transporting them to and from the Site. The Contractor is in all respects responsible for the housing and transporting of his employees, and for the arrangement thereof, and no extension of time due to delays resulting from this will be granted. For test pumping temporary tents can be established on site to allow for 24 hour continuous monitoring.

3.4.8.4 Features requiring special attention

(a) Access to properties

The Contractor shall organise the work to cause the least possible inconvenience to the public and to the property owners adjacent to or affected by the work, and except as hereunder provided, shall at all times provide and allow pedestrian and vehicular access to properties within or adjoining or affected by the area in which he is working. In this respect the Contractor's attention is drawn to Clause 8.1.2 of the Conditions of Contract (GCC 2015).

If, as a result of restricted road reserve widths and the nature of the work, the construction of bypasses is not feasible, construction shall be carried out under traffic conditions to provide access to erven and properties.

(b) Existing residential areas

Where sites are located within residential areas, the contractor shall organise and schedule the works to avoid disturbance via noise, dust or transport, where possible. Working beyond normal working hours will not be permitted, unless under instruction by the Employers Agent with sufficient notice to the public.

(c) Construction in restricted areas

Working space is sometimes restricted. The construction method used in these restricted areas largely depends on the Contractor's Plan. Notwithstanding, measurement and payment will be strictly according to the specified cross-sections and dimensions irrespective of the method used, and the rates and prices tendered will be deemed to include full compensation for any difficulties encountered by the Contractor while working in restricted areas. No extra payment nor any claim for payment due to these difficulties will be considered.

(d) Notices, signs, barricades and advertisements

All notices, signs and barricades, as well as advertisements, may be used only if approved by the Employer's Agent. The Contractor shall be responsible for their supply, erection, maintenance and ultimate removal and shall make provision for this in his tendered rates.

The Employer's Agent shall have the right to instruct the Contractor to move any sign, notice or advertisement to another position, or to remove it from the Site of the Works if in his opinion it is unsatisfactory, inconvenient or dangerous.

(e) Workmanship and quality control

The responsibility to produce work that conforms in quality and accuracy of detail to the requirements of the Specifications and Drawings rests with the Contractor, and the Contractor shall, at his own expense, institute a quality control system and provide suitably qualified and experienced engineers, foremen, surveyors, materials technicians, other technicians and technical staff, together with all

transport, instruments and equipment to ensure adequate supervision and positive control of the Works at all times.

The cost of supervision and process control, including testing carried out by the Contractor, will be deemed to be included in the rates tendered for the related items of work.

The Contractor's attention is drawn to the provisions of the various Standardized Specifications regarding the minimum frequency of testing required. The Contractor shall, at his own discretion, increase this frequency where necessary to ensure adequate control.

On completion and submission of every part of the work to the Employer's Agent for examination and measurement, the Contractor shall furnish the Employer's Agent with the results of the relevant tests, measurements and levels to demonstrate the achievement of compliance with the Specifications.

(f) Workers Living Conditions

In addition to the General Health and Safety Specification, the Contractor shall provide adequate living quarters for the field staff and workers on the drilling sites.

(g) Vandalism and Gangsterism

Some of the drilling and construction sites are considered high risk and vulnerable to vandalism, theft and gangsterism. It is the responsibility of the Contractor to ensure the safety of equipment and personnel during construction; e.g. through provision of safety guards on site. It is required that the security situation of the site and access routes is assessed prior to site establishment and adequate security is made available by the contractor during all site work. The Schedule of Rates allows for different levels of security required for dayshifts and nightshifts, for areas with varying levels of risk.

Extremely high risk areas include Hanover Park, Delft, Khayelitsha, Mitchells Plain and Mfuleni.

3.4.9. CONTRACTOR'S REPRESENTATIVE AND SUPERINTENDANCE

The Contractor shall employ suitably-qualified representatives to oversee construction activities. Any change in the Contractor's key supervisory personnel shall be communicated timeously to the Engineer in writing.

The Contractor shall submit to the Employer and Engineer a list of addresses and telephone numbers of his Representatives who may be contacted both during and outside normal working hours in connection with the Works. The Contractor shall also refer to the General Conditions of Contract for Construction Works (Third Edition, 2015).

3.4.10. SITE MEETINGS

The Engineer will conduct monthly site meetings as a minimum, prepare and circulate minutes, as determined by him in consultation with the Employer. The Contractor shall attend these meetings and shall ensure that when necessary, all required sub-contractors are represented. The Contractor shall submit monthly progress reports as required in terms of the Employer's reporting systems.

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C3.5 Management

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- 3.5.1. FORMS FOR CONTRACT ADMINISTRATION
- 3.5.2. PARTICIPATION OF TARGETED LABOUR
- 3.5.3. COMMUNITY LIAISON OFFICER
- 3.5.4. PARTICIPATION OF TARGETED ENTERPRISES
- 3.5.5. ENVIRONMENTAL MANAGEMENT PROGRAMME
- 3.5.6. HEALTH AND SAFETY

3.5.1 FORMS FOR CONTRACT ADMINISTRATION

The Contractor shall complete, sign and submit with each monthly statement for payment in respect of each Works Project contract, the following updated returns (the format of which are attached in C3.6 Annexes):

- a) Monthly Project Labour Report (Annex 1)
- b) B-BBEE Sub-Contract Expenditure Report (Annex 2)
- c) Joint Venture Expenditure Report (Annex 3)
- d) Targeted Labour Contract Participation Expenditure Report (Annex 4)
- e) Targeted Enterprises Contract Participation Expenditure Report (Annex 5)

The Monthly Project Labour Report must include details of all labour (including that of sub-contractors) that are South African citizens earning less than R450.00 per day, as adjusted from time to time (excluding any benefits), who are employed on a temporary or contract basis on this contract in the month in question.

In addition to the Monthly Project Labour Report the Contractor shall simultaneously furnish the Employer's Agent with copies of the signed employment contracts entered into with such labour, together with certified copies of identification documents, proof of attendance in the form of attendance register or timesheets, as well as evidence of payments to such labour in the form of copies of payslips or payroll runs. If the worker is paid in cash or by cheque, this information must be recorded on the envelope and the worker must acknowledge receipt of payment by signing for it and proof of such acknowledgement shall be furnished to the Employer's Agent.

The Monthly Project Labour Reports shall be completed and submitted in accordance with the instructions therein and copies of all submitted documents must be kept on site be made available to the employer's agent upon request.

The **B-BBEE Sub-Contract Expenditure Report** is required for monitoring the prime contractor's compliance with the sub-contracting conditions of the **Preference Schedule**.

The Joint Venture Expenditure Report is required for monitoring the joint venture's compliance with the percentage contributions of the JV partners as tendered, where the joint venture has been awarded preference points in respect of its consolidated B-BBEE scorecard.

The Targeted Labour Contract Participation Expenditure Report is required for monitoring the contractor's compliance for achieving the specified minimum targeted labour contract participation goal (CPG_L) and, if applicable, for calculating any penalty in terms thereof.

The Targeted Enterprises Contract Participation Expenditure Report (if applicable) is required for monitoring the contractor's compliance for achieving the specified minimum targeted enterprises contract participation goal (CPG_E) and, if applicable, for calculating any penalty in terms thereof.

The Expenditure Reports shall be verified by the Employer's Agent/Employer's Agent's Representative.

In respect of Annexes 2 and 3, the Employer shall, in addition to any other sanctions available to it, apply the financial penalties applicable to breach of preferencing conditions in the **Preference Schedule** in Part T2.2 Returnable Schedules. In the case of joint ventures (Annex 3), the contractor shall prove his compliance with

item 6) in Section 2 of the **Preference Schedule** by providing a consolidated scorecard at his own cost on instruction from the Employer's Agent.

3.5.2 PARTICIPATION OF TARGETED LABOUR

3.5.2.1 Minimum targeted labour contract participation goal

In support of the National Department of Public Works' Expanded Public Works Programme which is aimed at alleviating poverty through the creation of temporary employment opportunities using labour intensive methodologies and practices where possible, the Employer is seeking to increase the intensity of labour, as appropriate, in all of its infrastructure sector projects.

It is a requirement of this term tender contract, therefore, that the work be executed in such a manner so as to maximise the use of labour intensive construction methods in order to provide low and semi-skilled temporary employment opportunities.

To this end, a minimum targeted labour contract participation goal is specified below, which shall be achieved by the Contractor in the performance of each Works Project contract, failing which, penalties as described will be applied. The Contractor is required to provide all skills training where necessary, so as to ensure that a minimum level of competence is achieved and maintained, such that the various activities are carried out safely and to the required standard. The cost of training shall be included in the rates for the various work activities.

The specified minimum targeted labour contract participation goal (CPGL) is

0.1 %

The minimum CPGL is such that the Contractor will have to carry out some of the work that would normally have been undertaken using mechanised construction methods, by using labour intensive construction methods instead. It is left to the discretion of the Contractor to identify suitable work activities for the intensification of labour. The Contractor shall, within 5 working days of being requested in writing by the Employer's Agent to do so, submit details of his/her plan to achieve the minimum CPGL in the Works Project. If, due to the selection of items and quantities in any individual Works Project, it is not possible for the Contractor to achieve the specified minimum CPGL on that particular Works Project, then the Employer's Agent, at his/her sole discretion, may reduce such minimum CPGL upon motivation by the Contractor.

3.5.2.2 Definitions

For the purposes of the requirements in respect of the participation of targeted labour, the following definitions shall apply:

"Target area" means the geographical area described in the Works Project contract document.

"Targeted labour contract participation goal (CPGL)" means the sum of the wages (excluding any benefits), for which the Contractor, or any of his/her sub-contractors contracts targeted labour in the performance of the contract, expressed as a percentage of the value of the contract.

"Targeted labour" means low and semi-skilled individuals, whose wages (excluding any benefits) do not exceed the threshold value, who reside in the target area, that are employed by the Contractor, or any of his/her sub-contractors, in the performance of the contract.

"Threshold value" is R450.00 per day as adjusted from time to time (excluding any benefits). The threshold value is not to be confused with any industry sector minimum wage determined in accordance with the Basic Conditions of Employment Act, 75 of 1977.

"Value of the contract" means the **Works Project** contract sum (accepted contract amount) less provisional sums, contingencies and VAT.

3.5.2.3 The selection and recruitment of targeted labour

Where targeted labour is to be drawn from specific local communities (defined in terms of the target area), such labour shall be identified using the relevant Sub-Council Job-Seekers Database. The Contractor shall request, via a Community Liaison Officer (if required in terms of the contract), a list of suitable candidates from the database, from which the Contractor shall make his/her final selection. The contractor shall enter into written contracts of temporary employment with all targeted labour.

Any difficulty experienced by the Contractor in identifying candidates through the Job-Seekers Database, or as regards any matter relating to the employment of targeted labour, shall be immediately referred to the Employer's Agent.

3.5.2.4 Contract participation goal credits

Credits towards the achieving the minimum CPG_L shall be granted by converting the total monetary value of wages paid to targeted labour (including that of sub-contractors) to a percentage of the value of the contract. No credits shall be accorded should the contractor/sub-contractor fail to enter into written contracts with the targeted labour. Furthermore, no credits shall be accorded in respect of targeted labour employed on work in respect of provisional sums or prime cost items. Such labour shall nevertheless be recorded on the Monthly Project Labour Report which is required to be furnished by the Contractor.

3.5.2.5 Training of targeted labour

The Contractor is required to provide all informal (on-the-job) skills training so as to ensure that a minimum level of competence is achieved and maintained, such that the various activities are carried out safely and to the required standard. The cost of informal training shall be included in the rates for the various work activities.

3.5.2.6 Penalties

The financial penalty to be applied for failing to meet the specified minimum targeted labour contract participation goal in the performance of the contract (unless proven to be beyond the control of the Contractor), is as follows:

$$\text{Penalty} = (\text{CPG}_L^S - \text{CPG}_L^A) \times P^*$$

Where CPG_L^S = the specified minimum targeted labour contract participation goal (expressed as a percentage).

CPG_L^A = the targeted labour contract participation goal achieved (expressed as a percentage).

P^* = the value of the contract.

3.5.3 COMMUNITY LIAISON OFFICER

Not required for this Contract.

3.5.4. PARTICIPATION OF TARGETED ENTERPRISES

3.5.4.1 Minimum targeted enterprises contract participation goal

Not required for this contract.

3.5.5 ENVIRONMENTAL MANAGEMENT PROGRAMME

Particular Specification E: Environmental Management Specification and its Annexures are attached hereto.

3.5.6 HEALTH AND SAFETY

Particular Specification H: Health and Safety Specification is attached hereto.

SPEC E: ENVIRONMENTAL MANAGEMENT SPECIFICATION

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E: ENVIRONMENTAL MANAGEMENT SPECIFICATION

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

E1 SCOPE

The general Environmental Management Programme (EMP) for the contract is comprised of this Environmental Management (EM) Specification and its Annexures, including the "Additional environmental issues deemed to form part of the Environmental Management Specification" attached as Annexure D hereto, which together cover the requirements for controlling the impact on the environment of construction activities. Additional site-specific specifications might be provided for in each Works Project.

E2 INTERPRETATIONS

E2.1 Supporting specifications

The following standardised specification shall, *inter alia*, apply to this Contract:

- a) SANS 1200A, as may be varied or added to in the Scope of Work
- b) New Water Programme – Environmental Management Programme

E2.2 Application

This EM Specification covers the requirements for controlling the impact of exploratory, production and MAR drilling on the environment, and is applicable to all of the activities associated with the drilling process, including access, site establishment, drilling, test-pumping, injection testing and rehabilitation and closure. Environmental management is concerned not only with the results of the Contractor's operations, but also with the manner in which operations are carried out. It is thus a requirement that the Contractor shall comply with the environmental requirements on an on-going basis.

Site specific EMPs will be compiled for each working area and will contain site specific information detailing the sensitivity of the environment, concerns raised by environmental specialists and landowners, as well as mitigation measures proposed to reduce the risk of environmental degradation.

In the event of any difference or discrepancy between the provisions of the Standardised Specifications and the provisions of the EM Specification, the latter shall prevail.

E2.3 Definitions and abbreviations

For the purposes of this EM Specification the following definitions and abbreviations shall apply:

E2.3.1 Contaminated water

Water contaminated by the Contractor's activities containing cements, concrete, lime, paint products, thinners, turpentine, chemicals, fuels, oils washing detergents, etc.

E2.3.2 Contractor's camp or construction camp

The area designated for all temporary site offices, storage areas, construction plant parking areas, staff welfare facilities, etc.

E2.3.3 Employer's Agent

The person/firm so named in the Contract Data, whose function is to administer the Contract as agent of the Employer.

E2.3.4 Employer's Agent's Representative (ER)

The natural person appointed by the Employer's Agent in terms of the Contract, who shall observe the execution of the Works, examine and test materials and workmanship, and deliver and receive communications to/from the Contractor.

E2.3.5 Environment

The surroundings within which humans exist and that are made up of -

- a) the land, water and atmosphere of the earth;
- b) micro-organisms, plant and animal life;
- c) any part or combination of a) and b) and the interrelationships among and between them; and
- d) the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being.

E2.3.6 Environmental Officer (EO)

Appointed by the Engineer as his environmental representative on Site, with the mandate to enforce compliance with the EMP. The duties of the EO are stipulated in the City's guideline document for the EO and ER.

E2.3.7 Environmental Control Officer (ECO)

An independent appointment to objectively monitor implementation of relevant environmental legislation, conditions of Environmental Authorisations (EAs), and the EMP for the project.

E2.3.8 Environmental Site Officer (ESO)

Employed by the Contractor as his environmental representative to monitor, review and verify compliance with the EMP by the Contractor. The ESO must ensure that he is involved at all phases of the construction (from site clearance to rehabilitation).

E2.3.9 Method Statement (MS)

A written submission by the Contractor to the Engineer in response to the EM Specification or a request by the Engineer, setting out the plant, materials, labour and method the Contractor proposes using to carry out an activity, in such detail that the Engineer is enabled to assess whether the Contractor's proposal is in accordance with the Scope of Work and/or will produce results in accordance with the EM Specification. The MS will feed into the compilation of the site specific EMP, which will be approved by the City's WRECO, ECO and Contractor at a minimum.

E2.3.10 Pollution incident

Any incident that may or has caused damage to or the contamination of the natural environment.

E2.3.11 Potentially hazardous substance

A substance which, in the reasonable opinion of the Engineer, can have a deleterious effect on the environment.

E2.3.12 Reasonable

Unless the context indicates otherwise, means reasonable in the opinion of the Engineer after he has consulted with a person suitably experienced in "environmental implementation plans" and "environmental management plans" (both as defined in the National Environmental Management Act, 107 of 1998).

E2.3.13 Sensitive area

Any area that is denoted as sensitive by this Specification or ECO/ Engineer due to its particular attributes, which could include the presence of rare or endangered vegetation and the presence of heritage resources. When works are to be done in a nature reserve, the Reserve Manager is to provide input on the scope of work. This must be included in the site specific EMP.

E2.3.14 Solid waste

All solid waste, including construction debris, chemical waste, excess cement/ concrete, wrapping materials, timber, tins and cans, drums, wire, nails, domestic waste (e.g. plastic packets and wrappers), dead vegetation, asphalt products, etc.

E2.3.15 Water Resilience Environmental Compliance Officer (WRECO)

The Water Resilience Environmental Compliance Officer (WRECO) will report to the City of Cape Town and is responsible for the day-to-day management of environmental performance on the development. The WRECO is ultimately accountable for the implementation of the requirements contained within the generic EMPr.

E2.3.16 Watercourse

Any river, stream and natural drainage channel whether carrying water or not.

E2.3.17 Water body

A body containing any form of water and includes dams and wetlands, whether ephemeral or permanent. In this regard, wetland means any area that is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the area is covered by shallow water.

E2.3.18 Working area

Any area within the boundaries of the Site where construction is taking place.

E2.3.19 Abbreviations

The following abbreviations occur in this EM Specification:

EMP - Environmental Management Programme
EM Specification – Environmental Management Specification
EO - Environmental Officer
ECO – Environmental Control Officer
ESO – Environmental Site Officer
ER – Engineer’s Representative
MSDS - Material Safety Data Sheets
MS – Method Statement
WRECO – Water Resilience Environmental Compliance Officer

E2.4 Engineer’s authority to delegate

In terms of Clause 3.2.4 of the General Conditions of Contract, Third Edition, 2015 (GCC 2015), the Engineer has the authority to appoint a representative. Other than the Engineer’s Representative (ER) in terms of Clause 3.2, this can be in the form of an Environmental Officer (EO), who shall be responsible for monitoring compliance with the EMP. All instructions given by the EO shall go through the ER, who will then convey these to the Contractor, except in the case of an environmental emergency, in which case the EO can issue an instruction directly to the Contractor. An environmental emergency is one which, in the opinion of the EO, would cause serious environmental harm if not addressed immediately. The City’s WRECO needs to be informed of all environmental emergencies when they occur.

Depending on the nature/environmental sensitivity of the Contract the following variations in the organisational structure are possible:

- a) The ER may work together with an EO; or
- b) There may be an ER only (for construction projects with low potential for causing significant environmental impacts). In this case the ER has responsibility for the EO’s functions.
- c) There may be an independently appointed Environmental Control Officer (ECO) who will fulfil essentially the same functions as the EO. The ECO may work with just the ER (if there is no EO) or may work with both the ER and EO.

In the case of this project, an independently appointed ECO will fulfil the role of EO.

The term “Engineer” in this EM Specification refers to the Engineer as defined in Clause E2.3.3 acting through the ER/EO/ECO as delegated.

E2.5 Measurement and payment

E2.5.1 Basic principles

No separate measurement and payment will be made to cover the costs of complying with any of the provisions of this Specification not noted as scheduled items, and such costs shall be deemed to be covered by the rates tendered for the items in the Schedule of Quantities completed by the Contractor when submitting his tender.

The Contractor shall tender a rate or sum against each scheduled item and shall not price any item as nil or "0-00" and shall not indicate that the cost of any of the items listed in this schedule as being included elsewhere. In the event that the Contractor fails to provide a rate or sum, prices an item as nil or "0-00", or indicates an item as being included elsewhere, the Engineer shall assign what he believes to be a reasonable price to each of these items and the Tendered Sum shall not be adjusted to accommodate any additional costs.

E2.5.2 Fixed versus time-related charges

The scheduled items below have been categorised as Fixed Charges, Time-Related Charges, Quantity-Proportional Charges or Provisional Sums:

A Fixed Charge is a charge for a scheduled item which is deemed to remain unaltered throughout and which is deemed to be expended and due upon the fulfilment of the requirements under the item, irrespective of any time duration or any quantity measured;

A Time-Related Charge is a charge for a scheduled item which is deemed to be expended and due in linear proportion to the time expended in the execution of the Works or service or obligation in relation to the total length of time duration tendered for that item;

A Quantity-Proportional Charge is a charge for a scheduled item which is deemed to be expended and due in linear proportion to the volume of work executed, the quantity of material, number of articles supplied, or services rendered, etc., as defined by the unit scheduled for the item; and

Where required by this Specification, Provisional Sum items have been included in the Schedule of Quantities.

The sum tendered for each Fixed Charge item will be authorised for payment in terms of the first certificate issued after the Contractor's obligations have, in the opinion of the Engineer, been met as far as that item is concerned.

Payment for Time-Related Charge items will be certified by way of incremental amounts (calculated by the division of the tendered sum by the scheduled duration per borehole) in each of the subsequent progress certificates until the sums tendered have been fully certified.

E3 MATERIALS

E3.1 Materials handling, use and storage

The Contractor shall ensure that any delivery drivers are informed of all procedures and restrictions (including "no go" areas) required to comply with the EM Specification. The Contractor shall ensure that these delivery drivers are supervised during off loading by someone with an adequate understanding of the requirements of the EM Specification.

Materials shall be appropriately secured to ensure safe passage between destinations. Loads, including but not limited to, sand, stone chip, fine vegetation, refuse, paper and cement, shall have appropriate cover to prevent them spilling from the vehicle during transit. The Contractor shall be responsible for any clean-up resulting from the failure by his employees or suppliers to properly secure transported materials.

All manufactured and or imported materials shall, where reasonably possible, be stored within the Contractor's camp and, if so required by the Engineer, out of the rain. The location and method of protection of such materials stored outside of the Contractor's camp and the method of rehabilitation of these areas, shall be subject to the Engineer's approval.

Stockpile areas shall be approved by the Engineer before any stockpiling commences.

E3.2 Hazardous substances

Hazardous chemical substances (as defined in the Regulations for Hazardous Chemical Substances in GN 1179 (25 August 1995)) stored on Site for use during construction shall be stored in secondary containers which are clearly and appropriately marked/signed. The relevant Material Safety Data Sheets (MSDS) shall be available on Site. Procedures detailed in the MSDSs shall be followed in the event of an emergency situation.

If potentially hazardous substances are to be stored on Site, the Contractor shall inform the Engineer of such substances and provide a Method Statement detailing the substances/ materials to be used, together with the storage, handling and disposal procedures of the materials. Hazardous substances shall be stored out of flood risk areas and disposal of these substances shall be at a licensed waste disposal facility.

E3.2.1 Fuel (petrol and diesel)

Fuel may be stored on site in an area approved by the Engineer. The fuel storage area shall be located in a portion of the exploration camp where it is unlikely to pose a significant risk in terms of water pollution or traffic safety. The Contractor shall ensure that diesel is stored in sound storage tanks or in bowzers. The tanks/ bowzers shall be placed within a bunded area or on an area where the ground has been protected. The proper dispensing equipment shall be used, and the drum shall not be tipped in order to dispense fuel. The dispensing mechanism of the fuel/ oil storage drum shall be stored in a waterproof container when not in use.

The Contractor shall prevent unauthorised access into the fuel storage area. No smoking shall be allowed within the vicinity of the fuel storage area. The Contractor shall ensure that there is adequate fire-fighting equipment at the fuel stores.

Where reasonably practical, equipment shall be refuelled at the fuel storage area. If it is not reasonably practical, then fuel containers shall be appropriately secured during transport and the surface under the refuelling area shall be protected against pollution to the reasonable satisfaction of the Engineer prior to any refuelling activities.

E3.2.2 Oils and lubricants

The Contractor shall ensure that oil and lubricant containers are stored in an area where the ground has been protected. The containers shall be inspected regularly to ensure that no leakage occurs. When oil/ lubricant are dispensed, the proper dispensing equipment shall be used, and the storage container shall not be tipped in order to dispense the oil/ lubricant. The dispensing mechanism of the oil/ lubricant storage container shall be stored in a waterproof container when not in use. The Contractor shall take all reasonable precautions to prevent accidental and incidental spillage during the use of oils. A spill kit and drip trays to be available during all drilling and construction processes.

In the event of an oil/ lubricant spill, the source of the spillage shall be isolated, and the spillage contained. The Contractor shall clean up the spill, either by removing the contaminated soil or by the application of absorbent material in the event of a larger spill. Treatment and remediation of the spill area shall be undertaken to the reasonable satisfaction of the Engineer.

E3.3 **Cement and concrete batching**

No batching activities shall occur directly on unprotected ground. Batching areas shall be located on a smooth impermeable surface (concrete or 250 µm plastic). All wastewater resulting from batching of cement / concrete shall be disposed of via the contaminated water management system and shall not be discharged into the environment. To this end, diversion berms shall be installed to direct all contaminated water to a storage area. Contaminated water storage areas shall not be allowed to overflow and appropriate protection from rain and flooding shall be implemented.

The Contractor shall ensure that sand, aggregate, cement or additives used during the mixing process are contained and covered to prevent contamination of the surrounding environment. Empty cement bags shall be stored in weatherproof containers to prevent wind-blown cement dust and water contamination. Empty cement bags shall be disposed of on a regular basis via the solid waste management system, and shall not be used for any other purpose.

The Contractor shall take all reasonable measures to prevent the spillage of cement/ concrete during batching and construction operations. All spoiled and excess aggregate/ cement/ concrete shall be removed and disposed of via the solid waste management system

E4 **PLANT (referring to “Construction Equipment” as defined in GCC 2015, and the Contractor’s facilities as used in SANS 1200A)**

E4.1 **General**

The Contractor shall be cognisant of the requirements of this Specification in the selection and operation of his equipment, to ensure that environmental degradation is kept to a minimum. To this end, the Contractor shall ensure that his equipment operators are made aware of the environmental requirements and any other reasonable controls.

E4.2 **Equipment maintenance and storage**

All vehicles and equipment shall be kept in good working order. Leaking equipment or vehicles emitting noticeably excessive fumes shall be repaired immediately or removed from Site. Where practical, no maintenance of equipment and vehicles shall be performed on Site. If it is necessary to do maintenance on Site, the Contractor shall obtain the prior approval of the Engineer, and portable drip trays shall be used to

collect the waste oil and other lubricants to ensure there is no contamination of the environment.

Drip trays shall be provided in construction areas for stationary and "parked" equipment. Drip trays shall be inspected and emptied daily. Drip trays shall be closely monitored during rain events to ensure that they do not overflow. Where practical, the Contractor shall ensure that equipment is covered so that rainwater is excluded from the drip trays. Oil from the drip trays shall be stored in externally clean drums on an area where the ground has been protected. These shall be removed on a regular basis to an oil-recycling centre.

The washing of equipment on Site shall be strictly prohibited.

E4.3 Ablution and toilet facilities

Washing, whether of the person or of personal effects, defecating and urinating are strictly prohibited other than at the facilities provided.

The Contractor shall provide ablution facilities for all personnel employed on the Site, including shelter, toilets and washing facilities during all drilling and construction processes. Proof of sewage disposal, with a stamp from a Waste Water Treatment Works, must be retained by the ECO. The Contractor's personnel will not be permitted to use the City's ablution facilities.

Toilet facilities provided by the Contractor shall occur in a ratio of not less than 1 toilet per 30 workers (1:15 is preferred) of each sex. Toilet facilities shall be located within the Contractor's camp, but also at work areas remote from the camp, all to the satisfaction of the Engineer. All portable toilets shall be adequately secured to the ground to prevent them toppling over as a result of wind or any other cause.

The Contractor shall ensure that the entrances to these toilets are adequately screened from view, that they are maintained in a hygienic state, serviced regularly, that no spillage occurs when they are cleaned and that contents are removed from Site. Toilets shall also be emptied before any temporary site closure for a period exceeding one week. Discharge of waste from toilets into the environment and burial of waste is strictly prohibited. The Contractor shall provide toilet paper at all times.

No ablution facilities shall be located closer than 50m to any water body

A Method Statement shall be provided by the Contractor detailing the provision, location, and maintenance of ablution facilities.

E4.4 Eating areas

The Contractor shall designate eating areas within the approved Contractor's camp. The feeding of, or leaving of food for, animals is strictly prohibited. Sufficient bins, as specified in Clause E4.7 below, shall be present in these areas.

Any cooking on Site shall be done on well-maintained gas cookers with fire extinguishers present. No open fires for cooking purposes shall be permitted.

E4.5 Water use

Water is a scarce resource in South Africa and water shall be conserved wherever possible. The Contractor shall minimise the use of water and shall immediately attend to any wastage.

E4.5.1 General water use

Water for potable uses shall be sourced from a legal source and the Contractor shall absolve the Employer of all risk or liability in terms of compliance with all relevant statutory obligations in this regard. Where a water source is located on private property, the Contractor shall not abstract water without the prior written approval of the landowner.

E4.5.2 Sourcing and storage of drilling water

Water for drilling operations shall be brought to site in bowsers and stored in appropriately sized portapools. Cognisance shall be taken of the requirements of this Specification in the siting and management of the portapools, particularly with respect to the site demarcation and no go areas, site clearing, erosion and sediment control and landscaping and rehabilitation. The Contractor shall ensure that the re-use of drilling water is maximised, and shall include both water brought to site as well as water derived from the drilling operation themselves.

E4.6 Fire control

The Fynbos Biome, within which the drilling activities occur, is a particularly fire prone environment. The Contractor shall thus take adequate precautions to ensure that the fire hazard on or near the Site is reduced to a minimum.

No open fires may be lit on Site. Any fires which occur shall be reported to the Engineer and ECO immediately.

Smoking shall only be permitted in designated smoking areas on Site. These smoking areas must be demarcated and equipped with suitable ash trays and fire-fighting equipment. Smoking areas may not be located near areas considered to be a fire hazard, such as in close proximity to fuel storage and refuelling areas, nor where the vegetation is dense and grassy, etc. The vegetation is highly sensitive to the rapid spread of fire. All cigarette butts are to be disposed of in provided bins and removed from Site.

In terms of the National Environment Management: Air Quality Act, 39 of 2004 and Community Fire Safety By-law, burning is not permitted as a disposal method.

The Contractor shall appoint a Fire Officer (who may be the ESO) who shall be responsible for ensuring immediate and appropriate actions in the event of a fire and shall ensure that employees are aware of the procedure to be followed. The Contractor shall advise the relevant authority of a fire as soon as one starts and shall not wait until he can no longer control it. The Contractor shall forward the name of the Fire Officer to the Engineer for his approval.

The Contractor shall comply with Clause 27 of the Construction Regulations, 2014 where applicable, and shall ensure that there is suitable and sufficient fire-fighting equipment available on Site at all times.

The Contractor shall be liable for any costs relating to the rehabilitation of burnt areas, should the fire be the result of the Contractor's activities on Site

The Contractor shall submit a MS to the Engineer covering the procedure to be followed in the event of a fire.

E4.7 Solid waste management

E4.7.1 Litter and refuse

The site shall be kept neat and clean at all times, littering is prohibited.

No on-site burying or dumping of any waste materials, vegetation, litter or refuse shall occur. The Contractor shall provide scavenger and weatherproof bins with lids, of sufficient number and capacity to store the solid waste produced on a daily basis. The lids shall be kept firmly on the bins at all times. Bins shall not be allowed to become overfull and shall be emptied regularly, at least once a week. Waste from bins may be temporarily stored on Site in a central waste area that is weatherproof and scavenger-proof, and which the Engineer has approved. Wherever possible refuse shall be recycled, and containers for glass, paper, metals and plastics shall be provided and the contents delivered to suitable recycling facilities when necessary.

All other litter and refuse shall be disposed of off Site at an approved landfill site. The Contractor shall supply the Engineer and ECO with a certificate of disposal.

E4.7.2 Construction waste

Where possible all construction waste or spoil material shall be recycled, either on Site or elsewhere. As a last resort all construction waste shall be disposed of off Site at an approved landfill site. The Contractor shall supply the Engineer and ECO with a certificate of disposal.

E4.7.3 Treatment of spoil

Unless specified otherwise elsewhere, the cores and rock chips that emanate from the diamond and rotary mud drilling respectively, shall be regarded as spoil once they have been analysed and logged. In operating the spoil areas, the Contractor shall ensure that:

- a) Only existing disturbed areas are utilised as spoil areas;
- b) Topsoil that would have been buried as a result of the spoiling of material is moved to one side within the demarcated area, appropriately covered, and placed over the spoil site on completion;
- c) The spoil disposed of in the spoil areas is free of contamination;
- d) Surface water runoff is appropriately channelled through or around the spoil areas to minimise erosion and sedimentation; and

- e) The surface of the spoil area is appropriately rehabilitated as per the requirements of this Specification.

E4.8 Contaminated water management

E4.8.1 General

Potential pollutants of any kind and in any form shall be kept, stored, and used in such a manner that any spill or escape can be contained and the water table and/or any adjacent water courses or bodies are not endangered. Spill kits which can be used to contain and/or mop up spills shall be available on site throughout the drilling and construction processes. Water containing such pollutants as cements, concrete, lime, chemicals, oils and fuels shall be discharged into a conservancy tank for removal from the Site to a licensed disposal or treatment facility, and proof of disposal retained by the ECO. This particularly applies to water emanating from concrete batching plants and to runoff from fuel storage, refuelling or construction equipment washing areas. Wash down areas shall be placed and constructed in such a manner so as to ensure that the surrounding areas are not polluted.

No paint products, chemical additives and cleaners, such as thinners and turpentine, may be disposed of into the stormwater system or elsewhere on Site. Brush/roller wash facilities shall be established to the satisfaction of the Engineer.

A Method Statement shall be provided by the Contractor detailing the management of contaminated water.

Should contaminated water be released into the environment, specifically into a water course, monitoring thereof shall commence in accordance to the National Water Act, 36 of 1998, Section 21(f) – refer to GN 399 (26 March 2004). Contaminated water must not be released into the environment without authorisation from the relevant authority.

The Contractor shall notify the Engineer immediately of any pollution incidents on Site and, at his own cost, take all reasonable measures to contain and minimise the effects of the pollution.

Any rehabilitation of the environment required as a result of such pollution shall be carried out by the Contractor at his own cost in accordance with a Method Statement (MS) approved by the Engineer.

E4.8.2 Contamination of drilling water

Contamination of drilling water could result from the water exhibiting an unacceptably high temperature or a neutral, alkaline or excessively acidic pH or from the presence of suspended solids, drilling foam contaminants or undesirable chemical compounds. Contaminated water may be derived from drilling per se, or from artesian flow, and hence the water emanating from any artesian borehole shall be regarded as contaminated water until deemed otherwise by the Engineer.

During the drilling and pump-testing operations, the Contractor shall ensure that the contamination of drilling water is actively managed and minimised, and that measures are put in place to manage contaminated water. In this regard:

- a) No additives shall be utilised for drilling operations without the prior approval of the Engineer and ECO;
- b) Where instructed by the Engineer, the Contractor shall construct a retainer sump within the demarcated boundary of each of the drilling sites, downstream of all drilling platforms to retain chemical additives, sludge and grouting, and to accommodate drilling water and possible artesian flow. The Contractor shall ensure that sumps are located outside of the floodplain and riparian vegetation zones of watercourses and that the area is rehabilitated pursuant to the cessation of the operation of the pond. Each sump shall have sufficient capacity for their purposes and shall be made watertight using a minimum of a 250 µm plastic lining. Construction shall follow specified design parameters (see diagram). Side walls and berms to be constructed from sand bags. Pond base and side walls to be underlain with DPC. Joins in DPC to be water resistant bonded to ensure no leakage;
- c) Care shall be taken to minimise disturbance to natural vegetation during the construction of the sumps, and the plant and materials used in the construction shall themselves not cause environmental degradation. As per the requirements of Subclause 5.3.4, topsoil from the area affected by the sumps shall be stockpiled for subsequent use in the rehabilitation of the affected area;
- d) All natural ground water and stormwater runoff must be diverted around the sumps to ensure that washout of contaminated water or accumulated sludge does not occur;
- e) The launder at the drilling site shall be constructed to ensure that all water is contained and channelled into the sump, and that no contaminated water is discharged into the environment causing pollution, erosion and sedimentation;
- f) Water of an acceptable quality shall be pumped from the sump into the storage portapools for re-use in the drilling operations;

- g) All effluent emanating from sumps shall be sampled and tested at point of source using approved hand-held instruments. No water shall be released into the environment without the prior approval of the Engineer, and the quality of released water shall comply with the criteria agreed to by the Engineer. Water from settling tanks shall only be released after settling and precipitation of solids;
- h) Subject to the Site-Specific Environmental Management Plan, excess or surplus water shall be released into the environment via lay-flat pipes or DPC lined channel directed to the closest suitable watercourse or drainage line. No water shall be released into any water bodies. The site of and arrangements for water release back to the environment shall be subject to the Engineers and ECO approval;
- i) Irrespective of the provisions of this specification, no water used for or emanating from diamond drilling shall be discharged into the environment. Diamond drilling water as well as water that does not comply with the agreed water quality requirements shall be transported from site and disposed of at an appropriate and approved facility, and proof thereof retained by the ECO;
- j) A flow measuring device shall be installed at the start of each lay-flat or DPC lined channel to measure water flow; and
- k) Uncontaminated water discharged during each pump test will be channelled into either (1) the nearest stormwater or sewerage drain, with DWS being informed prior to the commencement of the test, (2) the adjacent vegetation, or (3) a nearby dam which will require written permission from the owner prior to the commencement of test pumping. Erosion measures to be used at each site include, but are not limited to, the following:
 - Placing a steel plate at exit of layflat pipe to diffuse flow of water and prevent erosion at end point;
 - Utilisation of a manifold to create sheet flow;
 - Moving the end of the layflat regularly to prevent erosion patterns forming and to prevent flooding of one area;
 - Utilising a perforated layflat to diffuse the spread of water;
 - Any other measures to reduce flow strength and minimise impacts of erosion and flooding, and;
 - Relocation of discharge point should the flooding cause a visible disturbance to local population of burrowing creatures

Natural stormwater runoff not contaminated by drilling operations and clean water can be discharged directly to watercourses and water bodies, as specified in the Site Specific Environmental Management Plan.

E4.9 Site structures

The type and colour of roofing and cladding materials to the Contractor's temporary structures shall be selected to reduce the visual impact.

E4.10 Lights

The Contractor shall ensure that any lighting installed on the Site for his activities does not cause a reasonably avoidable disturbance to other users of the surrounding area.

Lighting installed shall, as far as practically possible, be energy efficient. Lighting utilised on Site shall be turned off when not in use.

E4.11 Workshop, equipment maintenance and storage

No workshops or plant maintenance facilities shall be constructed on Site for performing major or routine maintenance of equipment and vehicles.

The Contractor shall ensure that in those areas where, after obtaining the Engineer's approval, the Contractor carries out emergency or minor routine plant maintenance, there is no contamination of the soil, water sources or vegetation. Drip trays to collect waste oil and other lubricants shall be provided in any areas of the Site where such maintenance takes place. Drip trays must be emptied regularly and after rain, and the contents disposed of at a licensed disposal facility.

All vehicles and plant shall be kept in good working order. Leaking vehicles and plant shall be repaired immediately or removed from the Site.

The washing of vehicles and plant on Site shall be restricted to emergency or minor routine maintenance requirements only. Washing may only be undertaken in areas designated by the Engineer.

E4.12 Noise

The Contractor shall limit noise levels (for example, by installing and maintaining silencers on plant). The provisions of SANS 1200A Clause 4.1 regarding "built-up areas" shall apply.

Appropriate directional and intensity settings are to be maintained on all hooters and sirens.

No amplified music shall be allowed on Site. The use of audio equipment shall not be permitted, unless the volume is kept sufficiently low so as to be unobtrusive. The Contractor shall not use sound amplification equipment on Site, unless in emergency situations.

Construction activities generating output levels of 85 dB(A) or more in residential areas, shall be confined to the hours approved by the Engineer. Should the Contractor need to do this work outside of the above times, he shall do so only with the approval of the Engineer, and the surrounding communities shall be informed prior to the work taking place.

E5 CONSTRUCTION

E5.1 Method Statements

The Contractor shall submit the Environmental Method Statements (MSs) required within such reasonable time as the Engineer shall specify or as required by the EM Specification. The Contractor shall not commence any activity until the Method Statement in respect thereof has been approved and shall, except in the case of emergency activities, allow a period of two weeks for consideration of the Method Statement by the Engineer. Approval is required by the ECO, the Contractor, the City's WRECO, as well as any Interested and Affected Parties such as a Nature Reserve Manager.

The Engineer may require changes to a Method Statement if the proposal does not comply with the specification or if, in the reasonable opinion of the Engineer, the proposal may result in, or carries a greater than reasonable risk of, damage to the environment in excess of that permitted by the EM Specification.

Approved Method Statements shall be readily available on the Site and shall be communicated to all relevant personnel. The Contractor shall carry out the Works in accordance with the approved Method Statement. Approval of the Method Statement shall not absolve the Contractor from any of his obligations or responsibilities in terms of the Contract.

Changes to the way the Works are to be carried out must be reflected by amendments to the original approved Method Statements, and these amendments require the signature of both the Contractor, the Engineer, ECO, and the WRECO.

Method Statements shall consider all environmental hazards and risks identified by the Contractor and/or Engineer and ECO, and shall contain sufficient information and detail to enable the Engineer to assess the potential negative environmental impacts associated with the proposed activity and shall cover applicable details with regard to:

1. Overview of the site location, including:
 - 1.1. Drilling type or required construction,
 - 1.2. Exact site location/(s) with coordinates,
 - 1.3. Vegetation of the area, highlighting sensitive/endangered species and necessary rehabilitation if required,
 - 1.4. Site access and parking;
2. Site classification as per SANBI 2018 and City of Cape Town Biodiversity Network 2018;
3. Site photographs;
4. Site layout with a conceptual site plan to be considered by the Contractor;
5. Site-specific instructions addressing:
 - 5.1. Site establishment, drilling, site closure, and rehabilitation,
 - 5.2. Test pumping, including identifying the point of discharge;
6. Construction procedures;
7. Materials and equipment to be used;
8. Getting the equipment to and from Site;
9. How the equipment/material will be moved while on Site;
10. How and where material will be stored;
11. The containment (or action to be taken if containment is not possible) of leaks or spills of any liquid or material that may occur;
12. The control of fire;
13. Timing and location of activities;
14. Compliance/non-compliance with the EM Specification. This to include:
 - 14.1. Penalties and their associated fines,
 - 14.2. Contact information of the Site Manager, Site Supervisor, Site Safety Officer, ECO, WRECO and City of Cape Town Emergency Contact,
 - 14.3. An example of an information board required on site during all drilling and construction processes;
15. Any other information deemed necessary by the Engineer;
16. An approval page where the ECO, Contractor, WRECO and Interested and Affected Parties can sign.

The format to be used for the required Method Statements is bound in Annexure A of this EM Specification. The Contractor, ECO, WRECO and Interested and Affected Parties must also sign the Method Statement, thereby indicating that the work will be carried out according to the methodology contained in the approved Method Statement.

E5.1.1 MSs to be provided within 14 days from the Commencement Date

- a) Mobilisation and Operation Plans which include:
 - * Location and layout of the drilling footprint, showing vehicle parking, access point, sumps, staff toilet placement, and designated smoking area.
 - * Method of undertaking earthworks, including spoil management, erosion, dust and noise controls.
 - * Management measures to be undertaken in instances where traffic flows may be interrupted.
 - * A description of the proposed security and access control measures.
 - * Extent of areas to be cleared, the method of clearing and the preparation for this clearing so as to ensure minimisation of exposed areas.
 - * Measures to be put in place during temporary closure periods (e.g. Builders Holidays).
 - * Method for site rehabilitation and stabilisation.
 - * Provisional Construction Programme – In the event of a delay or lost time, a revised programme and method of how he proposes to rectify this.
- b) Solid Waste Management: number of, type, location, cleaning, method of securing to the ground, etc. of bins (E4.5).
- c) Contaminated water management system: including an indication of the source and volume of contaminated water and how this would be disposed of (E4.6)
- d) Environmental Awareness Training: logistics for the environmental awareness courses for all the Contractor's management staff, as well as other employees (E5.2).
- e) Emergency Procedures for spillages of hazardous substances, fire and serious accidents, including who should be notified (with contact information), where and how any spillages will be disposed of, the size of spillage which the emergency procedure could contain, and the location of all emergency equipment and an indication of how regularly the emergency equipment will be checked to ensure that it is working properly (E3.2, E5.7 and E5.8).
- f) Labour Plan including the number and type of positions (unskilled, semi-skilled, skilled); outline of the Contractor's staff recruitment policy, medical and other competencies, and transportation and accommodation.

E5.2 **Site specific environmental management requirements**

Each of the exploratory, monitoring, production and MAR sites will have specific environmental requirements that have been documented in a Site Specific Environmental Management Plan. These site specific environmental specifications will be provided to the Contractor on appointment. Specific Provisional Sum items have been allowed for in the Schedule of Quantities for compliance with the requirements of the Site Specific Environmental Specifications. These items will be under the control of the Engineer.

E5.3 **Environmental Awareness Training**

It is a requirement of this Contract that environmental awareness training courses are run for all personnel on Site. Two types of courses shall be run: one for the Contractor's and subcontractors' management, and one for all site staff and labourers. Courses shall be run during normal working hours at a suitable venue provided by the Contractor. All attendees shall remain for the duration of the course and sign an attendance register that clearly indicates participants' names on completion, a copy of which shall be handed to the Employer's Agent. The Contractor shall allow for sufficient sessions to train all personnel. Subsequent sessions shall be run for any new personnel coming onto Site. A Method Statement with respect to the organisation of these courses shall be submitted.

Notwithstanding the specific provisions of this clause, it is incumbent upon the Contractor to convey the spirit of the EM Specification to all personnel involved with the Works.

E5.3.1 Training Course for Management and Foremen

The environmental awareness training course for management shall include all management and foremen. The course, which shall be presented by the Employer's Agent or his designated representative, shall be of approximately one hour duration. The course shall be undertaken prior to the commencement of work on Site.

E5.3.2 Training Course for Site Staff and Labour

The environmental awareness training course for site staff and labour shall be presented by the Contractor from material provided by the Employer's Agent. The course shall be approximately one hour long. The course shall be undertaken not later than 3 working days after the commencement of work on Site, with sufficient sessions to accommodate all available personnel.

All the Contractor's employees, sub-contractors' employees and any suppliers' employees that spend more than 1 day a week or four days in a month on Site shall attend the Environmental Awareness Training Course for Site Staff and Labour

E5.4 **Contractor's Environmental Representative (ESO)**

The Contractor shall appoint an environmental representative, also called an Environmental Site Officer (ESO), who shall be responsible for undertaking a daily site inspection to monitor compliance with this EM Specification. The Contractor shall forward the name of the environmental representative (ESO) to the Engineer for his approval. The environmental representative (ESO) shall complete Environmental Site Inspection Checklists (Annexure B attached hereto) and these shall be submitted to the Engineer once a week.

E5.5 **Site division, demarcation and "no go" areas**

The Contractor shall restrict all his activities, materials, plant and personnel to within the Site or any particular working areas specified or indicated on the drawings.

The Contractor shall erect and maintain permanent and/or temporary fences of the type and in the locations specified elsewhere in the Scope of Work or on the drawings. Such fences shall, if so specified, be erected before undertaking any construction activities.

Where environmentally sensitive areas are specified as "no go" areas, the Contractor shall ensure that, insofar as he has the authority, no person, plant or material shall enter the "no go" areas at any time.

A Method Statement detailing the layout and method of establishment of the Contractor's camp (including all offices, shelters, eating areas, storage areas, ablution facilities and other infrastructure required for the running of the project) shall be provided.

E5.6 **Access routes/ haul roads**

On the Site and, if so required, within such distance of the Site as may be stated by the Engineer, the Contractor shall control the movement of all vehicles and construction equipment, including that of his suppliers, so that they remain on designated routes, are distributed so as not to cause an undue concentration of traffic, and that all relevant laws are complied with. In addition, the movement of such vehicles and construction equipment shall be planned and operated so as to minimise disruption to regular users of the routes. As far as possible the Contractor shall use existing access and haul routes. Damage to existing access roads as a result of construction activities shall be repaired to the satisfaction of the Engineer, using material similar to that originally used. The cost of the repairs shall be borne by the Contractor.

No new access roads or tracks shall be constructed to gain access to the exploratory camps without written consent of the landowner. Where new access routes are required to gain access to the sites, these shall be subject to prior approval by the Engineer and WRECO and shall be planned to ensure that as small an area as possible is disturbed (maximum width of 4 m), that they avoid all "no-go" areas and, as far as possible, that they follow the natural contours. For new access routes, no formal road shall be constructed, and construction equipment shall drive directly across the veld from the closest designated access road or track to the position of the site. Works required to facilitate the crossing of drainage channels shall be subject to the approval of the Engineer. The boundaries of the access route shall be demarcated using wooden posts at 2 m centres. The top 300 mm of each wooden post shall be painted with white paint and each post shall be long enough so that at least 1.5 m protrudes above the ground once it has been installed. To minimise damage to the vegetation, the Contractor shall ensure that vehicle trips are kept to a minimum and that all equipment remains on the demarcated access route.

Any directional signage required by the Contractor for the purposes of directing the movement of his own vehicles and construction equipment (or that of his subcontractors or suppliers) must be of a design and in a location approved by the Engineer. Directional signage may not be erected in such a manner that it interferes with sight lines or pedestrian movement.

Preferred access routes to the site have been detailed in the site specific EMPs.

E5.7 Dust management

The Contractors shall be solely responsible, at his cost, for the control of dust arising from his activities on Site, and for any costs involved in damages resulting from the dust. The Contractor shall take all reasonable measures to minimise the generation of dust.

E5.8 Construction personnel information posters

The Contractor shall erect and maintain information posters for the information of his employees, depicting actions to be taken to ensure compliance with aspects of the EM Specification. A2 information posters, printed on white vinyl, shall be erected at the eating areas and any other locations specified by the Engineer.

The specification for the poster is presented in Annexure C of this EM Specification. The symbols shall be black and the circles shall be red lines. The Contractor shall ensure that the construction personnel information posters are not damaged in any way, and shall replace a poster if any part of it becomes illegible.

E5.9 Emergency procedures

The Contractor's attention is drawn to the Method Statements required in terms of Clauses E1 above. Such Method Statements shall include procedures to be followed by the Contractor in the event of an emergency.

Furthermore, in the event of an emergency the Contractor shall contact the City of Cape Town's Emergency Call Centre by telephoning 107 or 021 480 7700 (from a cell phone). Telephone numbers of emergency services, including the local fire fighting service, shall be posted conspicuously in the Contractor's office near the telephone.

E5.10 Health and safety

The Contractor shall comply with requirements of the Occupational Health and Safety Act, 85 of 1993 and Construction Regulations, 2014, the Health and Safety Specification and relevant clauses of GCC 2015, insofar as health and safety is concerned.

The Contractor must be aware of, and have the contact details, of the nearest emergency healthcare centre.

E5.11 Community relations

If so required, the Contractor shall erect and maintain information boards in the position, quantity, design and dimensions specified in the Scope of Work or as directed by the Engineer. Such boards shall include contact details for complaints by members of the public in accordance with details provided by the Engineer.

The Contractor shall take every effort to ensure that private property abutting the Working Area is not damaged because of his activities, and that access for landowners and communities residing the vicinity of the Working Area is maintained. The Contractor shall absolve the Employer of any and all risk and liability in this regard.

In terms of the Fencing Act (Act 63 of 1963), it is a criminal offence to dismantle fences without the landowner's permission or to leave gates open. Accordingly, during the drilling activities, the Contractor shall:

- a) Use the gates provided to gain access to all parts of the defined Working Area;
- b) Leave the gates in the state the landowner intended (open if intentionally left open by the landowner, closed if inadvertently left open by the landowner or closed if left closed by the landowner); and
- c) Not drop or dismantle any fence or gate without the Engineer's permission.

The Contractor shall keep a "Complaints Register" on Site. The Register shall contain all contact details of the person who made the complaint, and information regarding the complaint itself. The Contractors shall ensure that any complaints are appropriately addressed, and the complaints registered shall merely serve as a record of the complaint and its remediation. All complaints, as well as the remedial actions taken, shall be brought to the attention of the Engineer, who shall be the sole arbiter regarding the adequacy of such actions.

The Contractor shall take all reasonable measures to ensure the safety of the public. Where the public could be exposed to danger because of the activities associated with the drilling, the Contractor shall provide suitable flagmen, barriers and/or warning signs in English, Afrikaans and isiXhosa, as appropriate, and subject to the approval of the Engineer.

All unattended open excavations shall be adequately demarcated (fencing shall consist of orange safety net or similar approved by the Engineer).

No firearms shall be permitted on site.

E5.12 General protections in terms of the National Heritage Resources Act, 25 of 1999

The Contractor shall take cognisance of the provisions of the National Heritage Resources Act, 25 of 1999 in respect of, *inter alia*, structures older than 60 years; archaeology, palaeontology and meteorites; burial grounds and graves; and public monuments and memorials. A heritage specialist needs to be consulted and a Notice of Intention to Develop (NID) be undertaken when necessary.

E5.13 Protection of natural features

The Contractor shall not deface, paint, damage or mark any natural features (e.g. rock formations) situated in or around the Site for survey or other purposes, unless agreed beforehand with the Engineer and Interested and Affected Parties. Any features affected by the Contractor in contravention of this clause shall be restored/rehabilitated to the satisfaction of the Engineer. The cost of restoration/rehabilitation shall be borne by the Contractor.

The Contractor shall not permit his employees to make use of any natural water sources (e.g. springs, streams, open water bodies) for the purposes of swimming, personal washing and the washing of machinery or clothes.

E5.14 Protection of flora and fauna

Except to the extent necessary for the carrying out of the Works, as specified by the Engineer, no vegetation shall be removed, damaged or disturbed.

Except to the extent necessary for the carrying out of the Works, flora shall not be removed, damaged or disturbed. At the commencement of the Contract, the Engineer and Interested and Affected Parties will identify to the Contractor natural vegetation or any rare or endangered flora that shall be preserved. The Contractor shall thereafter demarcate such and undertake all necessary measures to ensure the protection of such flora. Where possible, no equipment shall be driven across natural vegetation that is less than three years old (e.g. recently burned areas).

In areas where needless destruction of vegetation has occurred, the Contractor shall, at his own expense, reinstate those areas to the standard specified by the Engineer. In this regard, the Engineer will contact Cape Nature, False Bay Nature Reserve, Koeberg Nature Reserve or Witzands Nature Reserve and will arrange for the disturbed area to be examined by an appropriate botanical specialist. Acting upon the advice of Cape Nature, False Bay Nature Reserve, Koeberg Nature Reserve or Witzands Nature Reserve and the botanical specialist, the Engineer will advise the Contractor of the requisite actions. The costs for the appointment of the botanical specialist shall be borne by the Contractor.

The presence of any wild animals found on Site shall be reported to the Employer's Agent, who shall issue an instruction with regard to their removal or relocation. If a wild animal needs removal from the Site the Cape Nature (Metro Region) Conservation Services Manager may be contacted for assistance (tel 021 955 9132/9121/3122/9130). The Contractor shall protect fauna living within the Site and shall ensure that trapping, poisoning, shooting and/ or other hunting of animals is strictly prohibited, including the collection of the carcass of any domestic or wild animal. The Contractor shall ensure that no domestic pets or livestock are permitted on Site, and the keeping of pets by the Site staff shall be strictly prohibited. The requisite measures shall be put in place to ensure that domestic and native animals belonging to surrounding landowners are kept away and are safe from the unprotected Works.

The Contractor shall ensure that the Working Area is kept clean, tidy and free of rubbish that would attract animal pest species, and that no feeding of animals occurs. The Contractor's employees shall be prohibited from collecting firewood from the surrounding areas, and this shall be supplied by the Contractor from a legitimate supplier

E5.14.1 Clearing of vegetation

The Contractor shall ensure that the clearance of vegetation is strictly restricted to that required to facilitate the execution of the drilling activities. Vegetation clearance shall be subject to prior approval from the Engineer, and where required shall be restricted to the exploration camp, approved access routes and areas of the exploration sites where vegetation interferes with drilling operations. No undue or unnecessary removal of vegetation shall be permissible. Any natural vegetation, particularly trees, within or immediately adjacent to the Working Area, which do not require removal, shall be fully protected against damage.

Vegetation clearance shall be undertaken by hand, using hand held implements, with vegetation being cut off at ground level, and not uprooted (*viz.* brush-cutting). No tracked or wheeled mechanised equipment shall be used. Root structure shall not be removed or tampered with and all roots shall be left intact and in situ as far as reasonably possible.

In order to reduce erosion and the pollution of water entering watercourses and water bodies, vegetation clearance shall occur in a phased manner. Clearing operations shall be programmed to minimize the time

that cleared areas are exposed before drilling activities start and to ensure that cleared areas are stabilised as soon as possible. The detail of vegetation clearing shall be subject to the Engineer's approval.

Should fauna be encountered during site clearance, activities shall cease until such fauna have been safely relocated.

All cleared vegetation shall be used as brush packing along pathways on access routes (depending on the type of vegetation) or disposed of at an approved disposal site. The disposal of vegetation by burying or burning shall be strictly prohibited.

E5.15 Stripping and stockpiling of topsoil

The Contractor shall strip the topsoil, which includes the top 300mm of soil (or to the depth of the bedrock where the soil is shallower than 300mm) and root material of cleared vegetation, for subsequent use during rehabilitation and revegetation. Topsoil shall be stripped from all areas of the Working Area where topsoil will be compacted by the Contractors activities, as directed by the Site Specific Environmental Specifications and the Engineer. Topsoil stockpiles may be stored and appropriately covered with shade net (not plastic) within the demarcated area.

Topsoil collected from different areas shall be stockpiled separately and covered and replaced in the same areas from which it was taken. Furthermore, topsoil shall be stockpiled separately from subsoil. Where possible, stockpiles shall be located on previously disturbed areas or in areas where they pose the minimum risk of causing further environmental degradation. Topsoil stockpiles shall not exceed 2m in height and shall be so placed as to occupy the minimum width compatible with the natural angle of repose of the material, and measures shall be taken to prevent the material from being spread over too wide a surface. Where required, appropriate precautions shall be taken to prevent the erosion and limit the compaction of the stockpiles. The Contractor shall ensure that all stockpiles do not cause the damming of water or run off, or is itself washed away. Bund walls shall be built around stockpiles to reduce the risk of water erosion.

E5.16 Erosion and sedimentation control

The Contractor shall take all reasonable measures to limit erosion and sedimentation due to the construction activities and shall, in addition, comply with such detailed measures as may be required by the Scope of Work. Where erosion and/or sedimentation, whether on or off the Site, occurs, rectification shall be carried out in accordance with details specified by the Engineer. Where erosion and/or sedimentation occur due to the fault of the Contractor, rectification shall be carried out to the reasonable requirements of the Engineer, at the Contractor's cost. In particular, the Contractor shall ensure that the City's stormwater system is kept free from sediment arising from the Works.

Any runnels or erosion channels developed during the construction period or during the vegetation establishment period shall be backfilled and compacted, and the areas restored to a proper condition. Stabilisation of cleared areas to prevent and control erosion shall be pro-actively managed by the Contractor. The method of stabilisation shall be determined in consultation with the Engineer.

E5.17 Protection of watercourses, water bodies and wetlands

The Contractor shall ensure that all watercourses and water bodies are protected from contamination or degradation as a result of his activities, including protection from direct or indirect spills of pollutants. In the event of a spill, prompt action (as planned and approved in the Emergency Plan Method Statement) shall be taken to clear the polluted or affected areas, and the Engineer, ECO and WRECO shall be notified immediately. The Contractor shall not permit his employees to make use of any natural watercourse or water body for the purposes of swimming, personal washing and the washing of machinery or clothes.

The Contractor shall not work within the flood plain of any watercourses or within water bodies without the written approval of the Engineer. No activities shall be permitted within any wetland area, unless exceptional circumstances require that such activities cannot be avoided: The Engineer shall be the sole arbiter in this regard. Where, in the opinion of the Engineer, activities within a wetland area are unavoidable, the extent of any disturbances shall be kept to an absolute minimum. The various soil layers shall be removed and stockpiled separately. Following the completion of the construction activities, the soil layers shall be returned in the reverse order to which they were removed.

When working near any watercourses, the Contractor shall be cognisant of the following environmental controls and considerations:

- a) When planning work near watercourses the Contractor shall take into account possible river levels during the period of his activities;
- b) Construction equipment shall neither ford any watercourse containing flowing water nor operate from within the river channel. Where a flowing watercourse must be crossed, the necessary temporary crossing shall be constructed in accordance with the requirements of the Engineers and the Site-Specific Environmental Specifications;

- c) During the execution of the drilling activities, the Contractor shall take appropriate measures to prevent pollution and contamination of the riverine environment e.g. including ensuring that construction equipment is well maintained, using drip trays, provision of bins, monitoring etc., as detailed in the Site-Specific Environmental Specifications;
- d) Where earthwork is being undertaken in close proximity to any watercourse, slopes shall be stabilised using sandbags or geotextile fabric to prevent sand and rock from entering the channel; and
- e) Appropriate rehabilitation and revegetation measures for the riverbanks shall be implemented timeously. In this regard, the banks should be appropriately and incrementally stabilized as soon as construction allows.

E5.18 Aesthetics

The Contractor shall take any requisite measures to ensure that construction activities do not have an undue negative impact on the aesthetics of the area.

E5.19 Contractor's advertising signage

Any advertising on the Site or any part of the Works shall remain at the sole discretion of the Employer, who reserves the right to order, via the Engineer, its removal, covering or re-sizing, wherever placed, at no cost to the Employer.

Apart from at the Contractor's camp, no signage advertising the Contractor, or any of its subcontractors, manufacturers, suppliers or service providers shall be placed, fixed or erected anywhere on the Site or on the Works without the prior approval of the Engineer. No advertising signage will be permitted on any designated scenic route. Notwithstanding any prior approval given, the Engineer may instruct the Contractor to remove, cover or re-size any advertising signage at any time at no cost to the Employer.

Advertising signage at the Contractor's camp shall be appropriately designed and sized with due consideration to the surrounding environment, views and sight lines.

Branding or identification markings on the Contractor's and subcontractor's vehicles and equipment is generally permitted, although the Employer reserves the right to instruct, via the Engineer, the removal, covering or re-sizing of any branding, markings or signage, on any equipment (scaffolding, for example), which it considers inappropriate in the environment in which it is placed.

No third party advertising (that is, in respect of any person, business or product that is not associated with the Works) shall be permitted anywhere on the Site or Works.

E5.20 Temporary site closure

In the event of temporary Site closure (for a period exceeding one week), the Contractor's ESO shall carry out checks and ensure that, amongst others, the following conditions pertain and report on compliance with this clause:

- a) Fire extinguishers are serviced and accessible.
- b) There is adequate ventilation in enclosed spaces.
- c) All hazardous substance stores are securely locked.
- d) Fencing and barriers are in place.
- e) Emergency and management contact details are prominently displayed and available.
- f) Wind and dust mitigation measures, e.g. straw, brush packs, irrigation, etc. are in place.
- g) Excavated and filled slopes and stockpiles are at a stable angle and capable of accommodating normal expected water flows.
- h) There are sufficient detention ponds or channels in place.
- i) Cement and materials stores are secured.
- j) Toilets are empty and secured.
- k) Central waste area and all refuse bins are empty and secured.
- l) Contaminated water conservancy tank empty.
- m) Any bunded areas are clean and treated with an approved product where applicable (e.g. Spill Sorb or Enretech #1 powder or equivalent).
- n) Drip trays are empty and secure

E6 Landscaping and rehabilitation

E6.1 Scope

All areas disturbed as a result of the construction activities and from which topsoil was stripped and stockpiled for this purpose, shall be subject to the landscaping and rehabilitation requirements outlined in this Specification.

For most disturbed areas, landscaping and rehabilitation shall entail the clearing, shaping, trimming and scarification of the area and replacement of the stockpiled topsoil. In some cases, these areas will be allowed to vegetated naturally, in others assistance will be required. The rehabilitation has been detailed further in the Site Specific Environmental Management Plan.

E6.2 Timing of landscaping and rehabilitation

Vegetation is the most effective control against surface erosion. Accordingly, taking cognisance of the fact that the optimal period for revegetation is April to September, the Contractor shall programme for the landscaping and rehabilitation of disturbed areas to occur as soon as practically possible for cessation of the work in a specific area. The period between the cessation of activities associated with the exploratory drilling at a particular site and the onsite of landscaping and rehabilitation for the area affected by these activities shall not exceed one week (seven days).

E6.3 Demolition and removal of structures

Prior to landscaping and rehabilitation, the Contractor shall demolish and remove from Site everything not forming part of the Permanent Works. This includes, but is not limited to, temporary facilities, portable fences, temporary access routes, protective works, equipment, materials (nuts, bolts, washes, cut strands of conductor wire etc.), solid waste and contaminated water. All material generated from the demolition and removal of structures from site shall be appropriately disposed of.

All sumps and incidental excavations shall be refilled and adequately compacted.

E6.4 Erosion control and revegetation measures

Site specific rehabilitation measures will be indicated in the Site Specific Environmental Management Plan. Detailed measures will explain management of sediment trapping and erosion control; management of the reapplication of topsoil; and species with which to re-vegetate, etc.

E6.5 Traffic on landscaped and rehabilitated areas

The Contractor shall not undertake the landscaping and rehabilitation of any areas until all operations that may require construction material and equipment to pass over those areas has been completed. All landscaped and rehabilitated areas shall be regarded as "no-go" areas, and no equipment, other than that required for establishment and maintenance purposes, shall be allowed to operate on these areas.

E6.6 Follow-up inspection, maintenance and monitoring

After initial rehabilitation, a once-off follow up inspection will be undertaken within the liability period. The Contractor shall check that soil stabilisation treatments are still intact and functioning, check that the established plants survive and check for the establishment of unwanted alien plants and remove them from the sites. Where needed, or instructed by the ECO, repairs shall be carried out and plants that die shall be replaced.

A fixed point photo site (FPPS) shall be established for each of the rehabilitation sites. Each FPPS shall allow for taking photographs in each compass direction (4 photos per site). Photographs shall be taken prior to rehabilitation, post rehabilitation and during the inspection at the end of the liability period.

E7 TOLERANCES

E7.1 Fines

Environmental management is concerned not only with the final results of the Contractor's operations, but also with the control of how these operations are carried out. Tolerance with respect to environmental matters applies not only to the finished product, but also to the standard of the day-to-day operations required to complete the Works.

It is thus required that the Contractor shall comply with the EM Specification on an on-going basis and any failure on his part to do so will entitle the Engineer to certify the imposition of a fine. Fines may be issued per incident at the discretion of the Engineer. Such fines will be issued in addition to any remedial costs incurred as a result of non-compliance with the environmental specifications. The Engineer will inform the Contractor of the contravention and the amount of the fine, and will deduct the amount from monies due in payment certificates issued under the Contract.

Maximum fines for the following transgressions by either the Contractor and/or his sub-contractors may be imposed by the Engineer, as follows:

	Maximum fine per incident
a) Vehicles, plant or materials related to the Contractor's operations, parked or stored outside the demarcated boundaries of the Site.	R 2 000
b) Persons, vehicles, plant or materials related to the Contractor's operations, found within the designated boundaries of a "no go" area.	R 4 000
c) Persistent and unrepaired oil leaks from machinery/not using a drip tray to collect waste oil and other lubricants/not using specified absorbent material to encapsulate hydrocarbon spillage/using inappropriate methods of refuelling (the use of a funnel rather than a pump).	R 3 000
d) Refuelling in areas not approved by the Engineer.	R 3 000
e) Litter on Site.	R 1 000
f) Deliberate lighting of fires on Site.	R 5 000
g) Individual not making use of the Site ablution facilities.	R 1 000
h) Damage to trees not specified to be removed.	R 5 000
i) Dust or excessive noise emanating from the site	R 1 000
j) Not containing water contaminated with pollutants such as cement, concrete, fuel, etc.	R 2 000

For each subsequent similar offence the fine shall be doubled in value to a maximum value of R50 000. Furthermore, time spent to clear up around the site will not be considered drilling time will therefore not be paid. It is therefore advised that the site be kept in a neat and clean manner daily to act proactively.

Record is to be kept of these penalties, and money is to be held in an environmental fund by the Client. As an incentive for future projects, a portion of the fund may be used as bonuses to individual site staff members who have shown exceptional diligence in applying good environmental practice on site. The remaining funds should be allocated towards increasing environmental education in the local community. The Client, in consultation with the ECO, will make a final decision regarding the allocation of penalty funds. These transactions should be kept on record and filed upon completion of the project.

E8 MEASUREMENT AND PAYMENT

E8.1 Basic principles

Except where separate pay items have been measured in the Bills of Quantities, all costs in respect of complying with the EM Specification are deemed to be covered by the sum tendered for complying with the EM Specification.

E8.2 General environmental obligations (Fixed Charge)

General environmental obligationsUnit: lump sum (Sum)

All facilities and equipment not measured elsewhere, associated with complying with any requirement of this Specification will be measured as a sum.

The tendered sum shall cover any fixed costs associated with complying with this Specification not measured elsewhere.

E8.3 General environmental obligations (Time Related Charge)

General environmental obligationsUnit: lump sum (Day)

All work not measured elsewhere, associated with complying with any requirement of this Specification will be measured as a sum per day.

The tendered sum shall cover any time-related costs associated with complying with this Specification not measured elsewhere. Payment will be effected only after payment of the Fixed Charge has been made, and in accordance with the provisions of Subclause E2.5.2.

E8.4 Environmental awareness training

Environmental awareness training.....Unit: Lump sum (Sum)

The provision of environmental awareness training to the Contractor’s staff will be measured as a sum.

The tendered sum shall cover all costs incurred by the Contractor in providing the venue and facilities as detailed in the Specification, in preparing and presenting the initial and refresher courses and in ensuring the attendance of his staff, including site management staff, at the courses.

A stated sum is provided in the Schedule of Quantities to cover payment for such additional work. Any additional work will be measured on tendered rates or in Dayworks and paid against the specified Provisional Sum.

E8.5 Method Statements: Additional work

Method Statements: Additional Work.....Unit: number (no)

No separate measurement and payment will be made for the provision of Method Statements but where the Engineer requires a change on the basis of his opinion that the proposal may result in, or carries a greater than warranted risk of damage to the environment in excess of that warranted by this Specification, then any additional work required, provided it could not reasonably have been foreseen by an experienced Contractor, shall be valued in Conditions of Contract.

Additional method statements will be measured by the number required. Payment will only be made on the written instructions of the Engineer.

E8.6 Site-specific environmental management requirements

Unless specifically measured elsewhere, compliance with the requirements of the Site-Specific Environmental Management Specifications will be paid against the relevant tendered rates specified elsewhere or in Dayworks.

E8.7 Dealing with public complaints

Dealing with public complaints.....Unit: number (no)

The monitoring and remediation of public complaints will be measured per drilling site.

The tendered rate shall cover the costs of all labour, materials, plant and equipment required to address public complaints, including maintaining a complaints register and implement the requisite measures to address public complaints, in accordance with the Specification and the instructions of the Engineer, where relevant. The tendered rate will be per active site. Payment will be effected only after payment of the Fixed Charge has been made, and in accordance with the provisions of Subclause E2.5.2.

E8.8 Dealing with watercourses, water bodies and wetlands

Dealing with watercourses, water bodies and wetlands.....Unit: number (No)

The provision of the conservation and protection measures, as required by this Specification, when working within or adjacent to watercourses, water bodies and wetlands will be measured per drilling site. Payment will only be made for dealing with watercourses, water bodies and wetlands on the written instructions of the Engineer.

The tendered rate shall cover the costs of all labour, materials, plant and equipment associated with providing the requisite conservation and protection measures, as well as their subsequent removal.

E8.9 Fire control

Fire control.....Unit: number (no)

The compliance with fire control requirements will be measured per drilling site.

The tendered rate shall cover the cost of all labour, materials, equipment and any other operation or thing necessary to comply with the requirements of the Specification related to the prevention and control of fires.

E8.10 Pollution control measures

Pollution control measuresUnit: number (No)

The provision of the requisite pollution control measures will be measured per drilling site.

The tendered rate shall cover the fixed costs of materials, plant and equipment required to implement the necessary pollution control measures required by the Specification, including facilities for the storage of fuel, oils, the provision of drip trays, the provision of absorbent materials, the installation of erosion control structures and the removal and disposal of, contaminated soil and contaminated water.

E8.11 Pollution management

Pollution managementUnit: number (No)

The implementation of the requisite pollution management requirements of the Specifications will be measured per drilling site.

The tendered sum shall cover all time-related costs associated with the management of pollution, including the monitoring, emptying and overall management of drip trays, the identification and remediation of leaks and spillages, the repair or removal from site of leaking equipment, the maintenance and management of erosion control structures, the maintenance of facilities and plant that may be required for the effective treatment of water returned to the environment and incident reporting. The tendered rate will be per active site. Payment will be effected only after payment of the Fixed Charge has been made, and in accordance with the provisions of Subclause E2.5.2.

E8.12 Dust control

Dust controlUnit: number (No)

The implementation of the requisite dust control measures will be measured per drilling site.

The tendered sum shall cover the costs of all labour, materials, plant and equipment required to implement the necessary measures to control dust, including watering of dust prone areas, enforcement of speed limits, securing of material loads, wheel cleaning, minimization of disturbed areas, management of stockpile etc. The tendered rate will be per active site. Payment will be effected only after payment of the Fixed Charge has been made, and in accordance with the provisions of Subclause E2.5.2.

E8.13 Noise control

Noise controlUnit: number (No)

The implementation of the requisite noise control measures will be measured per drilling site.

The tendered sum shall cover the costs of all labour, materials, plant and equipment required to implement the necessary measures to control noise. The tendered rate will be per active site. Payment will be effected only after payment of the Fixed Charge has been made, and in accordance with the provisions of Subclause E2.5.2.

E8.14 Erection of portable fencing

Erection of portable fencingUnit: linear metre (m)

The erection of portable fencing at the first site will be measured per net length of fencing erected as specified. Payment for the initial erection of portable fencing shall be certified as follows:

- a) 85% of the rate tendered when the fencing is erected
- b) 15% of the rate tendered when the fencing is removed from site.

If tape fencing is utilised it will be claimed under a separate rate.

The tendered rate shall cover the costs of all labour, materials, plant and equipment required for furnishing fencing materials, transporting it to the point of application, erecting the fence, and for any other work which may be necessary to establish and maintain the portable fencing as specified. The rate tendered shall also include full compensation for removing the portable fencing and removing it from site on completion of the Works.

E8.15 Access route fencing and route signage

Access route fencingUnit: linear metre (m)

The erection of access route fencing will be measured linear metre length of access road along which the fencing has been erected/ removed as specified including the cost of providing the required route signage. Where access route fences have been dismantled and re-erected at other locations full payment will only be due if the re-erected fence complies in all aspects with this Specification.

Payment for access route fencing shall be certified as follows:

- a) 85% of the rate tendered when the fencing is erected
- b) 15% of the rate tendered when the fencing is removed from site.

The tendered rate shall cover the costs of all labour, materials, plant and equipment required for furnishing fencing materials, transporting it to the point of application, erecting the fence, and for any other work which may be necessary to establish and maintain the access route fencing as specified. The rate tendered shall also include full compensation for removing the access route fencing, either to be erected at some other location or removing it from site, on completion of the Works. Access route fencing can only be claimed if included in the Method Statement.

E8.16 Vegetation clearance

Vegetation clearance.....Unit: square metre (m²)

The area designated by the Engineer or ECO and cleared will be measured per square metre. Payment will only be made for areas cleared on the written instructions of the Engineer.

The tendered rate shall cover the costs of all labour, materials, plant and equipment for all work necessary for the clearing of vegetation from the specified areas, including the trimming and cutting of shrubs and trees by hand and the removal, transporting and disposal of all cleared vegetation.

E8.17 Removal, stockpiling and re-spreading of topsoil

Removal, stockpiling and re-spreading of topsoilUnit: square metre (m²)

The removal, stockpiling and re-spreading of topsoil as instructed by the Engineer or ECO will be measured per square metre. Payment for removal, stockpiling, and re-spreading of topsoil shall be certified as follows:

- a) 50% of the sum tendered when the topsoil is removed
- b) 50% of the sum tendered when the topsoil is replaced

The tendered rate shall cover the costs of all labour, materials, plant and equipment required for removing, loading, transporting to stockpile, stockpiling, and subsequent replacement of top soil as well as ripping of areas prior to replacing the topsoil.

E8.18 Maintenance of topsoil stockpiles

Maintenance of topsoil stockpilesUnit: number (No)

The maintenance of topsoil stockpiles, in terms of the requirements of this Specification, will be measured per drilling site.

The tendered sum shall cover the costs of all labour, materials, plant and equipment required to maintain the topsoil stockpiles until the topsoil is loaded for re-spreading, including separation of topsoil stockpiles from those of other materials, ensuring topsoil stockpiles are appropriately located and meet the requirement of the specification with regard to height and ensuring that the requisite erosion measures have been installed. The tendered rate will be per active site. Payment will be effected only after payment of the Fixed Charge has been made, and in accordance with the provisions of Subclause E2.5.2.

E8.19 Solid waste management

Solid waste managementUnit: number (No)

The collection, management and disposal of solid waste will be measured per drilling site.

The tendered sum shall cover the costs of all labour, materials, plant and equipment required for the collection, management and disposal of solid waste, including the provision of weatherproof and scavenger-proof bins, the collection of waste and its temporary storage and the removal of waste from site to an approved landfill. The tendered rate will be per active site. Payment will be effected only after payment of the Fixed Charge has been made, and in accordance with the provisions of Subclause E2.5.2.

E8.20 Retainer sump pond system

Retainer Sump Pond System.....Unit: number (No)

The construction and maintenance during operation of a retainer sump pond system, as per specifications above, will be measured per drilling site. Payment will only be made for retainer sump ponds on the written instructions of the Engineer..

The tendered rate shall cover the costs of all labour, materials, plant and equipment required for the construction and maintenance during operation of a retainer sump pond system.

E8.21 Contaminated water management

Contaminated water management Unit: number (No)

The collection, management and disposal of contaminated water will be measured per drilling site.

The tendered rate shall cover the costs of all labour, materials, plant and equipment required for the collection, management and disposal of contaminated water, the collection and treatment of water, the discharge of acceptable water into the environment and the removal of unacceptable water from site to an approved facility. The tendered rate will be per active site. Payment will be effected only after payment of the Fixed Charge has been made, and in accordance with the provisions of Subclause E2.5.2.

E8.22 Treatment of spoil

Treatment of spoil Unit: number (No)

The treatment of spoil as per the requirements of this Specification will be measured per drilling site.

The tendered rate shall cover the costs of all labour, materials, plant and equipment required for loading, transporting and off-loading spoil, irrespective of haul distance, and for finishing and rehabilitating the spoil areas. Should the spoil be due to negligence by the Contractor, then the treatment of the spoil will be at the Contractors own expense, as instructed by the Engineer and ECO.

E8.23 Sedimentation trapping and erosion control

Sediment trapping and erosion control Unit: number (No)

The erection of the grass-fences for erosion control will be measured per drilling site. Payment will only be made for sites where the erection is required on the written instructions of the Engineer.

The tendered rate shall include full compensation for the erection of the grass-fences as specified, including labour, materials, plant and equipment required.

E8.24 Re-vegetation

Re-vegetation Unit: number (No)

Re-vegetation will be measured per drilling site. Payment will only be made for areas re-vegetated on the written instructions of the Engineer.

The tendered rate shall include full compensation for the re-vegetation as specified, including labour, materials, plant and equipment required.

ANNEXURE A: ENVIRONMENTAL METHOD STATEMENT

CONTRACT:.....

DATE:.....

PROPOSED ACTIVITY (give title of method statement and reference number from the EMP):

WHAT WORK IS TO BE UNDERTAKEN (give a brief description of the works - attach extra information to ensure accurate description given):

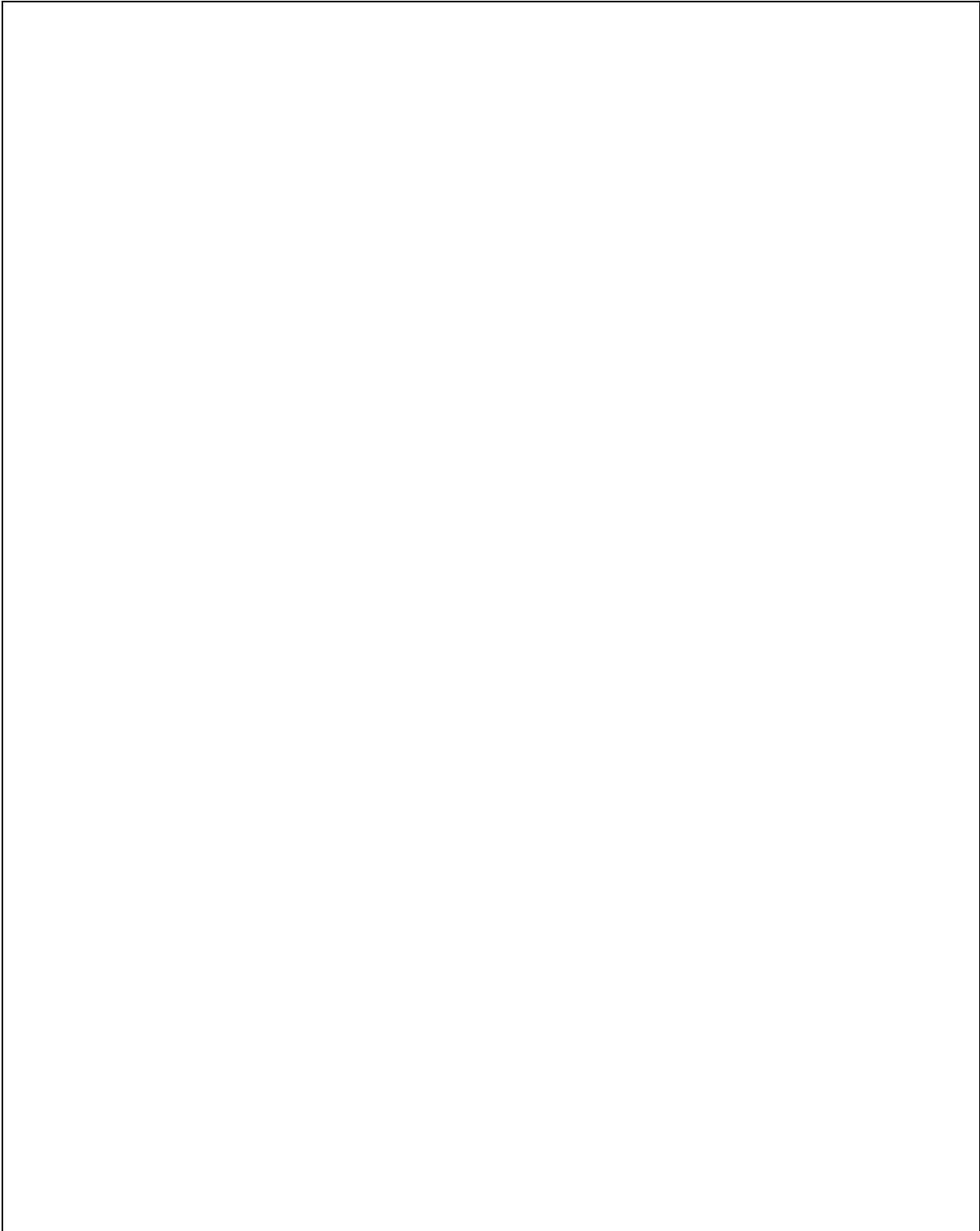
WHERE THE WORKS ARE TO BE UNDERTAKEN (where possible, provide an annotated plan and a full description of the extent of the works):

START AND END DATE OF THE WORKS FOR WHICH THE METHOD STATEMENT IS REQUIRED:

Start Date:

End Date:

HOW THE WORKS ARE TO BE UNDERTAKEN (provide as much detail as possible, including annotated sketches and plans where possible):



Note: please give too much information rather than too little. Please ensure that issues such as emergency procedures, hydrocarbon management, wastewater management, access, individual responsibilities, materials, plant used, maintenance of plant, protection of natural features, etc. are covered where relevant

DECLARATIONS

1) EMPLOYER’S AGENT’S REPRESENTATIVE/ENVIRONMENTAL OFFICER/ENVIRONMENTAL CONTROL OFFICER

The work described in this Method Statement, if carried out according to the methodology described, appears to be satisfactorily mitigated to prevent avoidable environmental harm:

(signed)

(print name)

Dated: _____

2) CONTRACTOR

I understand the contents of this Method Statement and the scope of the works required of me. I further understand that this Method Statement may be amended on application to other signatories and that the Employer’s Agent’s Representative/Environmental Officer/Environmental Control Officer will audit my compliance with the contents of this Method Statement. I understand that this method statement does not absolve me from any of my obligations or responsibilities in terms of the Contract.

(signed)

(print name)

Dated: _____

3) EMPLOYER’S AGENT

The works described in this Method Statement are approved.

(signed)

(print name)

(designation)

Dated: _____

ANNEXURE B: ENVIRONMENTAL SITE INSPECTION CHECKLIST

To be submitted to the Employer’s Agent once a week

CONTRACT:.....

DATE:.....

ENVIRONMENTAL ASPECT	YES/ NO (✓ or X)	COMMENTS
• All new personnel on Site are aware of the contents of the EMP and have been through the environmental awareness course.		
• Contractor’s camp is neat and tidy and the labourers’ facilities are of an acceptable standard.		
• Sufficient and appropriate fire fighting equipment is visible and readily available in the appropriate places.		
• Waste control and removal system is being maintained.		
• Fences are being maintained.		
• Drip trays are being utilised where there is a risk of spillage.		
• Bunded areas/drip trays are being emptied on a regular basis (especially after rain).		
• No leaks are visible from construction vehicles.		
• Refuelling of vehicles and plant occurs within designated areas, and appropriate refuelling apparatus and drip trays are being used.		
• “No go” areas, natural features, vegetation, etc. have not been damaged.		
• Dust control measures (if necessary) are in place and are effectively controlling dust.		
• Noise control measures (if necessary) are in place and are working effectively.		
• Erosion and sedimentation control measures (if necessary) are in place and are controlling effectively.		
• Material stockpiles are located within the boundary of the Site and are protected from erosion.		
• Other		

Completed by:.....

Signed:.....

ANNEXURE C: CONSTRUCTION PERSONNEL INFORMATION POSTER

ENVIRONMENTAL MANAGEMENT DO'S AND DON'TS

	Workers & equipment must stay inside the site boundaries at all times		Use the toilets provided Report full or leaking toilets
	Do not swim in or drink from streams		Only eat in demarcated eating areas Never eat near a river or stream Put packaging & leftover food into rubbish bins
	Do not throw oil, petrol, diesel, concrete or rubbish in the stream		Do not litter - put all rubbish (especially cement bags) into the bins provided Report full bins to your supervisor The responsible person should empty bins regularly
	Do not work in the stream without direct instruction		Always keep to the speed limit Drivers - check & report leaks Ensure loads are secure & do not spill
	Do not damage the banks or vegetation of the stream		Know all the emergency phone numbers
	Protect animals on the site Ask your supervisor or Contract's Manager to remove animals found on site		Fines of between R1000 and R5000 Removal from site Construction may be stopped
	Do not damage or cut down any trees or plants without permission		Report any breaks, floods, fires, leaks and injuries to your supervisor Ask questions!
	Do not pick flowers		
	Put cigarette butts in a rubbish bin		
	Do not smoke near gas, paints or petrol		
	Do not light any fires without permission		
	Know the positions of fire fighting equipment		
	Report all fires		
	Do not burn rubbish or vegetation without permission		
	Work with petrol, oil & diesel in areas marked for this		
	Report any petrol, oil & diesel leaks or spills		
	Use a drip tray under vehicles & machinery		
	Empty drip trays after rain & do not throw this water into a river		
	Try to avoid producing dust - wet dry ground & soil		
	Do not make loud noises around the site, especially near schools and homes		
	Report or repair noisy vehicles		

ANNEXURE D: ADDITIONAL ENVIRONMENTAL ISSUES DEEMED TO FORM PART OF THE ENVIRONMENTAL MANAGEMENT PROGRAMME

Listed below are issues pertaining to the environment that form part of the Contract Document. The clause references relate to the **General Conditions of Contract for Construction Works, Third Edition, 2015 (GCC 2015)**. They are listed here to emphasise that they form part of the environmental considerations and requirements for this project. They must be read together with any Contract Specific Data referring thereto in Part C1.2 Contract Data. The comments made below on the various issues are to be taken as explanatory, in so far as environmental matters are concerned, and do not modify the clauses in any way.

1. Monitoring

Clause 3.1.1 makes provision for the Employer's Agent to administer the Contract in accordance with the provisions of the Contract, including the monitoring of any environmental variables.

2. Health and safety

Clauses 3.1.4, 4.3.1, 4.3.2 and 4.10.1 remind the Contractor of his obligations in terms of the Occupational Health and Safety Act (No. 85 of 1993) and Construction Regulations 2003.

Clause 5.7 of SANS 1200A reinforces these requirements through the observation of proper and adequate safety arrangements.

3. Employer's Agent's authority to delegate

Clause 3.2.4 gives the Employer's Agent the authority to appoint a representative to act as the Environmental Officer (EO) for the Contract. The EO, who shall be responsible for monitoring compliance with the EMP, may be the Employer's Agent's Representative or any other person accountable to the Employer's Agent.

4. Employer's Agent's instructions

Clause 4.2.1 requires that the Contractor comply with the Employer's Agent's instructions on any matter relating to the Works. Moreover, Clause 4.2.2 ensures that the Contractor only takes instructions from the Employer's Agent, the Employer's Agent's Representative or a person authorised by the Employer's Agent in terms of Clause 3.2.4.

5. Compliance with applicable laws

Clause 4.3.1 requires that the Contractor comply with all applicable laws, regulations, etc. in fulfilling the Contract.

6. Protection of fossils, etc.

Clause 4.7.1 requires the Contractor to take reasonable precautions to prevent any person from damaging, *inter alia* anything of geological or archaeological interest, and requires that he inform the Employer's Agent and follows any instructions issued in this regard.

7. Housing, food and transport

Clause 4.10.1 requires the Contractor to make his own arrangements for payment, housing, feeding and transport for his employees, provided that if he uses any part of the Site for such purposes he shall obtain the Employer's Agent's prior approval.

Clause 4.2 of SANS 1200A further requires that facilities provided comply with local authority regulations and are maintained in a clean and sanitary condition.

8. Competent employees

Clause 4.11.1 requires that all persons employed on Site are careful, competent, and efficient. These attributes embrace knowledge of the environmental matters and issues dealt with in the EMP.

9. Removal from Site

Clause 4.11.2 makes provision for the Employer's Agent to instruct the removal from the Works and Site of any person who is guilty of misconduct, or is incompetent or negligent, or is an undesirable presence on Site.

Clause 7.1.1 requires that all Construction Equipment be in good working order. Accordingly, the Employer's Agent may order that any Construction Equipment not complying with the environmental specifications be removed from Site.

10. Unacceptable documentation

Clauses 5.3.1 and 5.3.2 require the Contractor to provide documentation required before commencement with Works execution, failing which the Employer may terminate the Contract. Such documentation includes the Protection of the Environment Declaration provided for in the Contract Document.

11. Programme and Method Statements

Clause 5.6.1 makes provision for the Employer's Agent to request the programmes for carrying out the Works.

Clause 5.6.2 makes provision for the Employer's Agent to request statements from the Contractor for the entire scope of the work. In the case of the environmental specifications, these would be submitted as Method Statements.

12. Hours of operation

Clause 5.8.1 restricts the Contractors hours of operation to between sunrise and sunset on working days (usually from Monday to Saturday), unless, *inter alia*, permitted by the Employer's Agent in writing.

Clause 5.7.2 further requires that in the event that permission is granted for night work, then such work shall be carried out without excessive noise and disturbance.

13. Suspension of Works

Clause 5.11.1 enables the Employer's Agent to suspend the progress of the Works or any part thereof, which may be as a result of some default or breach of the Contract on the part of the Contractor.

14. Site clean-up

Clause 5.15.1 requires that, on completion of the Works, the Contractor shall clear away and remove from the Site all Construction Equipment, surplus materials, rubbish and Temporary Works of every kind and leave the whole of the Site and Works clean and in a safe condition. All streams and watercourses shall be restored to the condition as at the commencement of the Works. Should the Contractor fail to do the work upon notice from the Employer's Agent, the Employer may in terms of Clause 7.8.3, employ others to carry out the work and recover the cost of doing so from the Contractor.

15. Access to the Works

Clause 7.3.1 makes provision for the Employer's Agent to authorise the Environmental Officer (EO) to have access to the Works and Site.

16. Pollution prevention and interferences

Clause 8.1.2 requires that all operations necessary for the execution of the Works be carried out so as not to cause unnecessary noise or pollution, or to interfere unnecessarily or improperly with public services, or the access to, use and occupation of public or private roads and footpaths or properties.

Clause 5.6 of SANS 1200A further requires the Contractor to minimise dust nuisance and pollution of streams and inconvenience to or interference with the public.

17. Dust

Clause 8.1.2 requires that all operations necessary for the execution of the Works be carried out so as not to cause unnecessary pollution.

Clause 5.6 of SANS 1200A requires that the Contractor take all reasonable measures to minimise any dust nuisance.

18. Noise

Clause 8.1.2 requires that all operations necessary for the execution of the Works be carried out so as not to cause unnecessary noise.

Clause 4.1 of SANS 1200A requires that when working in built-up areas, the Contractor shall provide and use suitable and effective silencing devices for pneumatic tools and other plant that would otherwise cause a noise level exceeding 85dB.

19. Protection of existing environment

Clause 8.1.3 requires that the Contractor uses every reasonable means to prevent any roads or bridges to or in the vicinity of the Site being subjected to damage by excessive loads, or disruption due to excessive traffic, occasioned by his transport arrangements.

20. Reinstatement

Clauses 8.2 and 8.4 make provision for the Contractor to repair and make good any damage to the Works in his care (other than "excepted risks"), and bear any costs associated with such reinstatement.

21. Reporting accidents

Clause 8.5.1 requires the Contractor to report to the Employer's Agent every occurrence on the Site which causes environmental damage.

H: HEALTH AND SAFETY SPECIFICATION

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H: HEALTH AND SAFETY SPECIFICATION

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

H1 DEFINITIONS

For the purposes of this Specification, the definitions given in the Occupational Health and Safety Act, 85 of 1993 and the Construction Regulations, 2014, and the following definitions, shall apply:

- a) "Construction Regulations, 2014" means the Construction Regulations (GNR. 84 of 7 February 2014) published in terms of the OHS Act.
- b) "Contractor" means the Principal Contractor as defined in the Construction Regulations, 2014.
- c) "Employer" means the Client or his agent as defined in the Construction Regulations, 2014.
- d) "Employer's Agent" means the person/firm so named in the Contract Data whose function is to administer the Contract as agent of the Employer, acting through, if appointed, a Health and Safety Agent.
- e) "OHS Act" means the Occupational Health and Safety Act, 85 of 1993.
- f) "subcontractor" means any contractor employed by the Contractor to perform construction work.

H2 SCOPE

In terms of the OHS Act and the Construction Regulations, 2014 the Employer must provide the Contractor with a Health and Safety Specification, to which the Contractor must respond with a Health and Safety Plan for approval by the Employer.

The purpose of this Specification is to ensure that a contractor entering into a contract with the Employer maintains an acceptable level of compliance with regard to health and safety issues during the performance of the Contract. In this regard the Health and Safety Specification forms an integral part of the Contract and the Contractor shall ensure that his subcontractors and/or suppliers comply with the requirements of this Specification.

H3 INTERPRETATION

The OHS Act and its associated regulations shall have precedence in the interpretation of any ambiguity or inconsistency between it and this Specification.

Responsibility for health and safety relating to the Works lies with the Contractor as described in this Specification. Nothing stated in or omitted from this Specification shall in any way limit the Contractor's obligations and liabilities in terms of the OHS Act.

H4 GENERAL REQUIREMENTS

The Contractor shall:

- a) create and maintain a safe and healthy work environment;
- b) execute the Works in a manner that complies with all the requirements of the OHS Act and all its associated regulations, and in so doing, minimize the risk of incidents occurring; and
- c) respond to the instructions issued by the Employer's Agent through the Employer's Agent's Representative, except in the case of a health and safety issue which requires the Contractor's immediate attention, in which case the Employer's Health and Safety Agent can issue an instruction directly to the Contractor.

H5 ADMINISTRATION

H5.1 Application for construction work permit

Not applicable until 7 August 2015.

H5.2 Notification of intention to commence construction work

The Contractor shall notify the Provincial Director of the Department of Labour in writing using the pro forma contained in Annexure 2 of the Construction Regulations, 2014 before construction work commences, and retain a copy of such notification in the health and safety file, if such work will:

- a) include excavation work;
- b) include working at a height where there is a risk of falling;
- c) include the demolition of a structure; or
- d) include the use of explosives to perform construction work.

The Contractor shall ensure that no work commences on an electrical installation which requires a new supply or an increase in electricity supply before the person who supplies or contracts or agrees to supply electricity to that electrical installation has been notified of such work.

The Contractor shall ensure that no asbestos work is carried out before the Provincial Director of the Department of Labour has been notified in writing.

H5.3 Occupational Health and Safety Agreement

The Contractor shall enter into an Agreement with the Employer before the commencement of the Works on Site.

H5.4 Good standing with the Compensation Fund or a licensed compensation insurer

The Contractor shall provide the Employer's Agent with a letter of good standing from the Compensation Commissioner or a licensed compensation insurer before the commencement of the Works on Site.

H5.5 Emergency procedures

The Contractor shall submit for acceptance to the Employer's Agent a health and safety emergency procedure, which includes but is not limited to fire, spills, accidents and exposure to hazardous substances, which:

- a) identifies the key personnel who are to be notified of any emergency;
- b) sets out details of available emergency services, including contact particulars; and
- c) the actions or steps which are to be taken during an emergency.

The Contractor shall within 24 hours of an emergency taking place notify the Employer's Agent in writing of the emergency and briefly outline what happened and how it was dealt with.

H5.6 Health and safety file

The Contractor shall ensure that a Health and Safety file, which shall include all documentation required in terms of the provisions of the OHS Act, the Construction Regulations, 2014 and this Health and Safety Specification, is open and kept on Site at all times.

The Health and Safety file shall be made available for inspection by any inspector, subcontractor, the Employer, the Employer's Agent, the Employer's Health and Safety Agent, or employee of the Contractor, upon the request of such persons.

The Contractor shall hand over the Health and Safety file to the Employer's Agent upon Works completion of the Contract and, if applicable, a certificate of compliance accompanied by a test report for the electrical installation in accordance with the provisions of the Electrical Installation Regulations, 1992.

H5.7 Health and safety committee

Where applicable, the Contractor shall establish a health and safety committee, and shall convene health and safety meetings as provided for in the OHS Act.

The Employer's Agent or the Employer's Health and Safety Agent shall be invited to attend such

meetings as an observer.

The Contractor shall ensure that minutes of the health and safety committee meetings are kept.

H5.8 Inspections, formal enquires and incidents

The Contractor shall inform the Employer's Agent:

- a) beforehand of inspections, investigations or formal inquiries of which he has been notified by an inspector; and
- b) as soon as reasonably practicable of the occurrence of an incident (as defined in the OHS Act) on the Site.

The Contractor shall record all incidents and notify the Employer's Agent of any incident, except in the case of a traffic accident on a public road, as soon as possible after it has occurred and report such incident to an inspector as designated in terms of the OHS Act.

The Contractor shall investigate all incidents and issue the Employer's Agent with copies of such investigations.

H5.9 Personal protective equipment and clothing

The Contractor shall ensure that all workers are issued with the necessary personal protective clothing.

H6 APPOINTMENTS

H6.1 Appointment of construction manager

The Contractor shall, prior to commencing the Works on Site, appoint a full-time competent person as the construction manager, with the duty of managing all construction work on a single site, including the duty of ensuring occupational health and safety compliance. In the absence of the construction manager an alternative must be appointed by the Contractor.

The Contractor may, having considered the size of the project, appoint, in writing, one or more assistant construction managers for different sections thereof.

No construction manager may manage any construction work on or in any construction site other than the Site in respect of which he or she has been appointed.

H6.2 Appointment of construction supervisor, and health and safety officers

The construction manager shall appoint a competent employee(s) in writing as the construction supervisor(s) for the Site, who will be responsible for construction activities and ensuring occupational health and safety compliance on the construction site. The Contractor may, having considered the size of the project, appoint, in writing, one or more competent employees to assist the appointed construction supervisor(s).

The Contractor may, having considered the size of the project, the degree of danger likely to be encountered or the accumulation of hazards or risks on the Site, appoint a full-time or part-time construction health and safety officer in writing, who has in the Contractor's opinion the necessary competencies and resources, to assist the Contractor in the control of all health and safety related aspects on the Site.

The Contractor shall compile and maintain an organogram which outlines the roles and responsibilities of the construction supervisor's assistants, and health and safety officers.

H6.3 Other competent persons

The Contractor shall appoint in writing competent persons to supervise or inspect, as relevant, any of the following:

- a) temporary works operations;
- b) excavation work;
- c) demolition work;
- d) scaffolding work operations;
- e) suspended platform work operations;
- f) rope access work;
- g) material hoists;
- h) operation of bulk mixing plant;

- i) explosive activated fastening device;
- j) cranes;
- k) construction vehicles and mobile plant (equipment);
- l) the stacking and storage of articles on the Site; and
- m) fire equipment.

The Contractor shall appoint in writing competent persons to:

- n) induct employees in health and safety; and
- o) prepare a fall protection plan.

H6.4 Health and safety representative(s)

The Contractor shall appoint in writing, if necessary in terms of the OHS Act, a health and safety employee representative(s), whose duties shall be as described in the OHS Act.

H7 EMPLOYER'S HEALTH AND SAFETY AGENT

The Employer's Health and Safety Agent shall:

- a) audit the Contractor's compliance with the requirements of this Specification prior to the commencement of any physical construction activities on the Site;
- b) accept or reject all safety plans, giving reasons for rejecting such plans;
- c) monitor the effective implementation of all safety plans;
- d) conduct periodic and random audits on the health and safety file to establish compliance with the requirements of this Specification and the Contractor's health and safety plan; and
- e) visit the site at regular intervals to conduct site inspections, and based upon such visits issue, wherever necessary, any notices and/or instructions to the Contractor or any of the Contractor's subcontractors with a copy to the Employer's Agent and, where relevant, to the Contractor.

The Contractor shall invite the Employer's Health and Safety Agent to audit compliance with the requirements of this Specification before commencing with any new construction activity on the Site.

The Contractor shall permit the Employer's Health and Safety Agent to audit the Contractor's compliance with the approved Health and Safety Plan, and shall provide any assistance and/or documentation as may be required in this regard.

H8 CREATING AND MAINTAINING A SAFE AND HEALTHY WORK ENVIRONMENT

H8.1 General

The Contractor shall with respect to the Site and the construction works that are contemplated:

- a) cause a preliminary hazard identification to be performed by a competent person before commencing any physical construction activity;
- b) evaluate the risks associated with such work constituting a hazard to the health and safety of such employees and the steps that need to be taken to comply with the OHS Act; and
- c) as far as is reasonably practicable, prevent the exposure of such employees to the hazards concerned or, where prevention is not reasonably practicable, minimize such exposure.

The Contractor shall ensure that:

- d) all reasonably practicable steps are taken to prevent the uncontrolled collapse of any new or existing structure or any part thereof, which may become unstable or is in a temporary state of weakness or instability due to the carrying out of construction work;
- e) no structure or part of a structure is loaded in a manner which would render it unsafe;
- f) relevant information, if any, provided by the designer of the structure is taken into account in the risk assessment; and
- g) the designer of any temporary works complies with the requirements of regulation 6(2) of Construction Regulations, 2014.

The Contractor shall carry out regular inspections and audits to ensure that the Works are being performed in accordance with the requirements of this Specification and the Contractor's health and safety plan

H8.2 Risk assessment

The Contractor shall before the commencement of any construction work on Site and during such construction work, cause risk assessment(s) to be performed by a competent person appointed in writing. Such assessment(s) shall as a minimum:

- a) identify the risks and hazards to which persons may be exposed to;
- b) analyse and evaluate the identified risks and hazards based on a documented method;
- c) document a plan of safe work procedures, including the use of any personal protective equipment or clothing and the undertaking of periodic "toolbox talks" or inductions before undertaking hazardous work, in order to mitigate, reduce or control the risks and hazards that have been identified;
- d) provide a monitoring plan; and
- e) provide a review plan.

The Contractor shall ensure that as far as is reasonably practicable, ergonomic related hazards are analysed, evaluated and addressed in the risk assessment.

The Contractor must review the relevant risk assessment -

- f) where changes are effected to the design and or construction that result in a change to the risk profile; or
- g) when an incident has occurred.

H8.3 Health and safety plans

The Contractor shall prior to commencing the Works to which this Specification applies, submit to the Employer's Health and Safety Agent for approval a suitable and sufficiently documented health and safety plan, based on this Specification and the risk assessment that is conducted.

The health and safety plan shall include, but not be limited to, the following:

- a) The safety management structure, including the names of all designated persons such as the construction supervisor and any other competent persons;
- b) Safety method statements and procedures to be adopted to ensure compliance with the OHS Act; Construction Regulations, 2014 and this Health and Safety Specification;
- c) The provision and use of temporary services;
- d) Personal protective equipment, devices and clothing required;
- e) Emergency procedures;
- f) Provision of workers' welfare facilities;
- g) Induction and training;
- h) Arrangements for monitoring and control to ensure compliance with the safety plan; and
- i) Provision and maintenance of the health and safety file and all other relevant documentation.

The Contractor shall provide each subcontractor with the sections of this Health and Safety Specification pertaining to the construction work to be performed by that subcontractor. The subcontractor shall provide the Contractor with a health and safety plan pertaining to his work, for incorporation into the Contractor's health and safety plan.

The Contractor shall discuss the submitted health and safety plan with the Employer's Health and Safety Agent, modify such plan in the light of the discussions and resubmit the modified plan for approval.

The Contractor shall apply the approved health and safety plan from the date of its approval and for the duration of the Works to which this Specification applies.

The Contractor shall conduct periodic audits for compliance with the approved health and safety plan at intervals agreed upon with the Employer's Health and Safety Agent, but at least once every month.

The Contractor shall update the health and safety plan whenever changes to the Works are brought about.

H8.4 Responsibilities towards employees and visitors

The Contractor shall, as far as is reasonably practicable, cause every employee to be made conversant with the hazards to his health and safety attached to any work which he has to perform, any article or substance which he has to produce, process, use, handle, store or transport and any plant or machinery which he is required or permitted to use, as well as with the precautionary measures which should be taken and observed with respect to those hazards or safe work procedures.

The Contractor shall ensure that all employees under his control are informed, instructed and trained by a competent person regarding any hazard and the related work procedures before any work commences, and thereafter at such times as may be determined in the risk assessment.

The Contractor shall cause a record of all induction training to be kept, which indicates the names, identity numbers and job description of all those who attended such training.

The Contractor shall not allow or permit any employee to enter the Site, unless such person has undergone health and safety induction training pertaining to the hazards prevalent on the Site at the time of entry.

The Contractor shall ensure that all of his employees have a valid medical certificate of fitness specific to the construction work to be performed and issued by an occupational health practitioner on the prescribed form.

The Contractor shall ensure that each visitor to the Site, save where such visitor only visits the site office and is not in direct contact with the construction work activities:

- a) undergoes health and safety instruction pertaining to the hazards prevalent on the Site; and
- b) is in possession of and using the necessary personal protective equipment.

The Contractor shall cause a record of all induction training to be kept in the Health and Safety file.

The Contractor shall provide suitable on-site signage to alert workers and visitors to health and safety hazards and requirements. Such signage shall include but not be limited to:

- c) prohibited unauthorized entrance;
- d) signage to indicate what personal protective equipment is to be worn; and
- e) activity related signs.

The Contractor shall not permit any person who is or who appears to be under the influence of intoxicating liquor or drugs, to enter or remain at a workplace.

H8.5 Subcontractors

The Contractor may only subcontract work in terms of a written subcontract and shall only appoint a subcontractor should he be reasonably satisfied that such a subcontractor has the necessary competencies and resources to safely perform the work falling within the scope of the subcontract.

The Contractor shall ensure that all of his obligations in respect of subcontractors in terms of the Construction Regulations, 2014 are adhered to.

H8.6 Work permits and wayleaves

The Contractor shall be responsible for obtaining all the wayleaves, permissions or permits applicable to working near any existing services or other infrastructure on Site, and shall abide by the safety conditions imposed by such wayleaves, permissions or permits.

H8.7 Access to the Site

The Contractor shall ensure that access to the Site is strictly controlled and that, where possible, only authorised persons are permitted onto the Site.

The Contractor shall control the access to Site of his own personnel and equipment, and that of his subcontractors and suppliers, in such a way so as to ensure that the safety of all public pedestrian and vehicular traffic is not compromised.

H8.9 First aid and emergency procedures

The Contractor shall, where more than five employees are employed at a workplace, provide a first aid box or boxes at or near the workplace, which shall be available and accessible for the treatment of injured persons at that workplace. Such first aid boxes shall contain suitable first aid equipment.

The Contractor shall ensure, where there are more than 10 employees employed on the Site, that for every group of up to 50 employees at that workplace at least one person is readily available during normal working hours who is in possession of a valid certificate of competency in first aid.

The following information shall be conspicuously posted in the offices of the Contractor for the duration of the Contract:

- a) Telephone numbers of emergency services;
- b) The names of all safety representatives and safety officers; and
- c) The name(s) of the competent first aider(s).

The Contractor shall post, in prominent places, notices indicating where the first aid box(es) is/are kept, as well as the name of the person in charge of the first aid box.

H8.10 Housekeeping

The Contractor shall ensure, *inter alia*, that suitable housekeeping is continuously implemented on the Site, including provision for the:

- a) removal of scrap, waste and debris, and materials which are no longer required for use, at appropriate intervals (in accordance with Construction Regulation 27); and
- b) proper stacking and storage of materials and equipment (in accordance with Construction Regulations 27 and 28).

H8.11 Fire precautions

The Contractor shall ensure that all appropriate measures are taken to minimise the risk of fire and that appropriate procedures and equipment are in place to deal with the event of a fire, all in accordance with Construction Regulation 29 and the Environmental Management Specification in Part C3.5 of the Scope of Work.

H8.12 Facilities for workers

The Contractor shall provide ablution facilities and eating areas all as specified in the Environmental Management Specification in Part C3.5 of the Scope of Work.

H9 GENERAL HAZARDS AND RISKS APPLICABLE TO WORK REQUIRED IN TERMS OF THIS TERM TENDER

Project specific Health and Safety requirements are included in C4 Site Information

CITY OF CAPE TOWN

WATER AND SANITATION

CONTRACT NO. 4Q/2021/22

**TERM TENDER FOR THE DRILLING, TESTING AND REHABILITATION OF BOREHOLES IN PRIMARY
AQUIFERS IN CAPE TOWN**

C3.6 Specifications

CONTENTS

3.6.1. STANDARDISED SPECIFICATIONS

Although not bound in nor issued with this document, the following Standardised Specifications for Civil Engineering Construction, as amended in Part C1 of the Project Specification, form part of this document:

SANS 1200 A	General
SANS 1200 C	Site Clearance
SANS 1200 D	Earthworks
SANS 1200 G	Concrete (Structural)

The Tenderer is expected to provide for himself the necessary SABS 1200 Specification and equivalent codes under SABS 0120 and the Engineer's Standard Details (Revised Edition, January 2000).

Specific amendments and additions to the Standardised Specifications are provided below as Particular Specifications.

PS A	General
PS C	Site Clearance
PS D	Earthworks
PS G	Concrete (Structural)

3.6.2 STANDARD SPECIFICATIONS AND PARTICULAR SPECIFICATIONS

The following Standard and Particular Specifications, as bound in this document, and as amended in Portion 2 of the Project Specification, shall apply:

SPEC V	-	STANDARD SPECIFICATION FOR EXPLORATORY CORE DRILLING WORK
SPEC W	-	STANDARD SPECIFICATION FOR DRILLING WORK
SPEC X	-	STANDARD SPECIFICATION FOR GEOPHYSICAL TESTING
SPEC Y	-	STANDARD SPECIFICATION FOR TEST PUMPING AND INJECTION TESTING
SPEC Z	-	STANDARD SPECIFICATION FOR CLEANING AND REHABILITATION OF BOREHOLES

SANS 1200 A: GENERAL

A 3 MATERIALS

PS A 3.1 QUALITY

Substitute the second sentence of the first paragraph of sub-clause A 3.1 with the following

All material used in the Works shall, where such mark has been awarded for a specific type of material, bear the SABS (SANS) mark. Alternatively, the Contractor shall furnish the Engineer with certificates of compliance of materials, which bear the official mark of the appropriate standard.

Substitute the second paragraph with the following:

The Contractor is responsible for the cost of all testing to ascertain that the materials do comply with the relevant minimum requirements and all such costs shall be deemed to be included in the tendered rates. The cost of control tests done by the Engineer and of which the results do not comply with the minimum requirements shall be for the Contractor's account.

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

The handling, storage, transport and erection of equipment, machinery and materials shall be strictly in accordance with the requirements of the supplier and or manufacturer. All materials shall be new and of the best quality available unless otherwise specified. Materials must function satisfactorily under prevailing climate and weather conditions at the place of installation.

PS A 3.3 DELAY DUE TO SUPPLY OF MATERIALS

Add new sub-clause A 3.3:

The Contractor shall ensure that the work is not delayed, due to the lack of materials on the site of the Works, by placing orders with suppliers for the required materials timeously.

A 4 PLANT

PS A 4.2 CONTRACTOR'S OFFICES, STORES AND SERVICES

PS A 4.2.1 Contractor's Camp

The Contractor's camp, if required as part of the site establishment, shall be kept clean at all times during construction and conform to the requirements and regulations of the Employer, authorities and the applicable Environmental Management Plan.

The Contractor must fence off his construction camp area. All temporary fencing must be removed on completion of the Contract.

The camp may be used for the working hours activities of the Contractor's and the Employer's personnel and for all related facilities required by the Contractor and the Employer such as workshops, stores, testing laboratories.

The Contractor shall at all times conform to all requirements contained in law or bylaws, as well as any other requirements set by the controlling local authority.

The Contractor shall water all access roads to the construction camp, as well as working areas used by vehicles inside the camps, twice daily including weekends as required or as may be directed by the Engineer, to prevent dust being churned up by vehicles or wind.

At the completion of the construction work, the Contractor must break down and remove all concrete slabs, etc. in the construction camps and at the batching plant (if applicable), remove all rubble from the camp site and hand back the site(s) in a clean and tidy condition.

No Certificate of Completion shall be issued for the Works unless the site clearing is done to the satisfaction of the Engineer.

PS A 4.2.2 Source of Water Supply

The Contractor shall be responsible under the Contract for the supply and distribution at his cost of all water that he may require for purposes of constructing, testing and commissioning the Works.

PS A 4.2.3 Source of Power Supply

The Contractor shall be responsible under the Contract for the supply and distribution at his cost of all electricity that he may require for purposes of constructing the Works.

PS A 4.2.4 Sanitary Facilities

Ablution facilities shall be kept hygienic at all times. The Contractor shall at all times during construction of the Works provide adequate sanitary facilities at all working fronts and places of work.

PS A 4.2.5 Housing

The Contractor will not be permitted to house any personnel within his camp site unless the Employer approves a written request to this end by the Contractor.

A 5 CONSTRUCTION

A 5.1 SURVEY

PS A 5.1.1 Setting Out of the Works

Substitute the first sentence in A 5.1.1 with the following:

Setting out of the works is the sole responsibility of the Contractor and shall be done from the details as indicated on the drawings.

PS A 5.2 WATCHING, BARRICADING, LIGHTING AND TRAFFIC CROSSINGS

Add the following to sub-clause A 5.2:

Construction along and across existing roads should be executed in such a manner that both pedestrian and vehicular traffic can be accommodated at all times.

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

PS A 5.4 PROTECTION OF OVERHEAD AND UNDERGROUND SERVICES

Add the following to sub-clause A 5.4:

The position and details of all existing services and structures known to the Engineer will be shown on the Drawings, as supplied for each Works Project. The Drawings show the best information available to the Employer. The Employer takes no responsibility as to the accuracy or completeness of this information and provides this information merely as an aid to the Tenderers in preparing their bids for construction of the Works.

The Contractor shall protect all known existing services as well as all work being carried out and structures being erected on the Site by other contractors/suppliers or public authorities. The Contractor must familiarize himself with the various standard regulations of the relevant public authorities and act accordingly. Any damage caused to these services or structures, or any obstructions or hindrance caused to other contractors/suppliers or public authorities by the Contractor and all claims arising from such damage, obstruction or hindrance shall be the sole responsibility of the Contractor.

All repair work shall be carried out at the Contractor's expense to the entire satisfaction of the Engineer or the appropriate public authority.

The Contractor shall as soon as possible after handing over of the site, commence with the detection of existing services, continue with it without interruption and finalise it before excavation starts at that particular section. No site work is allowed to commence prior to receiving wayleaves of all appropriate service providers.

The Contractor shall conduct the necessary search for unknown services as required by the Standard Specifications. After searching, all services shall be deemed as known. The Contractor's cost of searching for existing services and accommodating all existing services and relocating all services shall be priced into the appropriate items forming part of the Contract.

PS A 5.5 DEALING WITH WATER ON WORKS

Add the following to sub-clause A 5.5:

No additional payment for handling stormwater will be paid and all relevant cost will be deemed to be covered by the tendered rates.

Special treatment of water on site shall where necessary, be specified and paid under the relevant item in the Environmental Schedule.

PS A 5.8 GROUND AND ACCESS TO WORKS

Add the following to sub-clause A 5.8:

The Contractor shall maintain adequate access to all public and private property at all times unless otherwise sanctioned by the Engineer. Details of the proposed methods of providing access shall be submitted to the Engineer for approval before such access is restricted. Any claims arising from impeded accesses shall be wholly the responsibility of the Contractor.

A 7 TESTING

PS A 7.4 STATISTICAL ANALYSIS OF CONTROL TESTS

Substitute sub-clause A 7.4 with the following:

Test results shall not be evaluated by statistical methods. All results shall comply with the specified minimum requirements of the materials concerned.

PS A 7.5 PROCESS CONTROL

Add new sub-clause A 7.5:

All test results obtained by the Contractor in the course of construction of the Works shall be submitted to the Engineer or his Representative prior to requesting inspection of the relevant portions of the Works. Any request for inspection shall be submitted on the prescribed forms that will be issued once the Contract has been awarded.

The Contractor shall deliver to the Engineer, for his consideration, quality assurance programmes (as obtained from all the Contractor's proposed suppliers of pipes and water tanks) prior to the Contractor's appointment of any suppliers.

A 8 MEASUREMENT AND PAYMENT

A 8.2 PAYMENT

PS A 8.2.1 Fixed-Charge and Value-Related Items

Add the following to sub-clause A 8.2.1:

The sums tendered for fixed charge and value related items will not be increased should extension of time be allowed for completion of the Contract.

PS A 8.2.2 Time Related Items

Add the following to sub-clause A 8.2.2:

The tendered rate for a time related item will not be increased if an extension of time for the completion of the works is awarded, as time related items under Schedule A (P&G) are paid for only for time required to execute the work on site. Schedule A (P&G) can only be claimed if in accordance with Clause 5.12.3.

PS A 8.5 SUMS STATED PROVISIONALLY

Add new payment clauses:

Control Testing

N/A

Salary for Labour Desk Officer and Community Liaison Officer

Not applicable to this tender

Site Investigations and Locating Existing Services

Specific items have been included in the Schedule of Rates for site investigations and the location of existing services in terms of the Specification as ordered by the Engineer.

The sums or rates tendered for these items shall cover the cost of all materials, labour and plant required to execute and complete the work as specified, described in the Schedule of Rates.

In addition to the abovementioned amount, provision is made in the Schedule of Rates for a mark-up on the amount to be paid. The mark-up shall be regarded as full compensation for overheads, charges and profits as provided for in Clause 6.6 of the General Conditions of Contract for Construction Works (Third Edition, 2015).

Relocation of Existing Services

N/A

Artisans and Skills Training

N/A

Acceptance Control Testing

Specific items in the Schedule of Rates are available to be utilised for acceptance control testing ordered by the Engineer. These will be undertaken by the Contractor in either of his Works Projects or by another Contractor under a different Works Project. Payment will be based on the actual items listed in the Schedule of Rates. The costs for control tests instructed by the Engineer and of which the results do not comply with the minimum requirements shall be for the Contractor 's account.

Addressing Environmental Issues

If it is deemed necessary to address environmental issues or conditions other than those stated in the Environmental Management Plan, the Contractor may only carry out the work upon receiving a written instruction from the Engineer. The work will be defined and described by the Engineer and prior agreement will be reached with the Contractor for the payment thereof.

PS A 8.7 DAYWORK

Replace sub-clause A 8.7 with the following:

Daywork will be paid according to the hourly rates provided in the Schedule of Rates.

PS A 8.8 TEMPORARY WORKS

PS A 8.8.2 Accommodation of Traffic

Add the following to sub-clause A 8.8.2:

The rates for Item A1.3 and A2.3 (Dealing with access, including construction of temporary access roads, and reinstatement of site roads on completion) shall cover all costs pertaining to the provision, erection, moving, re-erection and maintenance of all temporary barricades, road traffic signs, lights, flagmen, etc. as required, for the guarding and protection of the Works, for the construction, gravelling and maintenance of access roads and detours to the site of the Works, borrow pits or spoil sites, as well as for the later removal or the cleaning and tidying up thereof, for making the necessary traffic arrangements and arrangements with regard to the moving and/or re-erection of existing traffic signs, as well as all other costs to accommodate the traffic during construction.

Separate items will be scheduled in the Work Package for the fixed and time-related costs of the work.

PS A 8.8.4 Existing Services

Add the following to sub-clause A 8.8.4:

Where the Contractor is responsible for the cost of repairs carried out by the Employer or others, the costs will be recovered by means of a deduction from the Contractor 's monthly payment certificate. The Employer will attend to the payment of monies due to others.

PS A 8.9 OCCUPATIONAL HEALTH AND SAFETY (PROVISIONAL)

Add new payment clause A 8.9:

For additional information refer to Spec H.

PS A 8.9.1 Health and Safety Requirements Unit : Sum

The rate shall cover all costs pertaining to the provision and maintenance for the duration of the Works Project of the health and safety measures required in terms of Clause 5 (Principal Contractor and Supplier) of the Construction Regulations (2014) of the Occupational Health and Safety Act. No other sum shall be paid in this respect and Tenderers must therefore ensure that adequate provision has been allowed for.

PS A 8.9.2 Health and Safety Plan Unit : Sum

The rate shall cover all costs pertaining to the provision and maintenance for the duration of the Works Project of the health and safety plan as required in the Construction Regulations (2014). The rate shall include for all risk assessments required as well as for the development and implementation of safe work procedures and method statements. No other sum shall be paid in this respect and Tenderers must therefore ensure that adequate provision has been allowed for.

PS A 8.9.3 Health and Safety File Unit : Sum

The rate shall cover all costs pertaining to the provision and/or collection of data (drawings, design, materials, operation and maintenance manuals, etc) to be contained in the file, co-operation with other parties, compilation and maintenance of the file during the duration of the contract and the handing over of the file to the Employer on completion of the contract. No other sum shall be paid in this respect and Tenderers must therefore ensure that adequate provision has been allowed for.

PS A 8.9.4 Health and Safety Agent Unit : Prov Sum

A salary must be paid monthly by the Contractor to the person appointed as Health and Safety Agent for the project. The H&S Agent shall be appointed by the Employer. The payment dates will be determined as soon as the H&S Agent is appointed. The salary will be determined by the Employer.

PS A 8.9.5 Contractor's Mark Up on item above Unit : %

The tariff is to cover the Contractor's overheads, surcharge and profit on payments made to the H&S agent. No payments will be made on this items until payments have been made to the H&S Agent.

PS A 8.9.6 Environmental Control Officer Unit : Prov Sum

N/A

PS A 8.9.7 Contractor's Mark-up on item above..... Unit : %

N/A

PS A 8.10 ENVIRONMENTAL MANAGEMENT PLAN

Items PS A 8.10.1 to PS A 8.10.3 are included under General Environmental Obligations in Schedule E of the Schedule of Rates.

PS A 8.10.1 Cost of Environmental Management Plan

The sum shall cover the Contractor's initial cost of providing and demonstrate to the Engineer a suitable and sufficiently documented Method Statement based on the Employer's documented Environmental Management Plan Specifications as set out under Particular Specification E.

PS A.8.10.2 Complying with the Environmental Management Plan (EMP)

The sum shall cover the time-related cost of whatever nature, for complying with the Environmental Management Plan (EMP) Specifications as set out under Particular Specification E.

PS A 8.10.3 Environmental Site Officer

A salary must be paid monthly by the Contractor to the person appointed as Environmental Site Officer for the project, as per the Environmental Specifications Clause E5.4. The Environmental Site Officer shall be appointed by the Contractor.

PS A 8.11 OVERHAUL AND ADDITIONAL TRANSPORT

N/A

PS A 8.12 DEALING WITH EXISTING SERVICES

Add new payment clause A 8.12:

Existing services (above ground or underground) will not be measured separately. Payment will be made by lump sum.

The sum tendered for dealing with existing services shall cover:

- The cost of meeting the requirements of sub-clause 8.3.5 of SANS 1200 DB.
- The cost of meeting the requirements of sub-clause 8.3.8.2 of SANS 1200 D
- The cost of meeting the requirements of sub-clause 8.8.4 of SANS 1200 A (Excluding the careful excavation by hand to locate a service)
- The cost of meeting the requirements of PS A 5.4 (excluding the careful excavation by hand to locate a service and the supply or hire and use of specialist equipment to locate underground services).
- The cost arising from the limiting influence of existing aboveground and underground services on the Contractor's activities.
- Dealing with and protecting poles affected by excavations and dealing with and working below overhead wires.

- The cost of dealing with and protecting and keeping safe all aboveground and underground existing services.
- The costs of delays and disruptions in the progress of the work which arises from dealing with and protection of existing services.

PS A 8.13 MISCELLANEOUS ITEMS

Add new payment clause A 8.13:

An item which, in the payment clause column of the Schedule of Rates, refers to this clause (PS A 8.13), will be measured in the unit scheduled in the Schedule of Rates. Where relevant, separate items will be scheduled for the fixed and time-related costs of the item.

The sum or rate for such an item shall cover the cost of all materials, labour and plant required to execute and complete the work as specified, described in the Schedule of Rates or shown on the drawings.

PS A 8.14 PERMANENT AND/OR TEMPORARY WORKS NOT MEASURED

Add new payment clause A 8.14:

The Contractor to specify and price any/all permanent and/or temporary works not specifically itemized and measured in the Schedule of Rates for the complete execution of the Contract in terms of the General Conditions of Contract for Construction Works (Third Edition, 2015) and Scope of Works.

SANS 1200 C: SITE CLEARANCE

C3 MATERIALS

PS C 3.1 DISPOSAL OF MATERIAL

Add the following to sub-clause C 3.1:

Materials arising from clearing and grubbing shall be disposed of at a suitable spoil site. The Contractor shall be responsible to make his own arrangements for a suitable spoil site and all transport costs shall be included in the rates tendered for site clearance. Trees and stumps necessarily removed shall not be burnt unless authorized by the Engineer but shall be cut and stacked at areas designated by the Engineer.

No payment will be made for overhaul and all transport shall be regarded as freehaul and the costs thereof shall be covered by the relevant tendered rates in the Schedule of Rates.

C5 CONSTRUCTION

PS C 5.1 AREAS TO BE CLEARED AND GRUBBED

Substitute the first sentence of sub-clause C 5.1 with the following:

Only the approved minimum area required for the execution of the works including areas on which material shall be stockpiled for later re-use or on which material shall be dumped and spread, shall be cleared and grubbed. No trees with a trunk girth of more than 1.0 m shall be removed without the written permission of the Engineer. The vegetation cleared shall be disposed of by approved means. All rubble on the Site shall be disposed of by approved means.

Measurement and payment for clearing and grubbing shall only occur for areas as required in writing by the Engineer.

The Contractor may proceed with clearing and grubbing after the handing over of the site only after written approval from the Engineer has been obtained.

Substitute the last paragraph with the following:

The Contractor shall program his work in such a manner that re-clearing will not be necessary. The cost of re-clearing shall be borne by the Contractor.

C 5.2 CUTTING OF TREES

C 5.2.3 Preservation of Trees

PS C 5.2.3.2 Individual trees

Add the following to sub-clause C 5.2.3.2:

Trees outside the site of works must be left standing and undamaged, except where otherwise ordered in writing by the Engineer. An amount of R 1,000 will be deducted from moneys due to the Contractor as a penalty for every tree that is damaged or removed unnecessarily.

PS C 5.6 CONSERVATION OF TOPSOIL

Add the following to sub-clause C 5.6:

Topsoil to be re-used, shall be removed from cleared areas to a depth of 150 mm and stockpiled on approved sites for later re-use. Until required for later re-use, the stockpiles of topsoil material shall be stabilized by watering or other approved means.

SANS 1200 D: EARTHWORKS

D 2 INTERPRETATIONS

PS D 2.1 SUPPORTING SPECIFICATIONS

Replace sub-clause D 2.1 with the following:

Any of the other SABS/SANS 1200 specifications may form part of the Contract documents.

PS D 2.3 DEFINITIONS

Add the following to sub-clause D 2.3:

Sand (cohesionless and non-cohesive)

For the purposes of the compaction requirements, a non-plastic material of which not less than 95 % by mass passes a sieve of nominal aperture size 4,75 mm, and not more than 10 % passes a sieve of nominal aperture size 0,075 mm.

D 3 MATERIALS

D 3.1 CLASSIFICATION FOR EXCAVATION PURPOSES

PS D 3.1.2 Classes of Excavation

Substitute sub-clauses D 3.1.2 (a) and D 3.1.2 (b) with the following:

3.1.2 (a) Soft excavation:

“All material that is not classified as hard rock excavation in terms of clause 3.1.2 (c), boulder excavation class A in terms of clause 3.1.2 (d) or boulder excavation class B in terms of clause 3.1.2 (e) shall be classified as soft excavation”

In clause 3.1.2 (c) (1), replace the words “equivalent to that specified in (b) (1) above” with the words “of mass approximately 35 t, fitted with a single-tine ripper suitable for heavy ripping and of fly wheel power approximately 220 kW.”

In the last sentence of clause 3.1.2 (d), replace the words “intermediate excavation” with the words “soft excavation.”

In the last sentence of clause 3.1.2 (e) (2), replace the words “or intermediate excavations, according to the nature of the material” with the word “excavation.”

No intermediate material will be paid under this Contract. Only soft or hard material will be paid.

D 3.3 SELECTION

PS D 3.3.1 General

Substitute the second paragraph of sub-clause D 3.3.1 with the following:

The Contractor shall deal selectively with material from general excavation. Any imported material in road reserves that do not comply with the minimum requirements for the respective layers, shall be removed and replaced with suitable material, all at the Contractor's expense. The Contractor shall deal in such a way with materials from all excavations for pipe trenches to ensure that usable material is not contaminated with unsuitable material. If usable material is contaminated, such contaminated material shall be removed and replaced with suitable material, all at the Contractor's expense. No additional payment shall be made in respect of this and all relevant costs shall be deemed to be included in the tendered rates. All unsuitable material shall be removed prior to importing fill material in such areas.

PS D 3.3.3 Borrow Area

Add new sub-clause D 3.3.3:

Approval of a borrow area for a certain purpose does not necessarily mean that all the material in that area is suitable for the specified purpose. What it does mean is that the borrow area contains some suitable material. The responsibility shall rest on the Contractor to ensure that only material that is indeed suitable is removed and used for the specified purpose.

When the Contractor has to select excavated material for a specific purpose, the above provisions relating to borrow areas shall apply mutatis mutandis to excavations.

The Contractor shall not waste or contaminate material that has been selected for a specific purpose.

D 4 PLANT

PS D 4.4 DETECTORS

Replace sub-clause D 4.4 with the following:

The Contractor shall, for the purposes of detecting and locating underground services in accordance with the provisions of sub-clause 5.4 of SANS 1200 A and sub-clause 5.1.2 of SANS 1200 D, provide and use detecting equipment which is suitable for the detection of underground cables and pipes.

PS D 4.5 AVOIDING QUAGMIRE CONDITIONS

In order to prevent quagmire conditions occurring in the excavations, relatively static plant such as back-actors shall be used combined with hand trimming to complete the excavation to final level. Should the Contractor allow quagmire conditions to develop, he shall, at his own expense, take such steps to rectify the conditions as the Engineer may order.

D 5 CONSTRUCTION

D 5.1 PRECAUTIONS

PS D 5.1.1.2 Safeguarding of Excavations

Add the following to sub-clause D 5.1.1.2:

Any cost the Contractor may undergo in ensuring the safety of excavations or any additional excavation and backfilling he may have to undertake due to the unstable sides of excavations and trenches shall be held to be for his account and the various rates for excavation and trenching included in the Schedule of Rates shall include full compensation for it.

D 5.1.2 Existing Services

PS D 5.1.2.2 Detection, Location and Exposure

Replace sub-clause D 5.1.2.2 with the following:

If existing services are not shown on the drawings but the existence thereof can be reasonably expected, the Contractor shall, in conjunction with all relevant authorities, determine the exact depth and location of such services before the commencement of construction. After locating the exact position of services, whether indicated on the drawings or not, such services shall be deemed to be known services and the Contractor shall be liable for all costs and subsequent costs arising from the damage thereof as a result of the Contractor 's activities. These services must also be indicated on the Record (As Built) drawings.

All services must be located and opened for inspection by the Engineer before commencing trench excavation. Any costs or losses suffered by the Contractor as a result of not abiding by this specification will be for the Contractor 's account.

The exposure by the Contractor of underground services, as required in terms of sub-clause 5.4 of SANS 1200 A (as amended) shall be carried out by careful hand excavation at such positions and to such dimensions as are agreed to by the Engineer.

Unless otherwise instructed or agreed by the Engineer, no service shall be left exposed after its exact position has been determined and all excavations carried out for the purposes of exposing underground services shall be promptly backfilled and compacted to the following densities:

(a) In roadways: 93% Mod AASHTO density; and

(b) In all other areas: 90% Mod AASHTO density.

Where hand excavations to expose underground services have to be carried out in roadways, the Contractor shall reinstate the road layer works in accordance with the provisions of sub-clause 5.9 of SANS 1200 DB.

Payment in respect of reinstating layer works in roadways will be made in accordance with sub-clause 8.3.6.1 of SANS 1200 DB (as amended).

PS D 5.1.2.3 Protection of Cables

Substitute "estimated position" in the second sentence of sub-clause D 5.1.2.3 with "actual or exposed position".

PS D 5.1.2.5 Protection during Construction

Add new sub-clause D 5.1.2.5:

Further to the requirements of sub-clause 5.4 of SANS 1200 A (as amended), major excavating equipment and other plant shall not be operated dangerously close to known services. Where necessary, excavation in close proximity to known services shall be carefully carried out with suitable hand tools, excluding picks wherever their use could damage the services. No additional payment will apply to such more difficult work.

Should any service not being a known service be discovered or encountered during the course of the Contract, the Contractor shall, in addition to complying with the requirements of sub-clause 5.4 of SANS 1200 A (as amended), immediately notify the Engineer thereof and implement such measures as will prevent damage of such service or, if it was damaged in the course of discovery, will prevent and minimise the occurrence of any further damage occurring.

PS D 5.1.3 Stormwater and Groundwater

Add the following to sub-clause D 5.1.3:

The Contractor shall, where applicable and at the earliest practicable opportunity at his own cost provide temporary drainage required to protect the works.

PS D 5.1.4 Nuisance

PS D 5.1.4.1 Dust Nuisance

Add the following to sub-clause D 5.1.4.1:

The Contractor is responsible for dust control and is liable for all claims that may result from dust nuisance on all parts of the site and at all times from the date of handing over of the site to the completion date of the contract. No payment regarding the above-mentioned will be made and all costs shall be deemed to be covered by the tendered rates.

PS D 5.1.5 Reinstatement and Maintenance of Roads

Add the following to sub-clause D 5.1.5:

Where crossings have been made, the roads shall be reinstated in accordance with the details specified in sub-clause 5.9 of SANS 1200 DB.

PS D 5.1.6 Road Traffic Control

Add the following to sub-clause D 5.1.6:

- a) All road traffic signs shall be in accordance with the CSRA-CUTA : Road Traffic Signs Sub-Committee: Note No. 13: Roadworks, which should be read in conjunction with the latest edition of the South African Road Traffic Signs Manual (January 1993).
- (c) Sufficient road signs must be erected in such a way that motorists will be warned in time of works, e.g. at the closing of a street/road sufficient signs to direct traffic must be erected at the preceding intersection.
- (j) Bypasses and/or road signs shall be provided and/or erected at locations where the free flow of traffic is obstructed and shall be approved by the Engineer before the commencement of construction.
- Where a trench crosses a street/road or any place where a trench crosses the direction of traffic flow, drums must be placed in the street and not just along the sides of the street with danger tape in between.
- (h) Danger tape must be put up between drums and tied around the drums.
- 17. Drums may not be filled with stones. The spacing of drums must be in such a way (maximum 5 m) that they are visible from all directions.
- a) Sufficient safety measures must be utilised for pedestrians.

No additional payment for compliance with the above-mentioned conditions will be made and all costs (labour, road traffic signs, etc.) shall be included under PS A 8.8.2.

D 5.2 METHODS AND PROCEDURES

D 5.2.1 Site Preparation

PS D 5.2.1.2 Conservation of Topsoil

Add the following to sub-clause D 5.2.1.2

Topsoil shall be removed from all areas where structures are to be constructed and shall be stockpiled or spread as and where indicated by the Engineer.

D 5.2.2 Excavation

PS D 5.2.2.1 Excavation for General Earthworks and for Structures

Add the following to sub-clause D 5.2.2.1:

Strip foundations and encasement of pipes shall be cast directly against excavated surfaces.

Materials under foundations and floors of structures which are regarded by the Engineer as unsuitable for the bearing of such structures shall be removed to the depths and widths ordered. The excavated voids shall then be filled with sand compacted to 100 % of Mod AASHTO density, to the underside of such foundation or floors, unless a soil cement mixture in terms of PS D 5.2.3.2 is ordered by the Engineer.

Add the following to paragraph (b):

"When the nature of the material precludes the above procedure, additional excavations shall be carried out to provide working space for the erection of formwork. The tendered rate for item 8.3.5 (SANS 1200 D) will be deemed to include the cost of a working width of 600 mm, but the Contractor may excavate a greater working width at no additional cost to the Employer."

Replace the first sentence of paragraph (e) with the following:

Where excavations have been carried below the authorised levels, the Contractor shall backfill such excavations to the correct level with approved gravel compacted to 93% of modified AASHTO density or to the density of the surrounding material, whichever is the higher density.

Where excavations for structures have been carried out in hard material, the Engineer may direct that over-excavation be backfilled with weak concrete if there is a danger of settlement or differential settlement of the foundations. Where the sides of excavations against which concrete is to be cast have been over-excavated or have collapsed partially, the Contractor shall re-trim the excavations if necessary and, unless other remedial measures are agreed to by the Engineer, shall cast the concrete for the structure, including the additional concrete that may be required as a result of the over-excavation or partial collapse. The cost of the additional concrete or remedial measures shall be for the Contractor 's account.

PS D 5.2.2.2 Borrow Pits

Add the following to sub-clause D 5.2.2.2:

Bedding and backfill materials shall be obtained from trench excavations, existing borrow pits or commercial sources. Where borrow materials are required, such materials shall be obtained from borrow sources to be identified by the Contractor, who shall be entirely responsible for ensuring that such materials comply in all respects with the material specifications. Unless otherwise specified the opening of new borrow pits shall not be allowed.

All costs associated with the importation of suitable material from borrow or other sources must be borne by the Contractor, including excavation, crushing, screening, transport and royalties, and the tendered rates for material from borrow must include therefore, as no other payment will be made in this regard.

The Contractor shall co-ordinate his borrowing operations with other contractors/suppliers that might be using the same borrow pit(s).

PS D 5.2.2.3 Disposal

Replace the second sentence of sub-clause D 5.2.2.3 with the following:

The Contractor shall provide all necessary spoil sites for the spoiling of all surplus and unsuitable materials and shall make the necessary arrangements with the owner of the site where the material is disposed of, and pay all charges and levies as may be applicable for the use of such spoil sites.

Every spoil site provided by the Contractor shall be approved by the local authority in whose area it is located, and the spoiling shall comply with the applicable statutory and municipal regulations as well as the requirements of the owner of the spoil site.

If so instructed by the Engineer, surplus or unsuitable materials arising from the works shall be spoiled and neatly spread and levelled so as not to interfere with future works or to disrupt the natural overland flow of storm runoff, at spoil areas arranged by the Contractor and approved by the land owner and Engineer. Where a pipeline is laid within a rail or road reserve the route of the pipeline shall be finished neatly to be flush with the natural ground level or finished sidewalk level as may be applicable.

No payment will be made to the Contractor in respect of locating and making arrangements for suitable spoil sites and spoiling material at sites and the costs thereof shall be covered by the relevant tendered rates in the Schedule of Rates.

Notwithstanding any clause in any standardized specification in respect of the definition, no payment will be made for overhaul and all transport shall be regarded as freehaul and the costs thereof shall be covered by the relevant tendered rates in the Schedule of Rates.

PS D 5.2.2.4 Selection and Stockpiling

Add new sub-clause D 5.2.2.4:

Approval or designation of the material in a particular borrow pit or excavation for particular purpose does not imply that all the material in the borrow pit or excavation is suitable for the particular purpose to which the said approval or designation relates, nor that all material in the borrow pit or source

should be used for the particular purpose. The Contractor shall select suitable material from that borrow pit or source, discard unsuitable material and reserve material for other purposes as necessary.

The Contractor shall organize and carry out his operations in such a manner as will prevent the contamination of suitable embankment and backfill material with unsuitable materials. Any excavated material which becomes, in the Engineer's opinion, unsuitable for use in embankments or backfill as a result of contamination, shall be disposed of in a manner acceptable to the Engineer and shall be replaced by the Contractor with materials acceptable to the Engineer, all at the Contractor's cost. When required, or when ordered by the Engineer, material shall be stockpiled for later use. The additional costs for stockpiling material shall be paid to the Contractor in accordance with the provisions of sub-clause PS D 8.3.15.

PS D 5.2.2.5 Excavation by Hand Around Existing Services

Add new sub-clause D 5.2.2.5:

Where hand excavation is required around existing services it shall be done within 3,0 m above and on both sides of cables and within 300 mm above and on both sides of pipes, as well as underneath the services, within the above-mentioned horizontal widths. Hand excavations shall be done in 1 m increments.

PS D 5.2.3.2 Backfilling of trenches and backfilling against structures

Add the following to D 5.2.3.2:

Backfilling around structures shall be compacted to 93 % (100 % for sand) of Modified AASHTO density.

When specified or ordered by the Engineer the backfilling against structures shall be done using a mixture of soil cement. The mixture shall contain 5 % cement and just sufficient water for it to be placed and compacted like ordinary backfilling material.

All over-excavation must be backfilled by the Contractor with mass concrete of the specified grade at his own cost. Where such over-excavation has been ordered by the Engineer, the backfilling with concrete will be measured and paid separately.

D 5.2.3 Placing and Compaction

PS D 5.2.3.3 Backfilling with Soilcrete

Add new sub-clause D 5.2.3.3:

Soilcrete backfilling shall be a G5 material as specified in SANS 1200M, stabilised with 5% cement and compacted to 93% modified AASHTO maximum density.

D 5.2.4 Finishing

PS D 5.2.4.2 Top soiling

Add the following to D 5.2.4.2:

Topsoil shall be placed in areas where directed by the Engineer.

D 5.2.5 Transport for Earthworks

PS D 5.2.5.1 Freehaul

Substitute sub-clause D 5.2.5.1 with the following:

Notwithstanding any clause in any standardized specification in respect of the definition, no payment will be made for overhaul and all transport shall be regarded as freehaul and the costs thereof shall be covered by the relevant tendered rates in the Schedule of Rates.

PS D 5.2.5.2 Overhaul

Substitute sub-clause D 5.2.5.2 with the following:

Notwithstanding any clause in any standardized specification in respect of the definition, no payment will be made for overhaul and all transport shall be regarded as freehaul and the costs thereof shall be covered by the relevant tendered rates in the Schedule of Rates.

D 7 TESTING

PS D 7.2 Taking and Testing of Samples

Replace the contents of sub-clause D 7.2 with the following:

The Contractor shall arrange with an approved independent laboratory engaged by the Contractor to carry out sufficient tests on a regular basis as agreed between him and the Engineer to determine whether the degree of compaction, and, where applicable, the quality of materials used, comply with the Specifications and shall submit the results of these tests to the Engineer in a form approved by him.

SANS 1200 G: CONCRETE (STRUCTURAL)

PERFORMANCE SPECIFICATION

1. APPLICATION

This performance specification is applicable to all concrete used for the construction for the project above.

The structural concrete in the project comprises, but is not limited to, the following:

- plinths
- grouting of casing

2. CODES AND DESIGN SPECIFICATIONS

All works to comply with current South African Standards as a minimum.

These include but are not limited to:

- SANS 10160:2011 Basis of structural design and actions for buildings and industrial structures. Part 1 to 8.
- SANS 1200:1982 Concrete (Structural). Part G.
- SANS 10100:2000 The structural use of concrete. Part 1 and 2
International standards for consideration:
- BS EN 206:2013 Concrete - Specification, performance, production and conformity

3. RESPONSIBILITIES

The Contractor's scope of work to include (design responsibility):

- Mix design for the applicable exposure and durability for the project;
- Reinforcement cover = 50mm
- Design life = 50 years
- Submitting documentation required for the mix design for acceptance by the Engineer.
- Preparing and implementing a Quality Assurance Management Plan.
- Site monitoring reports (to be signed off by the Mix Designer) to be submitted for acceptance by the Engineer (monthly).
- A maintenance procedure and plan (for client implementation).

4. SUBMITTALS

- Details and experience of Mix Designer, including PR Eng registration number.
- Copy of valid Professional Indemnity cover Certificate of Designer (Minimum value to be twice the value of the concrete works for each and every claim).
- List concrete requirement (to include, but not limited to):
 - The structures are exposed to industrial and municipal sewage.
 - Abrasion and chemical resistance required, mainly due to industrial waste.
 - Water tight structures, designed with a maximum crack width of 0.1mm and a minimum cover of 50mm.
 - The structures design life: 50 years.
 - The grade of concrete for all structures and structural elements = 35MPa cube strength @ 28days , 19mm stone
 - Shutters as proposed by contractor (Steel, timber, etc.)
 - Curing and shutter stripping as proposed by contractor.
 - Maximum heat of hydration = 24°C.
- Mix design (to include):
 - Materials, material origins, mix proportions and associated testing.
 - Cube test results for 3, 7 and 28 days (56 day test results can follow)
- Quality Assurance Management Plan (including post concreting inspections and sign offs).
- Remedial Maintenance Procedures and Suggested Remedial Maintenance Program.

5. SUPPLIERS WARRANTY

The contractor shall submit a written guarantee accompanied by substantiating data, stating that the products used are in accordance with or exceed these specifications.

In addition to the above, upon completion of works the Mix Designer shall submit all documentation to confirm constructed concrete works meet his design specifications and were correctly implemented on site.

G 3 MATERIALS

G 3.2 CEMENT

PS G 3.2.1 Applicable Specifications

Substitute sub-clause G 3.2.1 with the following:

All cement types shall comply with the requirements of SANS EN 197-1.

Only Ordinary Portland Cement (OPC) and Pulverised Fly Ash (P.F.A.) shall be used in all concrete for this Contract. No other types of cement (e.g. Rapid Hardening cement, PBFC or Milled Granulated Blastfurnace Slag) shall be permitted.

Pulverised Fly Ash (PFA) shall comply with the following specifications:

a)PFA shall be obtained from only one Power Station, from which the PFA has been approved for use in concrete by the SABS/SANS.

b)All PFA shall comply with the requirements of SABS/SANS 1466.1988.

Pulverised Fly Ash (PFA) shall be used as partial replacement of the Ordinary Portland Cement (OPC) in concrete. The maximum percentage by mass of PFA shall be 33% of the total cementitious material in the concrete, which is defined as the total mass of OPC and PFA, and shall be mixed before delivery to site.

The PFA/OPC Mix shall be stored in the same manner as that specified for OPC. When handled in bulk and stored in silos, the PFA/OPC mix shall require increased silo capacity, more efficient filters and aeration compared to OPC.

PS G 3.2.3 Storage of Cement

Substitute sub-clause G 3.2.3 with the following:

Cement which is stored on the Site shall be kept under a cover that provides adequate protection against moisture and other factors that may aggravate deterioration.

Where the cement is supplied in bags, the bags shall be closely and neatly stacked to a height not exceeding 12 bags, and they shall be so arranged that they can be used in the order in which they were delivered to the Site. Different brands and/or types of the same brand shall be stored separately.

The storage of cement in bulk in silos or similar containers shall be permitted, provided that the cement drawn for use is measured by mass and not by volume.

Cement shall not be kept in storage for longer than 6 weeks from the date of manufacture without the Engineer's permission.

The Engineer may order the removal of cement, which is older than 6 weeks, from the Site or the alteration of the design mix if he does allow its use. Alternatively, he may allow the cement to be used in concrete of less critical importance, as in blinding layers.

G 3.4 AGGREGATES

PS G 3.4.1 Applicable Specifications

Add the following to sub-clause G 3.4.1:

Fine Aggregate

Fine aggregate shall be clean, coarse, sharp drift, pit or river sand entirely free from vegetable or any other foreign matter and shall be in accordance with SANS 1083 (latest edition). It shall be screened and washed if directed by the Engineer. No dump or crusher sand shall be used.

Samples of the proposed fine aggregate shall be submitted to the Engineer for his approval before use.

The Contractor shall submit a sieve grading analysis to the Engineer for approval and if unacceptable, the Contractor shall offer another sample and grading for approval, or may blend aggregate from different sources and submit the blend for approval.

The water demand of the fine aggregate shall not exceed 195 l/m³.

Fine aggregate shall be stored on a concrete surface and washed sand shall be allowed to drain for at least 24 (twenty-four) hours before use. The Engineer may require the Contractor to test the sand daily (or more frequently if necessary) for moisture content, impurities and grading before use.

Coarse Aggregate

Coarse aggregate for concrete shall be hard, non-friable quartzite or other suitable rock, in accordance with SANS 1083 (latest edition) crushed and screened to the specified sizes, of good shape, clean and free from dust.

Coarse aggregate containing more than 19% (nineteen percent) shale will not be accepted.

Samples of coarse aggregate proposed to be used shall be submitted to and approved by the Engineer. Any broken stone delivered to the site which contains 5% more flaky and/or 10% more elongated particles than the approved sample will be condemned and shall be removed from the site. Voids ratio shall not exceed 47% (forty-seven percent).

PSG 3.4.2 Use of Plums

Substitute sub-clause G 3.4.2 with the following:

The use of plums will not be permitted.

G 3.5 ADMIXTURES

PS G 3.5.2 Air-entraining Agents

Substitute sub-clause G 3.5.2 with the following:

Air-entraining agents shall not be used in concrete.

G 4 PLANT

G 4.5 FORMWORK

PS G 4.5.2 Finish

Add the following to sub-clause G 4.5.2:

All external corners shall be chamfered by the fixing of fillet strips into the corners of the formwork to form 25 mm x 25 mm chamfers, all at no extra payment.

PS G 4.5.3 Ties

Add the following to sub-clause G 4.5.3:

Permanent metal ties shall have a minimum concrete cover of 40 mm after formwork has been removed.

Tie holes shall be filled with an approved expansive cementitious grout similar to "Durabed" of ABE. The product shall be prepared to a non-slump consistency, but where no cracking occurs when pressed into a firm ball. Trial mixes shall be made to arrive at the required working consistency.

G 5 CONSTRUCTION

G 5.1 REINFORCEMENT

PS G 5.1.2 Fixing

Add the following to sub-clause G 5.1.2:

The Engineer will inspect the reinforcing after it has been fixed in place, the formwork has been cleaned, cover blocks have been positioned, and before concreting commences.

The Contractor shall inform the Engineer when the reinforcement is ready for inspection. Welding of reinforcing steel will not be permitted.

PS G 5.1.3 Cover

Substitute sub-clause G 5.1.3 with the following:

The cover of concrete over reinforcement, unless otherwise indicated on the drawings, shall in no case be less than 40 mm.

PS G 5.2.1 Classification of Finishes

Add the following to sub-clause G 5.2.1:

The following surface conditions are required on the various portions of the finished concrete:

(a) **Rough**

Concealed surfaces and surfaces more than 100 mm below final ground level.

(b) **Smooth**

All surface finishes not classified as "rough" in paragraph (a) shall be classified as "smooth". All exposed arrises (i.e. where the angle between adjacent sides is 110° or less) unless otherwise indicated on the drawings, shall be chamfered 20 mm x 20 mm by means of triangular fillets fixed to the formwork.

(c) **Special smooth, repaired and rubbed**

This shall be for formed surfaces of structures prominently exposed to public view where appearance is of special importance. Formwork shall only be of approved plywood, approved commercial formboard or smooth tongue-and-groove boards, except that in certain cases such as for pre-cast units permission may be granted to use steel formwork provided that sufficient vibration is used. After defects have been repaired, as described in paragraph (e), all ridges, nail marks and other projections shall be removed with carborundum stone. After the treatment the surface shall then be kept continuously wet for 10 days after which period of additional curing it shall be allowed to approach surface dryness immediately prior to treatment by sack rubbing in order to secure a degree of suction most favourable for obtaining good bond. A soft mortar consisting of one part cement and two parts sand passing the 1,18 mm sieve shall be thoroughly rubbed over the entire exposed surface with clean hessian, completely filling all pits and irregularities. The mortar consistency shall be that of thick cream. At a sufficient interval after the sack rubbing to prevent smearing, but before the mortar hardens, most of the excess mortar shall be removed by rubbing with clean hessian. After the mortar has set for several hours, curing shall be resumed and continued for at least two (2) days. The surface shall then be allowed to become surface dry and in this condition well sanded with no. 2 sandpaper.

Imperfections such as small fins, bulges, irregularities, surface honeycombing, and slight surface discolorations shall be made good and repaired by approved methods including rubbing down or grinding to the complete satisfaction of the Engineer. The finish of the concrete shall be accurate to Degree of Accuracy I (one) as defined in terms of Clause 6 of SANS 1200 G (also see section 5.5.10.3).

(d) **Exposed arrises**

All exposed arrises (i.e. where the angle between adjacent sides is 110° or less) unless otherwise indicated on the drawings, shall be chamfered 20 mm x 20 mm by means of triangular fillets fixed to the formwork.

(e) **Repair of New Concrete Cast under this Contract**

Immediately after the removal of the formwork, the Engineer shall inspect the concrete for defects. Skilled workmen only shall perform all repairs of such defects, by approved methods and to the satisfaction of the Engineer and at the expense of the Contractor.

Repairs shall be carried out as soon as practicable after the removal of the formwork and in any case not longer than twenty four (24) hours after exposure. Concrete that is damaged from any cause and concrete that is honeycombed, fractured or otherwise defective, and concrete which, because of excessive surface depressions must be excavated and built up to bring the surface to the prescribed lines, shall be removed and replaced with mortar or concrete as hereinafter specified or as otherwise directed by the Engineer.

Concrete filling generally of the same class as the damaged concrete shall be used for holes extending entirely through concrete sections and of such a size as will accept concrete and for holes in mass concrete greater in area than 0,1 m² and deeper than 100 mm and for holes in reinforced concrete which are greater in area than 0,15 m² and which extend beyond the reinforcing. Mortar filling composed of sand and cement in the same proportions as used for the concrete and of a consistency such as will make the mortar sufficiently plastic to be easily placed, shall be used for all other imperfections.

A filling shall be bonded tightly to the surface of the area being repaired and shall be bound and free from shrinkage, cracks and hollow areas after the filling has been cured and dried. Curing of repaired areas shall be performed in such a manner and for such periods as the Engineer may direct.

Particular care shall be exercised to ensure that the colour of the repair work shall match as nearly as possible to the colour of the surrounding concrete. No cement washing or plastering shall be carried out except on the written instruction of the Engineer.

PS G 5.2.2 Preparation of Formwork

Add the following to sub-clause G 5.2.2:

The joints between continuous formwork elements shall be closely butted and, where necessary, if undue leakage is expected, the joints shall be caulked, taped or packed with a sealing gasket, all at no extra payment. Paper, cloth or similar materials shall not be used for this purpose.

PS G 5.4 PIPES AND CONDUITS

Add the following to sub-clause G 5.4:

All pipes and specials, which must be installed in the floors and walls of structures, shall be embedded in the concrete during the casting of such concrete. No holes shall be left for the later installation of pipes and specials, without the written approval of the Engineer.

Where such holes have been approved by the Engineer, the Contractor shall be responsible for the grouting-in of such pipes or specials with an approved expansive cementitious grout as specified in PS G 4.5.3, regardless of whether or not these have been supplied by himself. The Contractor shall provide a smooth, dense and waterproof finish around the pipes or specials.

The clear space between pipes of any kind embedded in reinforced concrete and the clear space between such pipes and reinforcement shall at any point be not less than -

- (a) 40 mm, or
- (b) 5 mm plus the maximum size of coarse aggregate,

whichever is the greater.

PS G 5.5 CONCRETE

PS G 5.5.1.2 Consistency

Add the following under sub-clause 5.5.1.2(a):

The slump for concrete to be used in water retaining structures shall not be less than 30 mm and not more than 60 mm.

PS G 5.5.1.3 Workability

Add the following to sub-clause 5.5.1.3:

The concrete mix to be used in water retaining structures shall have a water/cement ratio not exceeding 0,5.

PS G 5.5.1.5 Durability

Substitute sub-clause G 5.5.1.5 with the following:

Concrete shall be so proportioned to ensure that the water/cement ratio does not exceed 0,5 and, to ensure workability, water-reducing admixtures of approved manufacture shall be used in preference to increasing the cement content.

PS G 5.5.1.7 Strength Concrete

Add the following to sub-clause G 5.5.1.7:

The concrete mix shall be designed by a specialist organization. No concrete shall be placed until the Contractor's concrete mix design has been approved by the Engineer. The Contractor shall submit to the Engineer a statement of the mix proportion proposed, together with a report from the specialist organization, showing the 28 day concrete strength obtained when using the material proposed for the work. The cost of the concrete mix design shall be borne by the Contractor and shall be deemed to be included in the rates for concrete work.

Admixtures may be used to increase the workability of the concrete but only with the express approval of the Engineer and when the details of the active ingredients of the admixture and their effects are supplied to the Engineer for approval before use. No additives likely to impair low permeability of the concrete will be approved. Calcium chloride or admixtures containing chlorides may not be used in concrete for water retaining structures. Other admixtures and constituents may only be used with the approval of, or as specified by the Engineer.

The grade of strength concrete and the maximum nominal size of coarse aggregate for each portion of the works, unless otherwise indicated on the drawings, shall be as follows:

- (a) Blinding layers 20 MPa/19 mm
- (b) Benching and screeds 20 MPa/10 mm
- (c) Mass concrete 20 MPa/19 mm
- (d) Encasing of pipes 20 MPa/19 mm
- (e) Strip foundations 25 MPa/19 mm
- (f) All reinforced concrete 35 MPa/19 mm

PS G 5.5.9 Adverse Weather Conditions

Add the following to sub-clause G 5.5.9.1:

No material having a temperature of below 5 °C shall be used for concrete, and no concrete shall be deposited when the ground or air temperature is below 2 °C. Furthermore, if the air or ground temperature is likely to fall below 2 °C within 12 (twelve) hours after depositing of concrete, no

concreting shall be done without the written consent of the Engineer. If such consent is given the Contractor shall heat the aggregate stockpiles and mixing water, and defrost the formwork and reinforcement.

PS G 5.5.10.1 Concrete Surfaces

Add the following to sub-clause G 5.5.10.1:

Concrete surfaces under screeds, granolithic floor finishes or benching, and surfaces of strip foundations and footings shall be brought up to a plane, uniform surface with a suitable screed board.

PS G 5.5.11 Watertight Concrete

Substitute sub-clause G 5.5.11 with the following:

PS G 5.5.11.1 General

All structures that are designed to retain water or to keep water out, shall be regarded as watertight structures.

PS G 5.5.11.2 Requirements and Tests for Watertightness of Structures

The completed structure shall be watertight, and the quality and finish of the work shall be such that no after-treatment of the work (such as plastering or cement wash) is necessary to ensure compliance with this requirement.

The works will not be certified complete until the structures enumerated in PS G 5.5.11 has been proved by testing to be watertight.

Upon completion of construction and when so agreed by the Engineer, the structure shall be filled by the gradual admission of water until, the water level reaches the designed maximum level. The water level shall then be carefully noted and recorded by the Engineer in relation to a fixed bench mark, and the structure shall be allowed to remain filled for a period of two (2) weeks or such longer time as may be required to permit complete saturation of the concrete. During this period, readings will be taken by the Engineer and the results so obtained will be available for the information of the Contractor.

At the end of this period more water shall be added, if necessary, to bring the water level back to the designed maximum level and the water shall be left undisturbed for a period of at least four (4) days during which time the level shall again be recorded by the Engineer at regular intervals. The structure shall be considered to be watertight if the drop in water level does not exceed 6 mm in 96 (ninety six) hours in the case of a roofed structure and if no leakage is apparent.

The acceptable drop in level in the case of an unroofed structure shall be such that it allows for normal evaporation during the time of the test.

If appreciable leakage is evident at any stage of the filling or testing or if, in the opinion of the Engineer, the degree of watertightness is unsatisfactory, the Contractor shall, when so ordered by the Engineer, discontinue the test immediately and at his own expense take approved steps to rectify the work. The work of rectification shall be continued assiduously until, on repetition of the test procedure, a satisfactory test result is obtained and the degree of watertightness is acceptable.

The Engineer shall have the right to retest the structure before the expiry of the period of maintenance and the results of these tests will be made available to the Contractor. If these tests indicate to the Engineer that the degree of watertightness is unsatisfactory, the Engineer (before issuing the final certificate) will be entitled to order the Contractor to rectify the work at his own expense in such a manner as will cause least interruption to the running of the works and will ensure that the degree of watertightness of the structure is satisfactory.

Backfilling around structures shall not commence until a satisfactory test result has been obtained.

The Engineer shall have the right to retest the structure before the expiry of the period of maintenance, and the results of these tests will be made available to the Contractor. If these

tests indicate to the Engineer that the degree of watertightness is unsatisfactory, the Engineer (before issuing the final certificate) will be entitled to order the Contractor to rectify the work at his own expense in such a manner as will cause least interruption of the water supply to consumers and will ensure that the degree of watertightness of the structure is satisfactory.

PSG 5.5.13 Grouting

Add the following to sub-clause G 5.5.13:

PS G 5.5.13.1 Materials

- (a) Water. Water for grout shall comply with the requirements given in sub-clause 3.3 of SANS 1200 G.
- (b) Aggregates. Notwithstanding the requirements of sub-clause 3.4.1 of SANS 1200 G, the grading of fine aggregate (sand) and coarse aggregate (stone or pea gravel) shall conform to the gradings given in Tables 1 and 2, respectively, below.
- (c) Cement. Cement shall be ordinary portland cement.
- (d) Admixtures. Admixtures shall comply with the requirements of sub-clause 3.5 of SANS 1200 G and shall have a proven record of satisfactory performance under conditions encountered in the Republic of South Africa.
- (e) Proprietary grouting materials. Unless otherwise approved by the Engineer, proprietary grouting materials shall be obtained ready mixed in sealed pockets as supplied by the manufacturers.

TABLE 1 - SAND		TABLE 2 - STONE OR PEA GRAVEL	
1	2	1	2
Test sieve nominal aperture size, mm	% Passing (by mass)	Test sieve nominal aperture size, mm	% Passing (by mass)
9,75	100	9,5	100
4,75	95 - 100	4,74	95 - 100
1,18	45 - 65	2,36	0 - 5
0,3 (300 µm)	5 - 15		
0,15 (150 µm)	0 - 5		

PS G 5.5.13.2 Preparation and Procedures

- (a) Before a machine or structural bedplate is placed on the concrete the following steps shall be carried out:
 1. All defective concrete, laitance, dirt, oil, grease, and loose material shall be removed from the concrete foundation by bush-hammering, chipping, or other means until sound clean concrete is obtained. The surface of the foundation shall be scabbled, but shall not be so rough as to interfere with proper placing of the grout. All foundation bolt sleeves shall be cut out, or cut off flush if the sleeves cannot be removed. The top of the foundation shall be re-shaped if necessary.
 2. The underside of each steel base, particularly in the bearing areas, shall be cleaned and any burrs and ragged edges removed before the base is placed in its final location.
 3. All holding-down bolt sleeves shall be thoroughly cleaned of any materials that may prevent the grout from flowing freely to the bottom of the bolt sockets.
- (b) The base shall be properly aligned and levelled and shall be maintained in that position during grouting.

- (c) After the machine or structural bedplate has been placed the following precautions shall be observed:
1. Shimming shall be kept to a minimum. Steel plates shall be used for packing and shall be ground to the required thickness, where necessary.
 2. Before grouting is started all loose dirt, oil, grease, and other foreign matter on the surface of the foundation, the undersides of bedplates, and in the bolt holes shall be removed by means of compressed air or other approved means. The surface of the foundation slab shall be thoroughly saturated with clean water, and all free water shall be removed from the surface and the bolt holes just before the grout is placed.
 3. Grouting shall not be carried out until the alignment of all units to be grouted has been checked and approved by the Engineer.
 4. Special care shall be taken with grouting in hot or cold weather to ensure proper setting and gain of strength and, in the case of proprietary grouting materials, by having ice or hot water available, as the case may be, in accordance with the instructions of the manufacturer. Enclosures shall be provided for the grout such that, until it has set, its temperature will be in the range 15-27°C.

Shields to protect the grout from the sun and from hot winds shall be provided by the Contractor when so ordered.

PS G 5.5.13.3 Formwork

Formwork for grouting shall comply with the applicable requirements of sub-clause 5.2 of SANS 1200 G. Forms shall be caulked where necessary. Adequate clearance between forms and bedplates shall be provided to enable the grout to be worked into place.

PS G 5.5.13.4 Mixing (all free-flowing grouts except epoxy grouts)

The grout shall be mixed to a homogeneous uniform mixture and delivered ready for placing at a temperature between 15°C and 25°C.

The materials and water shall be mixed in a mortar mixer for at least 3 min. or, in the case of small jobs only, shall be thoroughly mixed by hand, the entire mass being turned over enough times to ensure even distribution of its components.

The mixing shall be done as close as possible to the place(s) where the grout is placed. No more grout shall be mixed at any one time than can be placed in a period of 20 min. After the grout has been mixed it shall not be re-tempered by the addition of water.

PS G 5.5.13.5 Grouting (all free-flowing grouts except epoxy grouts)

The grout shall be placed quickly and continuously to avoid the undesirable effects of over-working. (These effects are segregation, bleeding, and breaking-down of initial set). The method of placement shall be subject to approval. The means of placing the grout shall be such that the grout will completely fill the space to be grouted, will be thoroughly compacted, will be free of air pockets, and will have evenly distributed contact over an area in excess of 80% or, in the case of expanding grout, 95% of the bearing area of the item to be supported.

Wherever practicable, grout shall be placed from one side only and where this is not practicable, care shall be taken to ensure that any entrapped air is released.

After the grout has taken its initial set,

- (a) the forms shall be removed;
- (b) excess grout shall be so cut away as to leave a smooth and neatly finished job;
- (c) except where the grout is intended to provide resistance to side thrust, all edges shall be trimmed at 45° to the vertical, from the bottom edge of the bedplate; and
- (d) all excess grout on or about the bedplates shall be removed.

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Damage to paintwork, if any, shall be repaired within 24 hours. Packing plates, shims, and other levelling devices shall remain in position.

PS G 5.5.13.6 Dry-packed grout (standard dry sand and cement grout)

Dry-packed grout shall have a minimum compressive strength at 28 days of 20 MPa. The quantity of water added after placing shall be kept to a minimum consistent with placing conditions, and the cement, sand and, where applicable, pea gravel proportions by mass shall be as follows:

- (a) Where the clearance between bedplate and foundation is 25 mm or less : 1 part of portland cement and 2 parts of sand;
- (b) where the clearance exceeds 25 mm: 1 part of portland cement, 1 part of sand, and 1 part of pea gravel.

Dry-packed grout shall be rammed by means of tamping rods against formwork placed along three sides of the bedplate.

PS G 5.5.13.7 Non-shrink grout with metallic aggregate

The manufacturer's instructions shall be observed when non-shrink grout with metallic aggregate is used.

Where the clearance between the bedplate and the foundation is less than 50 mm a sand-based mix shall be used. Where the clearance exceeds 50 mm the Engineer may order a mix with a base of sand plus pea gravel to be used.

PS G 5.5.13.8 Expanding grout with powdered aluminium additive

The manufacturer's instructions shall be observed when an expanding grout with powdered aluminium additive is used. Where the clearance between the bedplate and the foundation is less than 25 mm, a sand-based mix shall be used.

Where the clearance exceeds 25 mm the Engineer may order mix with a base of sand plus pea gravel to be used.

Each batch shall be mixed for at least 6 min. after the powdered aluminium has been added. Where a ready-mixed grout is used, the powdered aluminium shall be added at the placing site and the batch mixed as specified. Grout shall be placed within 45 min. after the addition of the powdered aluminium.

The Contractor shall not use powdered aluminium additive when the ambient temperature is below 5°C.

PS G 5.5.13.9 Epoxy grout (epoxy mortar type only)

The manufacturer's instructions shall be observed when an epoxy grout is used.

PS G 5.5.13.10 Testing

The Contractor shall, where so ordered, carry out a site test for each grouting procedure and each grouting gang to be used. The tests shall be carried out on a dummy bedplate similar in configuration to that which is to be grouted, but not exceeding 1 m in area unless otherwise ordered.

When the dummy bedplate is dismantled, the underside shall show a minimum grout contact area of 80% with reasonably even distribution of the grout over the surface grouted except that, in the case of expanding grout, the minimum grout contact area shall be 95%. The test shall show evidence of good workmanship and materials and the results shall be to the satisfaction of the Engineer.

The Contractor shall, when so ordered, make standard test cubes from various grout mixtures and subject them to compression tests to determine whether the specified strength has been achieved. Test procedures shall comply with the relevant requirements of sub-clause 7.2.1 to 7.2.3 SANS 1200 G.

PS G 5.6 NO-FINES CONCRETE

Add new sub-clause G 5.6:

PS G 5.6.1 Materials

Cement shall be CEM II.

Water and aggregate shall comply with the requirements of sub-clauses G 3.3 and PS G 3.4.

Each size of aggregate shall be a single size aggregate graded in accordance with SANS 1083.

PS G 5.6.2 Classes of No-fines Concrete

No-fines concrete shall be classified by the prefix NF and the size of aggregate to be used. Class NF 19 means a no-fines concrete with a 19 mm nominal size aggregate.

The volume of aggregate per 50 kg of cement for each class of concrete shall be as follows:

CLASS	AGGREGATE PER 50 kg CEMENT
NF 38	0,33 m ³
NF 19	0,30 m ³
NF 13	0,27 m ³

PS G 5.6.3 Batching and Mixing

Cement shall be measured by mass or in full pockets of 50 kg each and aggregate shall be measured by volume in approved measuring boxes or barrows.

The aggregate shall be moist or wetted before the cement is added. Where drum mixers are used, about 20 % of the water shall be poured into the drum before the aggregate and cement are loaded. The mixing time in the drum shall be about 45 to 50 seconds.

The quantity of water added shall be just sufficient to form a smooth grout which will adhere to and completely coat each and every particle of aggregate, and which is just wet enough to ensure that, at points of contact of aggregate, the grout will run together to form a small fillet to bond the aggregate together. The mix shall contain no more than 20 litres of water for every 50 kg of cement.

Mixing shall be done in an approved batch-type mechanical mixer, but small quantities may be hand mixed.

PS G 5.6.4 Placing

No-fines concrete shall be placed in accordance with the procedure approved by the Engineer. It shall be placed in its final position within 15 minutes of having been mixed.

The concrete shall be worked sufficiently to ensure that it will completely fill the space to be concreted and that adjacent aggregate particles are in contact with one another. Excessive tamping shall be avoided and the concrete shall not in any circumstances be vibrated.

PS G 5.6.5 Protection

All no-fines concrete shall be protected from the elements and loss of moisture. Protection against loss of moisture shall be accomplished by one or more of the following methods:

- a) Retaining formwork in place;
- b) Covering exposed surfaces with sacking or other approved material kept continuously wet;

c)Covering exposed surfaces with plastic sheeting.

No-fines concrete placed during cold weather shall be adequately protected against frost for at least three (3) days.

PS G 5.7

JOINING NEW CONCRETE TO EXISTING

Add new sub-clause G 5.7:

Fresh concrete shall be bonded to the old concrete with an approved type of epoxy bonding compound, such as Epidermix 344 or similar.

SPEC V: STANDARD SPECIFICATIONS FOR EXPLORATORY CORE DRILLING WORK

1 SCOPE

This Specification covers the drilling and borehole construction aspects required for the exploratory and monitoring boreholes through core drilling, and that shall be implemented during the construction and/or plant installation and/or dismantling work specified below and shown in the Schedule of Rates. It covers temporary and permanent work.

The specific objectives and requirements vary between the different types of boreholes and selected drilling methodology;

- a) Exploration boreholes:
 - i) ability to establish the lithology at a given accuracy of at least 1cm or finer, and as directed by the Engineer
 - ii) borehole construction to allow for yield testing, as directed by the Engineer
- b) Monitoring boreholes:
 - i) As per exploration borehole plus
 - ii) Ability to establish long-term monitoring equipment in borehole, as directed by the Engineer
 - iii) Ability to take water samples representative of the surrounding aquifer

This Specification does not replace, take precedence over nor detract from the standard good practice of drilling. Nothing in this Specification shall relieve the Contractor of any obligations or responsibilities with regard to quality and good practices on site.

2 ESTABLISHMENT OF DRILL RIG(S) AND ANCILLARY EQUIPMENT IN THE PROJECT AREA

2.1 Description

This subsection addresses the establishment in the project area of drill rig(s), ancillary equipment and materials necessary to undertake the work and successfully complete the Contract. It includes the dismantling and removal of the drill rig(s) and ancillary equipment and materials following completion of the project or termination of the contract, whichever comes first.

A drill rig shall be regarded as a drilling machine of the required type, properly mounted and in full working order, together with all ancillary equipment (compressors, pumps, tools and other accessories) needed to execute the required work properly and efficiently.

It is anticipated that one rotary diamond core drilling rigs will be required. Should additional rigs be required, written approval from the Engineer shall be obtained before establishment of each additional rig.

2.2 Measurement

The quantity to be paid for the establishment of drill rig(s) in the project area shall be made according to the number of rigs employed by the Contractor for the work as indicated in the Schedule of Rates, and certified by the Engineer in writing following their deployment to a work site.

2.3 Payment

The price tendered and specified for each drill rig shall include full compensation for the supply and transport of the rig and all accompanying equipment, materials, tools and accessories needed for its operation, to and from the project area at the start and end of the contract respectively.

The supply and use of an additional compressor and or hydraulic water hammer is considered extra-over and will be paid for separately. The consumption of the extra diesel for the use of the additional equipment will be paid for per litre brought to site, as measured.

The Contractor will be entitled to claim the price tendered for each drill rig established in the project area at the start of a works project, and the price tendered for each drill rig de-established following completion or termination of the works or contract.

3 SET UP AND REMOVAL OF DRILL RIG AT EACH BOREHOLE

3.1 Description

This subsection addresses the setting up of individual drill rigs at each work site, and their subsequent removal after completion of the borehole. The rates tendered shall be deemed to include for transport to and the subsequent removal of labour, plant or any other incidentals necessary for the operations from each borehole position. Distinction shall be made between the type of rig used at each borehole, as follows:

- Mobile Core Rig : a rig mounted on tracks, a truck, trailer or other wheeled vehicle which may be driven or towed to a borehole position.
Skid-mounted Rig : a rig which does not classify as a mobile rig.

The type of rig to be employed at any borehole shall define the payment rate under which the set up and removal will be made, subject to the approval of the Engineer. Should the Contractor utilize a rig type different to that specified and approved by the Engineer, payment shall be made according to the type originally specified unless the Contractor can prove that the use of the rig type originally specified was impractical. In this regard the Contractor should note the following:

- a) The provisions of subsection 4 "Access to Borehole Site" which covers the cost of establishing access to the site.
- b) The provisions of the Environmental Management Specification and relevant payment items, which covers the cost of site clearance at the drill site.
- c) The boreholes shall be located at the positions as indicated on the drawings supplied, and/or as detailed in writing by the Engineer to the Contractor, and/or as marked in the field and shown to the Contractor by the Engineer. Each site will be shown to the Contractor by the Engineer well in advance of the set up.
- d) Some clearing of rocks and bush, as may be classified as reasonable by the Engineer within the framework of the EMP, may be required to provide access for a mobile rig to a borehole site. If unreasonable clearing for access is required, this will be paid for in accordance with subsection 4 or as extra work as defined in the General Conditions, as may be decided by the Engineer.
- e) The area to be cleared will be agreed between the Engineer and the Contractor and should be clearly marked. This area shall not be exceeded without prior discussion with and written approval from the Engineer.
- f) If it is necessary to dismount the rig from the crawler, trailer, truck, etc. at the borehole site in order to carry out the actual drilling operation, this will be measured as a mobile rig set up.
- g) The Contractor shall take all steps necessary to protect existing survey pegs, reference pegs, benchmarks and work area demarcation markings, and shall re-establish such at own expense should they be disturbed as a result of activities on site.
- h) The Contractor shall be responsible for the safety of any survey beacon or benchmark encountered on site, as well as for any costs incurred in replacing damaged beacons or benchmarks, and attention is drawn to Sections 35 and 36 of the Land Survey Act (Act No. 9 of 1927, as amended) which makes the removal of any beacon or benchmark an offence and provides for the correct procedure to be adopted where moving is required.

Rigs shall be securely anchored to be able to provide the necessary reaction to drilling and to prevent movement of the rig relative to the borehole. It may be necessary to provide a concrete drilling platform to which the rig is anchored, and a suitable tripod to permit the pulling of rods and core.

Before drilling commences at any hole, the Engineer's approval of the set-up of the rig will be required, and after completion of the hole, the rig shall not be removed without the Engineer's approval. For this approval before and after drilling of the hole, the Contractor must allow the Engineer, except if other arrangements have been negotiated, a waiting period of 12 working hours (each) before any standing time in accordance with subsection 15 may be claimed.

3.2 Measurement

The set ups ordered by the Engineer shall be measured by number for the type of rig employed. Setting up on inclined holes shall be measured extra over normal set ups for mobile or skid mounted rigs, as may be the case.

The movement of the rig between boreholes shall be included in the cost for the set-up for distances up to 1 km. The unit of measurement for the distance moved between boreholes, by the shortest practicable route as approved by the Engineer, shall be per kilometre measured in excess of 1 km.

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3.3 Payment

The price tendered and paid for shall include the supply, transport and placement of all materials, inclusive of the required personnel, supervision, labour, plant, equipment, tools and other incidentals necessary for the preparation of each borehole site, the erection of the rig with all accessories necessary to carry out the operations required at the hole and the subsequent removal from that borehole, including the removal of all embankments, drilling fluid circulation trenches, platforms and any other temporary works. Where borehole sites are located further than 1 km apart, the Contractor shall be reimbursed for each kilometre in excess of that deemed to be included in the set-up rate.

4 ACCESS TO BOREHOLE SITE

(Dependent on and subject to the conditions that are outlined in subsection 3 and the Standard Specification for Environmental Management)

4.1 Measurement

Establishing access to drill sites shall be measured by the time taken to establish suitable site access within the framework, guidelines and terms of the EMP for personnel, supervision, labour, plant, equipment, tools and other incidentals necessary for setting up the drill rig in accordance with subsection 3. The unit of measurement shall be man-hours expended by the labour employed for this task.

4.2 Payment

The Contractor shall be entitled to claim for this item at the hourly rate of the labour employed.

5 ROTARY CORE DRILLING

5.1 Description

This subsection addresses diamond core drilling through various categories of soft and hard material. Suitable diamond core drilling equipment of the type which will permit full core recovery shall be used.

At the commencement of drilling each hole, the Engineer shall indicate to the Contractor the expected depth to which the hole is to be drilled, measured from the level from which drilling is to commence. The Engineer, however, reserves the right to vary the required depth of the hole at any stage during the drilling of that hole. This includes ordering the premature curtailment of the drilling operation.

To prevent undue delays, the Contractor shall give the Engineer 12 working hours' notice of when it is anticipated that the required depth will be reached in any particular hole. In any event, no drill rig shall be dismantled and moved away from any particular hole on reaching the required depth until the Contractor is notified in writing by the Engineer that the rig may be moved. The Engineer may order the re-establishment of any drill rig moved away without written authority, and such work shall then be carried out at the Contractor's expense and no further payment for setting up the rig will be made. Authority to move a rig on completion of drilling shall not be withheld unreasonably. A delay exceeding 12 working hours in the granting of authority to move a drill rig after completion of a borehole shall entitle the Contractor to standing time according to subsection 15. Each drill rig used on this Contract by the Contractor shall be under supervision of a competent drilling supervisor who is experienced in drilling in the types of formation expected on the site and who is capable of completing the daily drilling records.

On completion of a borehole, and unless any instructions to the contrary are given by the Engineer, the hole shall be sealed and made safe to the satisfaction of the Engineer in accordance with subsection 8 and/or 17.

In general, all drilling shall be at least N-size when using either wireline or standard core drilling. Inclined holes shall be defined as all holes inclined at an angle greater than 20° measured from the vertical. The drilling size may be reduced with the approval of the Engineer.

The Contractor shall, unless otherwise specified or agreed to by the Engineer, strive for continuous core recovery whenever possible in both hard and soft material. This aspect is addressed in greater detail in subsection 7.

The artesian discharge shall be measured by means of an appropriately constructed and installed V-notch capable of measuring flows up to 100 l/s. The discharge shall be monitored for changes, and the measurements recorded in the driller's log together with the drilling depth associated therewith. No payment shall be made for the recording of artesian discharge rate, and allowance must be made in the core drilling rates tendered for the costs incurred.

If the drilling equipment should become stuck or lodged in a borehole or if, for any other reason, further drilling is not possible in that hole, the Contractor shall immediately notify the Engineer who will then decide if:

- a) the hole is drilled deep enough to be considered acceptable, in which case payment for drilling to the attained depth will be made, or
- b) the depth drilled is insufficient and that a new hole shall be drilled, in which case no payment will be made for the unacceptable hole, unless the failure to continue is due to unforeseen subsoil or geological conditions, in which case payment will be made for both the abandoned hole and the new hole. The Engineer shall in this event have due regard to the conditions encountered in already completed holes and the precautions taken by the Contractor to prevent loss of the hole.

The Contractor shall make all arrangements for the supply of water for drilling, and only a sum payment will be made for this item. Any additional costs related to this item shall be included in the rate for drilling.

5.2 Measurement

The quantity to be paid for shall be the linear metres actually drilled to the satisfaction of the Engineer. All measurements of depths drilled shall be made from the mean ground level in the immediate vicinity of the borehole. Reaming shall not be measured and paid for under this subsection.

5.3 Payment

The price tendered and paid for each metre drilled shall include full compensation for the supply of all labour, supervision, tools, drilling fluids, equipment, plant and incidentals necessary to complete the work as specified in this subsection, including core recovery as per the requirements of subsection 7.

Payment for drilling in very closely fractured material shall be extra over the payment made for drilling of material categorised as hard, very hard and extremely hard. Very closely fractured material is defined as rock containing uncemented joints or fractures inclined at an angle of less than 45° to the axis of the borehole, which occur at a consistent average spacing of less than 25 mm for a drilled length in excess of 300 mm, and which separate on drilling.

Payment for drilling with a triple tube core barrel shall be made under this subsection and shall be paid extra over the appropriate rate.

No payment shall be made under this subsection for any other rotary drilling undertaken for which there is a specified rate in any other subsection. This refers inter alia to drilling through boulders, the use of drilling mud, etc.

The provision of water on site for all drilling activities will be paid for as a sum for all sites.

6 CORE RECOVERY

6.1 Description

This subsection addresses the recovery of core obtained during drilling in materials requiring to be cored. Unless instructed or agreed to by the Engineer, continuous core recovery or sampling shall be striven for at all times. Core barrels exceeding 3 m in length shall not be used unless approved by the Engineer in writing.

In the event of unsatisfactory core recovery prevailing, the following shall apply:

- a) Should poor core recovery result from poor equipment and/or poor drilling technique and/or inexperienced drill operators, the Engineer may direct that improved equipment be brought to the site, a different drilling technique be employed, a more experienced driller be employed or a combination of these remedies be applied. No extra payment shall be made for compliance with such directives, nor shall unsatisfactory work be paid for.
- b) Where loose, friable material which is unable to be satisfactorily retained in the core barrel is encountered, the Engineer shall consult with the Contractor to determine what should be done to improve core recovery, such as using triple tube or Craelius barrels, and instruct the Contractor accordingly. The Contractor shall be paid for the work done according to the appropriate item(s) requested, and for any additional work ordered.
- c) The Engineer may insist that shorter drilling runs be used to facilitate core recovery.

The decision of the Engineer in the above regard shall be final.

Core shall be placed in the core boxes directly from the core barrels, and shall be in the correct order as they were drilled. Suitable permanent markings, not further than 1 m apart, or at the end of each core run

if these do not exceed 1.5 m, shall be made on the core itself to indicate the depth of sampling. In addition, wooden spacer blocks shall be used at suitable intervals to prevent the core from moving in the box during transport.

If core is lost, mixed up, destroyed or rendered useless for identification purposes in any way before final acceptance by the Engineer, the Contractor shall be required, entirely at his own cost, to re-drill, re-sample and deliver new core to the Engineer.

The rate for core recovery shall not be less than 30 % of the rate for rotary core drilling (subsection 5) or drilling through boulders (subsection 6), unless the Contractor can prove that this ratio is not applicable.

6.2 Payment

The core recovery is included in the tendered rate for drilling as defined in section 5.3.

7 SHUT OFF OF ARTESIAN CONDITIONS

7.1 Description

This subsection addresses the installation of grouted casing, cut-off valves and any other materials and equipment necessary to prevent artesian boreholes from overflowing.

It is expected that under certain conditions, boreholes may intersect water under sufficient hydrostatic pressure to cause the artesian flow of water from a borehole. Hydrostatic pressure at surface is not expected to exceed 10 bar (1 000 kPa). A completed artesian borehole may not be allowed to discharge on surface either through the casing or via the annulus between the casing and the borehole sidewall. Each borehole must therefore be equipped with a suitably fixed and grouted casing early in its establishment phase, so that a cut-off valve can be fitted to control any artesian discharge that occurs. The depth to which casing for artesian shut off purposes should be inserted will be informed by the nature of the strata intersected during the first phase of percussive drilling that will serve as "platforms" for the vertical core boreholes in accordance with subsection 5.1.

The initial drilling would entail percussive drilling, equipped with casing (nominal inside diameter sufficient to allow the passage of an H-size bit) and the casing grouted to ensure proper sealing of the annulus. Grouting must be done through the casing and not in the annulus. The depth of drilling will depend on the depth of bedrock. The Engineer will determine when to stop drilling.

Should overflowing artesian conditions be encountered or anticipated, a cut-off valve with pressure meter must be fitted, as required by the Engineer, so that the water can be completely stopped from discharging. The pressure meter must allow for automatic and continuous recording onto a digital data logger.

Should overflow conditions not be encountered, then a lockable borehole cap must be installed according to subsection 17.

The Contractor shall supply the Engineer with a written register of the casing inserted into the borehole. Specified in this register shall be the length, size and type of casing, borehole number and the surface coordinates of the borehole.

7.2 Measurement

The price tendered and paid for each metre drilled and casing installed shall include full compensation for the supply of all labour, supervision, tools, equipment, plant and incidentals necessary to complete the work as specified in this subsection, including core recovery as per the requirements of subsection 7.

Materials, equipment and instruments used to seal a borehole under artesian discharge conditions will be measured per unit installation. A lockable borehole housing and lock used to seal a borehole under non-flowing artesian conditions will be measured per unit installation.

7.3 Payment

The price tendered for each artesian shut off installation shall include full compensation for the supply, installation and placement of all materials, labour, tools, equipment, plant and incidentals necessary to complete the work as specified in this subsection.

Drilling through the grouted section shall be measured and paid for according to specifications in subsection 5.

8 CASING OF BOREHOLES FOR DRILLING PURPOSES

8.1 Description

This subsection addresses the supply, delivery and installation of casing necessary for drilling, and the removal/recovery or abandonment thereof, as instructed by the Engineer.

On completion of drilling at each hole, the Engineer shall notify the Contractor whether the casing, if any, is to be left in the hole. If casing is irrecoverably jammed in a borehole the Engineer may, at his discretion, pay for any casing so lost. The decision in this regard shall be based on whether:

- a) every possible attempt has been made by the Contractor to extract all or part of the casing, and/or
- b) the Contractor applied every reasonable precaution during drilling to ensure that the casing would not become jammed.

The Contractor shall supply the Engineer with a written register of any casing left permanently or jammed in a borehole. Specified in this register shall be the size and type of casing, depth below reference level, borehole number and the surface coordinates of the borehole.

8.2 Measurement

The quantity to be paid for shall be the linear metres of casing (supplied and installed separately), measured from the casing reference level, actually installed and/or subsequently removed, or casing left permanently in the hole on instruction of the Engineer, or casing irrecoverably jammed in the hole and for which the Engineer has agreed to pay.

8.3 Payment

The price tendered differentiates between supply and deliver, and installation of casing. Supply and deliver for each linear metre shall include full compensation for the supply and delivery to site of the casing. Installation for each linear metre will include the placing of all materials, centralisers, end caps, labour, tools, equipment, plant and incidentals necessary to complete the work as specified in this subsection. No distinction shall be made between casing in vertical or inclined holes.

Where casing has already been installed and a reduction in the size of the casing is required to advance the borehole further, no payment shall be made for the installation cost of that portion of the smaller diameter casing contained within the larger diameter casing. No extra payment shall be made for the use of drilling fluid or mud for the installation of casing.

9 USE OF DRILLING MUD/FLUID

9.1 Description

This subsection addresses the use of drilling mud/fluid (other than water) to support a borehole from collapse during the drilling of a rotary core borehole to facilitate drilling. This is an extra over to item 5 and only involves the additional mud/fluids necessary to stabilize boreholes. Prior approval for the use of any drilling fluid shall be obtained from the Engineer. The type of drilling mud or fluid used shall be selected by the Contractor in the particular circumstances of its use.

Drilling mud or fluid shall be properly disposed of after use to the satisfaction of the Engineer, and it shall not at any time be discharged into any watercourse, drain or receiving environment in which problems due to its presence therein could arise.

The use of drilling mud in any borehole shall be specifically noted on the borehole drilling record by the Contractor.

9.2 Measurement

The quantity to be paid for shall be the number of drums with drilling mud or fluid (usually 20-l drums) that is used as ordered or approved for use by the Engineer.

9.3 Payment

The price tendered for each 20-l drum shall include full compensation for the supply and placing of all materials, labour, tools, equipment, plant and incidentals necessary to complete the work specified in this subsection, regardless of the depth to which the drilling mud or fluid is used.

10 GROUTING

10.1 Description

Cement grouting for the stabilisation of fractured or brecciated zones or boulder horizons encountered during drilling may be undertaken with the approval of the Engineer. The grout employed shall usually be Portland cement, but the type of grout to be employed shall be decided upon by the Engineer and Contractor with due regard to the circumstances.

The grouting of additional casing, other than that covered in subsection 8, is covered in this subsection.

10.2 Measurement

The quantity paid for shall be the number of bags of cement (typically 40 kg per bag) or other grout actually used for grouting on the instructions or with the approval of the Engineer.

Redrilling of the grouted section shall be measured for the linear metres of grout through which it is necessary to redrill after the grout has set in the case of grouting for stabilisation purposes. If the grouting results in a significant improvement in the ease with which the unstable horizon may be drilled, it may be classified differently for payment purposes. For example, very closely fractured material may, after grouting, be classified simply as hard material and paid for accordingly.

10.3 Payment

The price tendered and paid for each bag of cement used for grouting on the instructions of the Engineer, and the redrilling through a grout plug, shall include full compensation for the supply of all materials, labour, tools, plant, equipment and incidentals necessary to complete the work as specified in this subsection. No payment shall be made for any time lost while waiting for grout to set, and standing time shall not be paid in this case.

11 RECORDING OF GROUNDWATER REST LEVEL

11.1 Description

The depth to rest level of groundwater in any borehole being drilled shall be measured daily before the start of drilling and no additional payment shall be made for these measurements.

After completion of any borehole, and except where the Engineer orders the contrary, the depth to groundwater rest level in the borehole shall be recorded according to the following procedure. The borehole must be pumped or air-flushed to remove any drilling fluid that may interfere with water level measurements and water samples, covered against ingress of rain or surface water, and left standing for 24 hours. The water level is to be measured at 24 hourly intervals until it has stabilised over a 24 hour period, the last measurement being recorded as the depth to water rest level. If the Contractor neglects to do this timeously and it becomes impossible to measure the groundwater rest level for any reason, the Engineer may instruct the Contractor to redrill the hole at own cost.

11.2 Measurement

The quantity to be paid for shall be the number of depth to groundwater rest level measurements required after completion of the borehole to establish this parameter to the satisfaction of the Engineer.

11.3 Payment

The price tendered for each groundwater rest level measurement made after completion shall include full compensation for all plant, labour, tools, equipment and incidentals necessary for the execution of the work as specified in this subsection.

No payment for the daily measurement of groundwater rest level in the borehole during drilling shall be made.

12 PROVISION OF CORE BOXES AND TEMPORARY STORAGE OF CORE

12.1 Description

12.1.1 Core Boxes

For the storage of all soil samples in plastic bags and for core, suitable metal core boxes shall be provided to comply with the following requirements:

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- a) They shall be able to accommodate the size of core specified in the Schedule of Rates, be 1.5 m long (I.D.) and hold at least 6 m of core per box.
- b) Longitudinal partitions shall be provided in the box.
- c) A hinged lid (fitted with at least two 50 mm hinges) of sufficient thickness to prevent warping shall be provided.
- d) Two hasps and staples shall be provided on the long side of the box opposite the hinges in order to secure the lid.
- e) The boxes shall be acceptable to the Engineer and shall, except if the size of core drilled dictates otherwise, be of the same external dimensions.
- f) A handle shall be fitted at both short ends of the box.

At the commencement of the Contract, a sample core box shall be submitted to the Engineer for his approval. Timber core boxes will not be approved.

The following information shall be indelibly printed on the inside and outside of the lid of the box, using a stencil or similar type of lettering device, approved by the Engineer; no free-hand writing shall be allowed:

- a) Contract name, project, Basement.
- b) Borehole number.
- c) Box number and total number of boxes, e.g. "Box 3 of 7".
- d) Depth range of box, e.g. "15.70 m to 23.95 m".
- e) Start date of drilling, e.g. "12 June 2006.
- f) End date of drilling, e.g. "24 June 2006"

The information described in points (b) to (f) above shall be marked on both ends of all core boxes.

The core samples shall be placed in core boxes in book order and shall be clearly and indelibly marked to define the beginning and end of each drill run and any other intermediate depth required by the Engineer. In addition, blocks or similar objects marked with the depth below ground or reference level shall be inserted in the core box at the appropriate position to mark the end of each drill run. These run blocks shall be fitted so tightly between the partitions or fixed to the partitions as to prevent any movement of the core or run blocks during handling and transport. Any position at which a known core loss occurred shall be similarly marked by means of a wooden block approximating the length of the core loss. Only core or samples from one borehole shall be placed in any particular core box. If the core placed in the boxes is likely to move around, it shall be secured to prevent such movement.

12.1.2 Temporary Storage of Core and Core Boxes

All core boxes shall be temporarily stored at the base camp, from where the drill site will be supplied as necessary and when required. During temporary storage, all precautions against possible loss or damage (wilful or accidental) as well as damage due to the elements shall be taken.

The temporary store shall be weatherproof and to the satisfaction of the Engineer. The minimum height between the lowest box in a stack and the floor of the temporary store shall be 200 mm.

The transportation of samples and core boxes from the drill site to the temporary storage facility, and the removal thereof from such facility, shall only occur on instruction of the Engineer.

12.2 Measurement

The measurement of the supply of core boxes will be the number of core boxes actually used for the storage of core or samples for each borehole to the satisfaction of the Engineer. No separate measurements or payments will be made for the temporary storage of core as specified in this subsection.

12.3 Payment

The price tendered for each core box shall include full compensation for the supply of the core box as well as all labour, materials, equipment, tools, transport, storage and incidentals necessary to complete the work as specified in this subsection. The price tendered shall provide for the packing of core into core boxes, the marking thereof as well as the transport thereof to the temporary storage place.

All core boxes supplied in terms of the Contract shall become the property of the Employer.

13 TRANSPORT OF SAMPLES AND CORE BOXES

13.1 Description

This subsection shall not apply in cases where samples and core boxes have to be transported to laboratories, offices or places of permanent storage over distances less than fifty (50) kilometres from the base camp site, in which case the Contractor shall be required to provide for the transport of samples and core boxes to laboratories, offices or places of permanent storage.

The transport of samples and core boxes to places of permanent storage or laboratories over distances greater than fifty (50) kilometres from the base camp, measured in one direction only, will be paid for separately and shall only be carried out on the specific approval of the Engineer in writing to ensure the saving of fuel and the optimum usage of capacity.

13.2 Measurement

The quantity to be paid for shall be the distance in kilometres over which the samples or core boxes have to be transported, measured as the distance from the base camp site to the permanent place of storage.

13.3 Payment

The price tendered for the transport of samples and core boxes to the place of permanent storage shall include full compensation for the supply of the transportation equipment, fuel, all labour, materials, tools, storage and incidentals to complete the work as specified in this subsection. The tender price shall allow for the neat stacking of the sample and core boxes in the required order in the place of permanent storage, and the provision of a list of all core boxes/samples delivered.

14 STANDING TIME

14.1 Description

Should the Contractor at any time during the Contract period be required to discontinue work on instruction of the Engineer pending the issue of instructions, approval or decisions by the Engineer, and to the extent that the Contractor's workers and equipment cannot be otherwise usefully employed, he shall be entitled to compensation for such time loss during normal working hours. Standing time shall only be in respect of major units of equipment such as drill rigs.

It is stressed that standing time during normal working hours is only applicable should the work be stopped on instruction of the Engineer (e.g. geophysical logging) or where decisions are being awaited from the Engineer. Where this can be foreseen, it shall be expected of the Contractor to notify the Engineer one full working day ahead that he will require instructions, approval or other decisions at a certain time. Without such prior notice, no standing time compensation shall be considered. In emergency instances where a decision can only be made once the Engineer has visited the site, the Contractor will not be entitled to claim standing time for the first 12 working hours after notifying the Engineer. No claim will be permitted for standing time due to inclement/abnormal weather conditions.

Standing time does not include time when drilling is discontinued for the purposes of taking directional, angular or any other readings or activity in connection with the work.

For the purpose of calculating standing time, "normal working hours" shall be as defined in Clause 5.8 under C1.2 Contract Data. If the Contractor should find it necessary to extend normal working hours, he shall obtain the Engineer's approval at least 3 days prior to such additional time being required, and shall furnish reasons for his request.

Such approval shall only be given on a week-to-week basis and can be withdrawn at any time the Engineer thinks fit. Without the Engineer's prior written approval, no standing time shall be paid for if outside the abovementioned normal working hours.

14.2 Measurement

Standing time shall only be measured for payment of periods in excess of one hour. The actual measurement will be made for the full period during which standing time was agreed for any specific unit of plant measured to the nearest hour. Distinction shall be made between drilling rigs and other major units of plant as detailed in the Schedule of Rates.

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The price tendered for each hour of standing time shall include full compensation for all revenue lost and any costs whatsoever thus incurred. Only claims for standing time which falls within the specifications of this subsection shall be paid for.

No standing time shall be payable if the work is stopped by the Engineer for the purpose of requiring the Contractor to make necessary repairs to his equipment, to make good unsatisfactory work or to provide proper alternative equipment or workmen.

15 FORMATION DESCRIPTION AND WATER SAMPLING

15.1 Description

This subsection addresses the description (logging) of borehole core and formation samples and the collection of water samples by the Engineer.

The Contractor shall furnish assistance in respect of labour, equipment or the supply of information and results as is consistent with the requirements of, amongst others, subsections 5, 7, 12 and 13, as may be required or requested by the Engineer to enable him to carry out logging and sample description. The Engineer will also on occasion need to collect a water sample during drilling. The Contractor will facilitate such activity by providing access to the hole for the duration of this process. The provision of labour, equipment and the supply of information and results shall, where applicable, be measured and paid for under the relevant subsections of the Specification.

All flow measurements shall be done by a totalising meter and/or induced flow meter, installed in the discharge pipe close to the abstraction borehole, as well as volumetrically using preferably an orifice weir or, alternatively, containers of appropriate capacity to accurately measure lower yields (< 40 l/s) with a stopwatch or higher yields (> 40 l/s) with a V-notch or U-notch.

Furthermore, the Contractor is required to document all activities on site in daily records. The types of records necessary are listed below.

Strata log	- Lithology or stratigraphy encountered during the day
Penetration log	- Penetration rates per metre during drilling
Drilling media used	- Record of drilling fluids, drilling mud etc.
Construction log	- Record of casings and groutings
Time log	- Record of time spent on all phases of drilling
Visitor's log	- Record of all visitors at the drilling site
Instructions log	- Record of all instruction from the Engineer
Measurements log	- Record of all measurements taken by the Contractor

The daily records are to be presented to the Engineer upon completion for his inspection and, if satisfactory, his signature.

After completion of the borehole and prior to acceptance of the work, the Contractor shall provide a borehole record, comprising of a strata log, a penetration log and a construction log.

The Contractor shall provide his own forms for approval by the Engineer.

15.2 Measurement and Payment

No separate measurements or payments will be made for observing the requirements of this subsection, and full compensation for these shall be made in the relevant rates tendered for other subsections of the work except under circumstances where any unit of equipment is prevented from continuing with its work for a period exceeding one hour at the site of a borehole as a result of the actions of the Engineer in carrying out the activities specified in this subsection. In such cases, standing time shall be applicable, and the Contractor entitled to claim for lost production as specified in subsection 15.

16 BOREHOLE COMPLETION

16.1 Description

The completion of any borehole comprises the proper sealing and marking of the borehole. The following must be adhered to:

- a) Completed boreholes must be fitted with tamper-proof, lockable steel boxes or manhole covers (see below and tender drawings under C3.8) in the correct size to fit the installed steel casing.
- b) The boreholes shall, if required by the Engineer, be equipped with concrete plinths of at least 1.5 m x 3.0 m x 0.5 m. The concrete plinths must be suitable for heavy vehicles. The plinth must

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- contain a reinforcing steel mesh welded to the borehole casing.
- c) On each plinth a concrete pillar of at least 1.5 m height shall be erected, with a special antenna mount, made of stainless steel, on top. The steel reinforcement for the pillar must be welded against the steel mesh of the plinth.
 - d) The casing shall extend not higher than 300 mm above the concrete plinth.
 - e) The casing must be equipped with a flange to connect to the wellhead construction.
 - f) The wellhead for a non-artesian borehole must include a lockable cap and the installation of a data logger for recording water level, as specified by the Engineer.
 - g) The wellhead for an artesian borehole must include a shut-off valve, as specified in section 8, a flow meter and a pressure meter, both of which are able to be connected to a data logger unit.
 - h) Where instructed by the Engineer, the borehole shall be protected at ground level by a man-hole cover, made of DN 1250 precast concrete rings. The man-hole cover must be covered with a lockable ductile iron lid (Securex Y-560C or similar).
 - i) In the case of completion below ground level, the borehole casing needs to be cut at least 200 mm below ground to allow for proper sealing.
 - j) A borehole number allocated by the Engineer must be inscribed, together with the final depth of the borehole, on both the concrete plinth and the casing of all completed boreholes (on metal plate).
 - k) If required by the Engineer, a yellow painted steel pipe (± 75 mm diameter) standing 1.8 m tall above ground shall be erected a distance of 10 m north of the borehole. The pipe shall be set a depth of at least 500 mm in a concrete block firmly embedded in the ground. The exact location of the steel pipe shall be determined on site and needs to be approved by the Engineer.
 - l) The final borehole construction with man-hole cover or borehole chamber must cater for access to the borehole for a pump rig for installing a pump and or other equipment into the borehole.

16.2 Measurement

The quantity to be paid for shall be the number of boreholes completed to the satisfaction of the Engineer. It will be distinguished between completion above ground level and completion below ground level.

16.3 Payment

The price tendered for borehole completion shall include full compensation for the supply of the required material and for all plant, labour, tools, equipment and incidentals necessary for the execution of the work as specified in this subsection.

17 REHABILITATION OF DRILL SITES

17.1 Description

Since the drill sites are likely to be located in ecologically sensitive areas, a high measure of environmental awareness and consideration will need to be practiced throughout the drilling operations. A rigorous yet pragmatic Environmental Management Plan (EMP) will be developed and put in place for the drilling operations. The Contractor shall familiarise himself with the requirements of the Environmental Management specifications.

Among the actions that will be required is for excess drill cuttings to be removed and disposed of at an approved location or a recognised active waste disposal site. All waste material and other items related to the drilling operations shall be removed from the site and all excavations filled in at the cost of the Contractor and to the satisfaction of the Engineer before the borehole will be certified as being completed.

17.2 Measurement and Payment

No separate measurements or payments will be made for observing the requirements of this subsection, and full compensation for these shall be made in the relevant rates tendered for complying with the environmental requirements as defined in the relevant environmental specifications.

18 PACKER PERMEABILITY TESTING

18.1 Description

This subsection addresses the permeability testing with a single packer device within the borehole during drilling operation, as instructed by the Engineer. The test shall be conducted every 6 m of drilling prior to continue drilling operation.

The Contractor must ensure that all the required equipment to undertake the measurements, as specified below, is readily available on site when required.

The requirement for additional measurements will be communicated to the Contractor timeously, and the drilling operation curtailed and drilling equipment removed from the borehole in order to provide suitable access to the borehole for the packer and testing instruments.

18.2 Measurement

The quantity to be paid for shall be the number of permeability tests conducted. The Contractor has to deliver the measurements in electronic/digital format and in hardcopy print-out. The measurements are subject to quality control and approval by the Engineer.

18.3 Payment

The price tendered for the permeability testing made during drilling shall include full compensation for all plant, labour, tools, equipment and incidentals necessary for the execution of the work as specified in this subsection. The interruption of the drilling operation shall be included in the price and the Contractor will not be entitled to claim for this interruption at the standing time rate.

19 BOREHOLE DEVELOPMENT

19.1 Description

This subsection addresses the development and cleaning of the core boreholes, as instructed by the Engineer.

The Contractor must ensure that all the required equipment to undertake the development, as specified below, is readily available on site when required.

On completion of construction, each borehole shall be developed to a maximum yield of water, free of suspended materials. Development shall be carried out using airlift over strike zones, where possible, and is expected to last between 2 and 5 hours.

19.2 Measurement

The quantity to be paid for shall be the number of hours required to develop a borehole to the satisfaction of the Engineer.

19.3 Payment

The price tendered for the borehole development shall include full compensation for all plant, labour, tools, equipment and incidentals necessary for the execution of the work as specified in this subsection.

20 DRILLABLE BRIDGE PLUGS

20.1 Description

This subsection addresses the installation of drillable bridge plugs in the event of artesian water flow sealing.

A downhole tool that is located and set to isolate the lower part of the borehole. Bridge plugs may be permanent or retrievable, enabling the lower borehole to be permanently sealed from production or temporarily isolated from a treatment conducted on an upper zone. The bridge plug would consist of cast iron so that it can be drilled out if needs be.

20.2 Measurement

The quantity to be paid for shall be for the bridge plug, installation, cementing and all equipment needed for the installation.

20.3 Payment

The price tendered for the bridge plug shall include full compensation for all plant, labour, tools, equipment and incidentals necessary for the execution of the work as specified in this subsection.

SPEC W: STANDARD SPECIFICATIONS FOR DRILLING WORK

1 SCOPE

This Specification covers the drilling and borehole construction aspects required for the exploration, monitoring, production and MAR boreholes, and that shall be implemented during the construction and/or plant installation and/or dismantling work specified below, shown on the drawings and/or billed in the Schedule of Rates. It covers temporary and permanent work.

The specific objectives and requirements vary between the different types of boreholes and selected drilling methodology;

- c) Exploration boreholes:
 - i) ability to establish the lithology at a given accuracy of at least 1m or finer, dependent on the drilling methodology, and as directed by the Engineer
 - ii) borehole construction to allow for yield testing, as directed by the Engineer
- d) Monitoring boreholes:
 - i) As per exploration borehole plus
 - ii) Ability to establish long-term monitoring equipment in borehole, as directed by the Engineer
 - iii) Ability to take water samples representative of the surrounding aquifer
- e) Production boreholes:
 - i) As per exploration borehole plus
 - ii) Ability to install borehole pump within the solid portion of the borehole casing
 - iii) Ability to pump the borehole without significant sand ingress that would pose risk of damage to the equipment
- f) MAR injection boreholes:
 - i) As per exploration borehole plus
 - ii) Ability to install monitoring equipment, injection pipes and pressurise the borehole
 - iii) Ability to inject water into the borehole under pressure without any leaks

This Specification does not replace, take precedence over nor detract from the standard good practice of drilling. Nothing in this Specification shall relieve the Contractor of any obligations or responsibilities with regard to quality and good practices on site.

2 ESTABLISHMENT AND DE-ESTABLISHMENT OF DRILL RIG(S) AND ANCILLARY EQUIPMENT IN THE PROJECT AREA

2.1 Description

This subsection addresses the establishment in the project area of drill rig(s), ancillary equipment and materials necessary to undertake the work and successfully complete the Contract. It includes the de-establishment, dismantling and removal of the drill rig(s) and ancillary equipment and materials following completion of the project or termination of the contract, whichever comes first.

A drill rig shall be regarded as a drilling machine of the required type, properly mounted and in full working order, together with all ancillary equipment (compressors, pumps, tools and other accessories) needed to execute the required work properly and efficiently.

It is anticipated that at least one (1) rotary mud drilling rig would be required for drilling in the primary aquifers. In addition, specialised drilling rigs would be required for drilling into the basement aquifers (Spec V) or for geotechnical investigations. Should additional rigs be required, written approval from the Engineer shall be obtained before establishment of each additional rig.

2.2 Measurement

The quantity to be paid for the establishment of drill rig(s) in the project area shall be made according to the type and number of rigs employed by the Contractor for the work as indicated in the Schedule of Quantities, and certified by the Engineer in writing following their deployment to a work site, with separate items for establishment and de-establishment after successful completion of termination of works.

2.3 Payment

The price tendered and specified for each drill rig shall include full compensation for the supply and transport of the rig and all accompanying equipment, materials, tools and accessories needed for its operation, to and from the project area at the start and end of an uninterrupted works project(s) period, respectively.

The Contractor will be entitled to claim the price tendered for each drill rig established in the project area, approved by the Engineer, at the start of a works project, and the price tendered for each drill rig de-established following completion or termination of the works or contract.

3 SET UP AND REMOVAL OF DRILL RIG AT EACH BOREHOLE

3.1 Description

This subsection addresses the setting up of individual drill rigs at each work site, and their subsequent removal after completion of the borehole. The rates tendered shall be deemed to include for transport to and the subsequent removal of labour, plant or any other incidentals necessary for the operations from each borehole position.

Should the Contractor utilize a rig type different to that specified and approved by the Engineer, payment shall be made according to the type originally specified unless the Contractor can prove that the use of the rig type originally specified was impractical. In this regard the Contractor should note the following:

- b) The provisions of subsection 4 "Access to Borehole Site" which covers the cost of establishing access to the site.
- c) The provisions of the Environmental Management Specification and relevant payment items, which covers the cost of site clearance at the drill site.
- d) The boreholes shall be located at the positions as indicated on the drawings supplied, and/or as detailed in writing by the Engineer to the Contractor, and/or as marked in the field and shown to the Contractor by the Engineer. Each site will be shown to the Contractor by the Engineer well in advance of the set up.
- e) Some clearing of rocks and bush, as may be classified as reasonable by the Engineer within the framework of the EMP, may be required to provide access for a mobile rig to a borehole site. If unreasonable clearing for access is required, this will be paid for in accordance with subsection 4 or as extra work as defined in the General Conditions, subject to written approval by the Engineer or ECO.
- f) The area to be cleared will be agreed between the Engineer or ECO and the Contractor and should be clearly marked. This area shall not be exceeded without prior discussion with and written approval from the Engineer or ECO.
- g) If it is necessary to dismount the rig from the crawler, trailer, truck, etc. at the borehole site in order to carry out the actual drilling operation, this will be measured as a mobile rig set up.
- h) The Contractor shall take all steps necessary to protect existing survey pegs, reference pegs, benchmarks and work area demarcation markings, and shall re-establish such at own expense should they be disturbed as a result of activities on site.
- i) The Contractor shall be responsible for the safety of any survey beacon or benchmark encountered on site, as well as for any costs incurred in replacing damaged beacons or benchmarks, and attention is drawn to Sections 35 and 36 of the Land Survey Act (Act No. 9 of 1927, as amended) which makes the removal of any beacon or benchmark an offence and provides for the correct procedure to be adopted where moving is required.

Rigs shall be securely anchored to be able to provide the necessary reaction to drilling and to prevent movement of the rig relative to the borehole. It may be necessary to provide a concrete drilling platform to which the rig is anchored, and a suitable tripod to permit the pulling of rods and core.

Before drilling commences at any hole, the Engineer's approval of the set-up of the rig will be required, and after completion of the hole, the rig shall not be removed without the Engineer's approval. For this approval before and after drilling of the hole, the Contractor must allow the Engineer, except if other arrangements have been negotiated, a waiting period of 12 working hours (each) before any standing time in accordance with subsection 12 may be claimed.

3.2 Measurement

The set ups ordered by the Engineer shall be measured by number for the type of rig employed and approved by the Engineer. Setting up on inclined holes shall be measured extra over normal set ups for mobile or skid mounted rigs, as may be the case.

The movement of the rig between boreholes shall be included in the cost for the set-up for distances up to 1 km. The unit of measurement for the distance moved between boreholes, by the shortest practicable route as approved by the Engineer, shall be per kilometre measured in excess of 1 km.

3.3 Payment

The price tendered and paid for shall include the supply, transport and placement of all materials, inclusive of the required personnel, supervision, labour, plant, equipment, tools and other incidentals necessary for the preparation of each borehole site, the erection of the rig with all accessories necessary to carry out the operations required at the hole and the subsequent removal from that borehole, including the removal of all embankments, drilling fluid circulation trenches, platforms and any other temporary works. Where borehole sites are located further than 1 km apart, the Contractor shall be reimbursed for each kilometre in excess of that deemed to be included in the set-up rate.

4 ACCESS TO BOREHOLE SITE

(Dependent on and subject to the conditions that are outlined in subsection 3 and the Standard Specification for Environmental Management of Drilling Work)

4.1 Measurement

Establishing access to drill sites shall be measured by the time taken to establish suitable site access within the framework, guidelines and terms of the EMP for personnel, supervision, labour, plant, equipment, tools and other incidentals necessary for setting up the drill rig in accordance with subsection 3. The unit of measurement shall be man-hours expended by the labour employed for this task and the equipment required.

4.2 Payment

The Contractor shall be entitled to claim for this item at the hourly rate of the labour employed and equipment required.

5 DRILLING

5.1 Description

This subsection addresses drilling through various categories of soft and semi-hard material. Suitable drilling equipment for rotary mud and percussion, or alternative method such as core, sonic or auger, of the type which will permit full penetration to the required depth shall be used.

At the commencement of drilling each hole, the Engineer shall indicate to the Contractor the expected depth to which the hole is to be drilled, measured from the level from which drilling is to commence. The Engineer, however, reserves the right to vary the required depth of the hole at any stage during the drilling of that hole. This includes ordering the premature curtailment of the drilling operation.

To prevent undue delays, the Contractor shall give the Engineer 12 working hours' notice of when it is anticipated that the required depth will be reached in any particular hole. In any event, no drill rig shall be dismantled and moved away from any particular hole on reaching the required depth until the Contractor is notified in writing by the Engineer that the rig may be moved. The Engineer may order the re-establishment of any drill rig moved away without written authority, and such work shall then be carried out at the Contractor's expense and no further payment for setting up the rig will be made. Authority to move a rig on completion of drilling shall not be withheld unreasonably. A delay exceeding 12 working hours in the granting of authority to move a drill rig after completion of a borehole shall entitle the Contractor to standing time according to subsection 12. Each drill rig used on this Contract by the Contractor shall be under supervision of a competent drilling supervisor who is experienced in drilling in the types of formation expected on the site and who is capable of completing the daily drilling records.

On completion of a borehole, and unless any instructions to the contrary are given by the Engineer, the hole shall be sealed and made safe to the satisfaction of the Engineer in accordance with subsection 6 and/or 13.

In general, all drilling shall be at least 12" when using standard rotary mud or percussion drilling. Drilling of standard production and MAR boreholes shall be at least 20" to allow for 12" casing installation. The drilling size may only be reduced with the approval of the Engineer.

The Contractor shall, unless otherwise specified or agreed to by the Engineer, strive for continuous recovery of rock chips whenever possible in both hard and soft material.

The blow yield shall be measured by means of an appropriately constructed and installed V-notch capable of measuring flows up to 100 l/s. The discharge shall be monitored for changes, and the measurements recorded in the driller's log together with the drilling depth associated therewith. No payment shall be made for the recording of blow yield, and allowance must be made in the drilling rates tendered for the costs incurred.

If the drilling equipment should become stuck or lodged in a borehole or if, for any other reason, further drilling is not possible in that hole, the Contractor shall immediately notify the Engineer who will then decide if:

- a) the hole is drilled deep enough to be considered acceptable, in which case payment for drilling to the attained depth will be made, or
- b) the depth drilled is insufficient and that a new hole shall be drilled, in which case no payment will be made for the unacceptable hole, unless the failure to continue is due to unforeseen subsoil or geological conditions, in which case payment will be made for both the abandoned hole and the new hole. The Engineer shall in this event have due regard to the conditions encountered in already completed holes and the precautions taken by the Contractor to prevent loss of the hole.

The Contractor shall make all arrangements for the supply of water for drilling, and only a sum payment will be made for this item. Any additional costs related to this item shall be included in the rate for drilling.

5.2 Measurement

The quantity to be paid for shall be the linear metres actually drilled to the satisfaction of the Engineer. All measurements of depths drilled shall be made from the mean ground level in the immediate vicinity of the borehole. Reaming shall not be measured and paid for under this subsection.

5.3 Payment

The price tendered and paid for each metre drilled shall include full compensation for the supply of all labour, supervision, tools, drilling fluids, equipment, plant and incidentals necessary to complete the work as specified in this subsection.

The price tendered shall distinguish between drilling size, depth of drilling and type of drill bit or technology (e.g. Rotary Mud, Percussion, Odex, Symmetrix), as specified in the Schedule of Quantities.

No payment shall be made under this subsection for any other drilling undertaken for which there is a specified rate in any other subsection. This refers inter alia to the use of drilling mud, etc.

The provision of water on site for all drilling activities will be paid for as a sum for all sites.

6 SHUT OFF OF ARTESIAN CONDITIONS

6.1 Description

This subsection addresses the installation of grouted casing, cut-off valves and any other materials and equipment necessary to prevent artesian boreholes from overflowing.

It is expected that under certain conditions, boreholes targeting the basement may intersect water under sufficient hydrostatic pressure to cause the artesian flow of water from a borehole. Hydrostatic pressure at surface is not expected to exceed 2 bar (200 kPa). A completed artesian borehole may not be allowed to discharge on surface either through the casing or via the annulus between the casing and the borehole sidewall. Each borehole must therefore be equipped with a suitably fixed and grouted casing early in its establishment phase, so that a cut-off valve can be fitted to control any artesian discharge that occurs. The depth to which casing for artesian shut off purposes should be inserted will be informed by the nature of the strata intersected during the initial phase of percussion/core drilling that will serve as "platforms" for the percussion/core boreholes in accordance with subsection 5.1.

The initial drilling would entail percussion/core drilling, equipped with casing (nominal inside diameter sufficient to allow the passage of a 12"-size bit) and the casing grouted to ensure proper sealing of the annulus. Grouting must be done through the casing and not in the annulus. The depth of drilling will depend on the depth of bedrock. The Engineer will determine when to stop drilling.

Should overflowing artesian conditions be encountered or anticipated, a cut-off valve with pressure meter must be fitted, as required by the Engineer, so that the water can be completely stopped from discharging. The pressure meter must allow for automatic and continuous recording onto a digital data logger.

Should overflow conditions not be encountered, then a lockable borehole cap must be installed according to subsection 13.

The Contractor shall supply the Engineer with a written register of the casing inserted into the borehole. Specified in this register shall be the length, size and type of casing, borehole number and the surface coordinates of the borehole.

6.2 Measurement

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The price tendered and paid for each metre drilled and casing installed shall include full compensation for the supply of all labour, supervision, tools, equipment, plant and incidentals necessary to complete the work as specified in this subsection, including core recovery as per the requirements of subsection 8.

Materials, equipment and instruments used to seal a borehole under artesian discharge conditions will be measured per unit installation. A lockable borehole housing and lock used to seal a borehole under non-flowing artesian conditions will be measured per unit installation.

6.3 Payment

The price tendered for each artesian shut off installation shall include full compensation for the supply, installation and placement of all materials, labour, tools, equipment, plant and incidentals necessary to complete the work as specified in this subsection.

Drilling through the grouted section shall be measured and paid for according to specifications in subsection 9.

7 CASING OF BOREHOLES

7.1 Description

This subsection addresses the supply, delivery and installation of casing necessary for borehole construction and or drilling, and the removal / recovery or abandonment thereof, as instructed by the Engineer. The type and size of casing to be installed and left in the hole for borehole construction shall be determined by the Engineer. In general, the following casing will be installed but this may be altered at the instruction of the Engineer:

- Exploration and monitoring boreholes within the primary sand aquifer.
 - 6.5" Class 8 PVC (solid and screened) casing with screen sizes of 0.25-1 mm
- Exploration and monitoring boreholes within the basement aquifer.
 - 6.5" Class 12 PVC (solid and screened) casing with screen sizes of 0.25-1 mm
- Production and MAR boreholes within the primary sand aquifer.
 - 12" 316 stainless steel (solid and wedge wire) with a 9 mm wall thickness and screen sizes of 0.5-1 mm.

Casing for drilling purposes shall be inserted without grouting, if possible. Casing that form part of the final borehole construction shall be either grouted in the annulus or installed with a suitably sized gravel pack between casing and host rock. All casing shall be installed with centralisers and end caps.

On completion of drilling at each hole, the Engineer shall notify the Contractor whether the casing, if any, is to be left in the hole. If casing is irrecoverably jammed in a borehole the Engineer may, at his discretion, pay for any casing so lost. The decision in this regard shall be based on whether:

- a) every possible attempt has been made by the Contractor to extract all or part of the casing, and/or
- b) the Contractor applied every reasonable precaution during drilling to ensure that the casing would not become jammed.

The Contractor shall supply the Engineer with a written register of any casing left permanently or jammed in a borehole. Specified in this register shall be the size and type of casing, depth below reference level, borehole number and the surface coordinates of the borehole.

7.2 Measurement

The quantity to be paid for shall be the type and linear metres of casing (supplied and installed separately), measured from the casing reference level, actually installed and/or subsequently removed, or casing left permanently in the hole on instruction of the Engineer, or casing irrecoverably jammed in the hole and for which the Engineer has agreed to pay.

Grouting and gravel pack shall be measured as per subsection 9.2.

7.3 Payment

The price tendered differentiates between supply and deliver, and installation of casing. Supply and deliver for each linear metre shall include full compensation for the supply and delivery to site of the casing. Installation for each linear metre will include the placing of all materials, centralisers, end caps, labour, tools, equipment, plant and incidentals necessary to complete the work as specified in this subsection.

The price tendered shall distinguish between, supply, delivery and installation based on casing size and type of casing (e.g. solid, screened, wedge wire, steel, PVC), as specified in the Schedule of Quantities.

No extra payment shall be made for the use of drilling fluid or mud for the installation of casing.

8 USE OF DRILLING MUD/FLUID

8.1 Description

This subsection addresses the use of drilling mud/fluid (other than water) to support a borehole from collapse during the drilling of a rotary mud/core borehole to facilitate drilling. This is an extra over to subsection 5 and only involves the additional mud/fluids necessary to stabilize boreholes. Prior approval for the use of any drilling fluid shall be obtained from the Engineer/ECO. The type of drilling mud or fluid used shall be selected by the Contractor in the particular circumstances of its use.

Drilling mud or fluid shall be properly disposed of after use to the satisfaction of the Engineer/ECO, and it shall not at any time be discharged into any watercourse, drain or receiving environment in which problems due to its presence therein could arise.

The use of drilling mud in any borehole shall be specifically noted on the borehole drilling record by the Contractor.

8.2 Measurement

The quantity to be paid for shall be the number of drums with drilling mud or fluid (usually 20-l drums) that is used as ordered or approved for use by the Engineer.

8.3 Payment

The price tendered for each 20-l drum shall include full compensation for the supply and placing of all materials, labour, tools, equipment, plant and incidentals necessary to complete the work specified in this subsection, regardless of the depth to which the drilling mud or fluid is used.

9 GROUTING AND GRAVEL PACK

9.1 Description

Cement grouting for the stabilisation of fractured or brecciated zones or boulder horizons encountered during drilling, or to seal MAR boreholes for injection under pressure may be undertaken with the approval of the Engineer. The grout employed shall usually be Portland cement, but the type of grout to be employed shall be decided upon by the Engineer and Contractor with due regard to the circumstances.

The grouting of additional casing, other than that covered in subsection 6, is covered in this subsection.

Installation of the gravel pack will be at the instruction of the Engineer and may vary between 0.5 mm to 3 mm in size. Gravel pack should be rinsed sufficiently prior to installation to ensure no fines and installed using a tremmy pipe.

9.2 Measurement

The quantity paid for shall be the number of bags of cement or gravel pack (typically 40 kg per bag) or other grout actually used for grouting on the instructions or with the approval of the Engineer.

Redrilling of the grouted section shall be measured for the linear metres of grout through which it is necessary to redrill after the grout has set in the case of grouting for stabilisation purposes. If the grouting results in a significant improvement in the ease with which the unstable horizon may be drilled, it may be classified differently for payment purposes. For example, very closely fractured material may, after grouting, be classified simply as hard material and paid for accordingly.

9.3 Payment

The price tendered and paid for each bag of cement used for grouting or bag of gravel pack on the instructions of the Engineer, and the redrilling through a grout plug, shall include full compensation for the supply of all materials, labour, tools, plant, equipment and incidentals necessary to complete the work as specified in this subsection. No payment shall be made for any time lost while waiting for grout to set, and standing time shall not be paid in this case.

10 RECORDING OF GROUNDWATER REST LEVEL

10.1 Description

The depth to rest level of groundwater in any borehole being drilled shall be measured daily before the start of drilling if applicable and no additional payment shall be made for these measurements.

After completion of any borehole, and except where the Engineer orders the contrary, the depth to groundwater rest level in the borehole shall be recorded according to the following procedure. The borehole must be pumped or air-flushed to remove any drilling fluid that may interfere with water level measurements and water samples, covered against ingress of rain or surface water, and left standing for 24 hours. The water level is to be measured at 24 hourly intervals until it has stabilised over a 24 hour period, the last measurement being recorded as the depth to water rest level. If the Contractor neglects to do this timeously and it becomes impossible to measure the groundwater rest level for any reason, the Engineer may instruct the Contractor to redrill the hole at own cost.

10.2 Measurement

The quantity to be paid for shall be the number of depth to groundwater rest level measurements required after completion of the borehole to establish this parameter to the satisfaction of the Engineer.

10.3 Payment

The price tendered for each groundwater rest level measurement made after completion shall include full compensation for all plant, labour, tools, equipment and incidentals necessary for the execution of the work as specified in this subsection.

No payment for the daily measurement of groundwater rest level in the borehole during drilling shall be made.

11 FORMATION DESCRIPTION AND WATER SAMPLING

11.1 Description

This subsection addresses the collection and description (logging) of formation samples, and the collection of water samples by the Engineer, or by the Contractor under instruction by the Engineer.

The Contractor shall furnish assistance in respect of labour, equipment or the supply of information and results as is consistent with the requirements of, amongst others, subsections 5, 6 and 7, as may be required or requested by the Engineer to enable him to carry out logging and sample description. The Engineer will also on occasion need to collect a water sample during drilling. The Contractor will facilitate such activity by providing access to the hole for the duration of this process. The provision of labour, equipment and the supply of information and results shall, where applicable, be measured and paid for under the relevant subsections of the Specification.

Furthermore, the Contractor is required to document all activities on site in daily records. The types of records necessary are listed below.

Strata log	- Lithology or stratigraphy encountered during the day
Penetration log	- Penetration rates per metre during drilling
Drilling media used	- Record of drilling fluids, drilling mud etc.
Construction log	- Record of casings, groutings and gravel packs
Time log	- Record of time spent on all phases of drilling
Visitor's log	- Record of all visitors at the drilling site
Instructions log	- Record of all instruction from the Engineer
Measurements log	- Record of all measurements taken by the Contractor

The daily records are to be presented to the Engineer upon completion for his inspection and, if satisfactory, his signature.

After completion of the borehole and prior to acceptance of the work, the Contractor shall provide a borehole record, comprising of a strata log, a penetration log and a construction log. The Contractor shall provide his own forms for approval by the Engineer.

11.2 Measurement and Payment

No separate measurements or payments will be made for observing the requirements of this subsection, and full compensation for these shall be made in the relevant rates tendered for other subsections of the work except under circumstances where any unit of equipment is prevented from continuing with its work for a period exceeding one hour at the site of a borehole as a result of the actions of the Engineer in carrying out the activities specified in this subsection. In such cases, standing time shall be applicable, and the Contractor entitled to claim for lost production as specified in subsection 12.

12 STANDING TIME

12.1 Description

Should the Contractor at any time during the Contract period be required to discontinue work on instruction of the Engineer pending the issue of instructions, approval or decisions by the Engineer, and to the extent that the Contractor's workers and equipment cannot be otherwise usefully employed, he shall be entitled to compensation for such time loss during normal working hours. Standing time shall only be in respect of major units of equipment such as drill or testing rigs.

It is stressed that standing time during normal working hours is only applicable should the work be stopped on instruction of the Engineer (e.g. geophysical logging) or where decisions are being awaited from the Engineer. Where this can be foreseen, it shall be expected of the Contractor to notify the Engineer one full working day ahead that he will require instructions, approval or other decisions at a certain time. Without such prior notice, no standing time compensation shall be considered. In emergency instances where a decision can only be made once the Engineer has visited the site, the Contractor will not be entitled to claim standing time for the first 12 working hours after notifying the Engineer. No claim will be permitted for standing time due to inclement/abnormal weather conditions.

Standing time does not include time when drilling is discontinued for the purposes of taking directional, angular or any other readings or activity in connection with the work.

For the purpose of calculating standing time, "normal working hours" shall be as defined in Clause 5.8 under C1.2 Contract Data. If the Contractor should find it necessary to extend normal working hours, he shall obtain the Engineer's approval at least 3 days prior to such additional time being required, and shall furnish reasons for his request.

Such approval shall only be given on a week-to-week basis and can be withdrawn at any time the Engineer thinks fit. Without the Engineer's prior written approval, no standing time shall be paid for if outside the abovementioned normal working hours.

12.2 Measurement

Standing time shall only be measured for payment of periods in excess of one hour. The actual measurement will be made for the full period during which standing time was agreed for any specific unit of plant measured to the nearest hour. Distinction shall be made between drilling/testing rigs and other major units of plant as detailed in the Schedule of Quantities.

12.3 Payment

The price tendered for each hour of standing time shall include full compensation for all revenue lost and any costs whatsoever thus incurred. Only claims for standing time which falls within the specifications of this subsection shall be paid for.

No standing time shall be payable if the work is stopped by the Engineer for the purpose of requiring the Contractor to make necessary repairs to his equipment, to make good unsatisfactory work or to provide proper alternative equipment or workmen.

13 BOREHOLE COMPLETION

13.1 Description

The completion of any borehole comprises the proper sealing and marking of the borehole. The following must be adhered to:

- a) Completed boreholes must be fitted with tamper-proof, lockable steel boxes or manhole covers (see below and tender drawings under C3.8) in the correct size to fit the installed steel casing.
- b) The boreholes shall, if required by the Engineer, be equipped with concrete plinths of at least 1.5 m x 3 m x 0.5 m. The concrete plinths must be suitable for heavy vehicles.

- c) The casing shall extend not higher than 300 mm above the concrete plinth.
- d) The casing must be equipped with a flange to connect to the wellhead construction.
- e) The wellhead for a non-artesian borehole must include a lockable cap and the installation of a data logger for recording water level, as specified by the Engineer.
- f) The wellhead for an artesian monitoring borehole must include a shut-off valve, as specified in section 6, a flow meter and a pressure meter, both of which are able to be connected to a data logger unit. (a typical wellhead design is attached)
- g) On each plinth a concrete pillar of at least 1.5 m height shall be erected, with a special antenna mount, made of stainless steel, on top. The steel reinforcement for the pillar must be welded against the steel mesh of the plinth.
- h) Where instructed by the Engineer, the borehole shall be protected at ground level by a man-hole cover, made of DN 1250 precast concrete manhole rings (see attached). The manhole cover must be covered with a lockable ductile iron lid (Securex Y-560C or equivalent).
- i) In the case of completion below ground level, the borehole casing needs to be cut at least 200 mm below ground to allow for proper sealing.
- j) A borehole number allocated by the Engineer must be inscribed, together with the final depth of the borehole, on both the concrete plinth and the casing of all completed boreholes (on metal plate).
- k) If required by the Engineer, a yellow painted steel pipe (± 75 mm diameter) standing 1.8 m tall above ground shall be erected a distance of 10 m north of the borehole. The pipe shall be set a depth of at least 500 mm in a concrete block firmly embedded in the ground. The exact location of the steel pipe shall be determined on site and needs to be approved by the Engineer.
- l) The final borehole construction with man-hole cover or borehole chamber must cater for access to the borehole for a pump rig for installing a pump and or other equipment into the borehole.

13.2 Measurement

The quantity to be paid for shall be the number of boreholes completed to the satisfaction of the Engineer. It will be distinguished between completion above ground level and completion below ground level.

13.3 Payment

The price tendered for borehole completion shall include full compensation for the supply of the required material and for all plant, labour, tools, equipment and incidentals necessary for the execution of the work as specified in this subsection.

14 REHABILITATION OF DRILL SITES

14.1 Description

Since the drill sites could be located in ecologically sensitive areas, a high measure of environmental awareness and consideration will need to be practiced throughout the drilling operations. A rigorous yet pragmatic Environmental Management Plan (EMP) will be developed and put in place for the drilling operations. The Contractor shall familiarise himself with the requirements of the Environmental Management specifications.

Among the actions that will be required is for excess drill cuttings to be removed and disposed of at an approved location or a recognised active waste disposal site. All waste material and other items related to the drilling operations shall be removed from the site and all excavations filled in at the cost of the Contractor and to the satisfaction of the Engineer or ECO before the borehole will be certified as being completed.

14.2 Measurement and Payment

No separate measurements or payments will be made for observing the requirements of this subsection, and full compensation for these shall be made in the relevant rates tendered for complying with the environmental requirements as defined in the relevant environmental specifications.

15 BOREHOLE DEVELOPMENT

15.1 Description

This subsection addresses the development and cleaning of the boreholes, as instructed by the Engineer.

The Contractor must ensure that all the required equipment to undertake the development, as specified below, is readily available on site when required.

On completion of construction, each borehole shall be developed until free of suspended materials. Development shall be carried out using airlift, where possible, and is expected to last ~6 hours or until clean.

15.2 Measurement

The quantity to be paid for shall be the number of hours required to develop a borehole to the satisfaction of the Engineer.

15.3 Payment

The price tendered for the borehole development shall include full compensation for all plant, labour, tools, equipment and incidentals necessary for the execution of the work as specified in this subsection.

16 STRAIGHTNESS TEST

16.1 Description

All boreholes shall be drilled and cased straight and vertical and all casings and liners shall be set round, plumb and true to line. Plumbness and alignment shall be tested by lowering into the borehole, to a depth directed by the Engineer, a section of pipe 10 m long or a dummy of the same length. The outer diameter of the plumb shall not be more than 10 mm smaller than the diameter of that part of the casing or borehole being tested. The Engineer shall have the right to reject any or all drilling or casing, which fails to meet this specification, and work and casing rejected will be replaced at the Contractor's expense.

16.2 Measurement and payment

The straightness test will be measured per test, irrespective of the casing diameter and depth of test. The rate tendered for the straightness test shall include all material, equipment and tools required, as well as all labour and other incidentals necessary for the execution of the works as specified herein.

No standing time will be paid for the duration of the test.

SPEC X: STANDARD SPECIFICATIONS FOR GEOPHYSICAL LOGGING WORK

1 ESTABLISHMENT OF EQUIPMENT

1.1 Description

This subsection addresses the establishment of geophysical logging equipment in the project area, including ancillary equipment and materials necessary to undertake the work and successfully complete the Contract.

The equipment shall be regarded as a self-contained unit, properly mounted and in full working order, together with all ancillary equipment (sondes, winches, cabling and other accessories) needed to execute the required work properly and efficiently.

1.2 Measurement

The establishment will be measured as a sum for mobilising the equipment to the project area and setting it up at the first borehole.

1.3 Payment

The price tendered and specified for establishment shall include full compensation for the supply and transport of the equipment, materials, tools and accessories needed for its operation, to and from the project area at the start and end of the contract respectively.

The Contractor will be entitled to claim the price tendered for the establishment of the geophysical logging equipment in the project area at the start of a works project, and the price tendered for the de-establishment of the equipment following completion or termination of the works or contract.

2 SET UP AT EACH BOREHOLE

2.1 Description

This subsection addresses the set up of geophysical logging equipment, including ancillary equipment and materials, at each borehole subsequent to the first. The equipment shall be regarded as a self-contained unit, properly mounted and in full working order, together with all ancillary equipment (sondes, winches, cabling and other accessories) needed to execute the required work properly and efficiently.

2.2 Measurement

The set up will be measured as a rate per borehole. Transport in excess of 1 km between borehole sites will be measured extra-over per kilometre.

2.3 Payment

The price tendered and specified for set up shall include full compensation for the supply and transport of the equipment, materials, tools and accessories needed for its operation.

Extra-over payment will be made per kilometre for transporting of equipment between borehole sites located further than 1 km apart.

3 GEOPHYSICAL LOGGING

3.1 Description

This subsection addresses the geophysical logging of drilled boreholes.

It is anticipated that measurements will need to be undertaken both during drilling operations, in which case drilling will be interrupted and access to the borehole made available for the logging equipment, and after the borehole is completed.

The Contractor must ensure that all the required equipment to undertake the measurements, as specified below, is readily available on site when required.

The following measurements (tools/sondes) will be required for the work:

- 3-arm calliper
- Gamma ray
- Dual Compensated Density
- Full Waveform Sonic
- Borehole Magnetic Resonance Response (bMR)
- Acoustic or Optical Televiwer / Borehole Verticality
- Fluid conductivity, pH, temperature, dissolved oxygen, redox potential and pressure
- Focused Electric (resistivity)
- Magnetic Susceptibility
- Fluid flowmeter
- Neutron

The equipment must be capable of passing through an N size rotary core borehole to a depth of at least 150 m.

3.2 Measurement

The work will be measured as a rate per metre for each of the tools/sondes listed in subsection 3.1.

3.3 Payment

The price tendered and specified for logging shall include full compensation for the supply and operation of the equipment, as well as for insurance cover of tools/sondes lost in a borehole. The Contractor will be entitled to claim for standing time for the drill rig where geophysical logging interrupts drilling operations on the instruction of the Engineer.

4 DATA PROCESSING AND REPORTING

4.1 Description

All the required reports must be completed by the Contractor as specified. Reports will include full colour broad format plots of the logging results for each run of the tools/sondes listed in subsection 3.1. The data will also be provided in digital format on a CD, together with a bitmap image of each of the plots.

4.2 Measurement

Data capture and standard processing to prepare plots of each logging run will be measured as a rate per borehole. Additional processing such as the picking of orientated fractures and polar plots will be measured as rate per metre picked. The provision of hard copy data plots will be measured per complete set for each borehole logged. The capture and provision of digital data on CD shall be measured as a sum.

4.3 Payment

The price tendered and specified for data processing and reporting shall include full compensation for all materials used and supplied.

SPEC Y: STANDARD SPECIFICATIONS FOR TEST PUMPING AND INJECTION TESTS

1 ESTABLISHMENT AND DE-ESTABLISHMENT OF PUMP RIG(S) AND ANCILLARY EQUIPMENT IN THE PROJECT AREA

1.1 Description

This subsection addresses the establishment in the project area of pump rig(s), ancillary equipment and materials necessary to undertake the work and successfully complete the Contract. It includes the de-establishment dismantling and removal of the pump rig(s) and ancillary equipment and materials following completion of the project or termination of the contract, whichever comes first.

A pump rig shall be regarded as a machine of the required type, properly mounted and in full working order, together with all ancillary equipment (compressors, pumps, tools and other accessories) needed to execute the required work properly and efficiently.

It is anticipated that the required pump rigs will be one (1) rig with a pump capacity of 10 – 35 l/s and or one (1) rig with a capacity of > 35 l/s. Should additional rigs be required, written approval from the Engineer shall be obtained before establishment of each additional rig.

In addition to a pump rig as described above, it is anticipated that a test unit for artesian flow testing and injection testing under pressure and gravity conditions will be required.

1.2 Measurement

The quantity to be paid for the establishment of pump rig(s) in the project area shall be made according to the number of rigs employed by the Contractor for the work as indicated in the Schedule of Quantities, and certified by the Engineer in writing following their deployment to a work site. The injection and artesian flow test units are not considered a separate pump rig.

1.3 Payment

The price tendered and specified for each pump rig shall include full compensation for the supply and transport of the rig and all accompanying equipment, materials, tools and accessories needed for its operation, to and from the project area at the start and end of the contract respectively. Payment shall distinguish between the different types of pump rig as indicated in the Schedule of Quantities.

The Contractor will be entitled to claim the price tendered for each pumping rig established in the project area at the start of a works project, and the price tendered for each pump rig de-established following completion or termination of the works or contract.

2 SET UP AND REMOVAL OF PUMP RIG AT EACH BOREHOLE

2.1 Description

This subsection addresses the setting up of individual pump rigs at each work site, and their subsequent removal after completion of the testing. The rates tendered shall be deemed to include for the access of personnel and transport to and the subsequent removal of labour, plant or any other incidentals necessary for the operations from each borehole position. Distinction shall be made between the size of pump rig used at each borehole.

The type of rig to be employed at any borehole shall define the payment rate under which the set up and removal will be made, subject to the approval of the Engineer. Should the Contractor utilize a rig type different to that specified and approved by the Engineer, payment shall be made according to the type originally specified unless the Contractor can prove that the use of the rig type originally specified was impractical.

The work area will be cleared prior to the set up and will be clearly marked. This area shall not be exceeded without prior discussion with and written approval from the Engineer or ECO.

The following shall be noted:

- (a) The Contractor shall take all steps necessary to protect existing survey pegs, reference pegs, benchmarks and work area demarcation markings, and shall re-establish such at own expense should they be disturbed as a result of activities on site.

- (b) The Contractor shall be responsible for the safety of any survey beacon or benchmark encountered on site, as well as for any costs incurred in replacing damaged beacons or benchmarks, and attention is drawn to Sections 35 and 36 of the Land Survey Act (Act No. 9 of 1927, as amended) which makes the removal of any beacon or benchmark an offence and provides for the correct procedure to be adopted where moving is required.

Before pump or injection testing commences at any hole, the Engineer or ECO's approval of the set up of the pump rig will be required, and after completion of the hole, the rig shall not be removed without the Engineer's approval. For this approval before and after pumping/injection testing of the hole, the Contractor must allow the Engineer, except if other arrangements have been negotiated, a waiting period of 12 working hours (each) before any standing time in accordance with subsection 8 may be claimed.

2.2 Measurement

The set ups ordered by the Engineer shall be measured by number for the type of rig employed. The moving of the rig between boreholes within one km radius shall be included in the cost for the set-up. The unit of measurement for the distance moved between boreholes, by the shortest practicable route as approved by the Engineer, shall be per kilometre measured, and shall be paid extra over the set up.

2.3 Payment

The price tendered and paid for shall include the supply, transport and placement of all materials, access to the borehole by personnel, supervision, labour, plant, equipment, tools and other incidentals necessary for the preparation of each borehole site, the erection of the rig with all accessories necessary to carry out the operations required at the hole and the subsequent removal from that borehole, including the removal of all embankments, platforms and any other temporary works.

3 EXISTING EQUIPMENT

3.1 Description

This subsection addresses the removal and re-installation of existing equipment at a borehole, including security cages, wellheads, monitoring equipment, string works and pumps. It must be noted that a crane will be required for this work.

3.2 Measurement and Payment

The removal and re-installation of existing equipment shall be measured and paid by the number of boreholes where removal and re-installation take place and shall include all material and personnel required to undertake the removal and re-installation.

4 INSTALLATION OF PUMP AND DISCHARGE PIPE

4.1 Description

This subsection addresses the installation of the required pump in the borehole at the required depth, the installation of any measurement device and the laying out of the discharge pipe. It includes the dismantling and removal of the pump and connection of the pump to the engine and discharge pipe in a safe manner so that the work can be conducted without interruption.

The installation of the required pump in an artesian borehole requires the release of pressure by opening the shut-off valve, removing or opening the wellhead, installation of the pump at the required depth, and sealing of the wellhead to allow for recovery of artesian pressure. Sealing of the wellhead shall be to the satisfaction of the Engineer.

The discharge pipe or layflat shall be laid from the pump to a designated discharge point as instructed by the Engineer or ECO. At the beginning of the discharge pipe a flow meter shall be installed for continuous measurements of the discharge rate as approved by the Engineer. The flow meter shall preferably not be of the propeller type, but of the ultrasonic (clamp on) flow type supplied with batteries.

4.2 Measurement

The installation shall be measured by number for each borehole up to a depth of 100 m. Any installation beyond that depth, as might be required and instructed by the Engineer, shall be measured in metres and paid for extra over the installation and removal cost.

Any installation of a pump in an artesian borehole, as might be required and instructed by the Engineer, shall be measured and paid for as extra over the installation and removal cost. No standing time for recovery of artesian pressure after installation will be paid for.

The laying out of the discharge pipe shall be measured in metres, to an accuracy of 10 m. The costs for provision and installation of the flow meter and other discharge measuring equipment shall be measured separately from the cost for the discharge pipe.

4.3 Payment

The price tendered for the installation and removal of the pump shall be deemed to cover all labour, materials and plant associated with successfully completing the work.

The price tendered for the supply and installation of layflat pipes and flow meters shall be deemed to cover all labour, materials and plant associated with successfully completing the work.

5 TEST PUMPING

5.1 Description

Test-pumping is to comprise step-drawdown, constant discharge and recovery tests. The specifications will be detailed per test, but the following is envisaged for all drilled boreholes:

- A minimum of 4 x 60 minute steps with subsequent recovery. The duration of the steps might be longer in specific circumstances. The discharge rate of the last step (highest rate) must be chosen in such a manner that the water level does not reach the pump inlet.
- A standard Constant Discharge (CD) test (minimum 72 hours) with subsequent recovery to establish aquifer parameters and borehole yield. The discharge rate will be given by the Engineer prior to commencing the test.
- A long-term Constant Discharge (CD) test (approximately 2 to 4 weeks) with delivery of the water into the distribution system to evaluate the long-term behaviour of the aquifer and boundary effects. The discharge rate will be given by the Engineer prior to commencing the test.
- A wellfield test (approximately 2 to 4 weeks), where multiple boreholes are pumped simultaneously to determine their impact on each other. The number of boreholes and their individual discharge rates will be given by the Engineer prior to commencing the wellfield test.

The step tests and/or constant discharge test may be terminated by the Engineer should the water level reach the pump inlet during any of the tests or for any reasons deemed necessary by the Engineer. The constant discharge test will be started at a time specified by the Engineer. No standing time will be payable for recovery periods.

The recovery test is to commence immediately following completion of both the step test and the constant discharge test. In all boreholes, recovery will be measured until full recovery is achieved after the constant discharge tests. Where recovery has not yet reached the original rest water level after a period equal in length to that of pumping, then recovery will be measured until a level within 5% of the pre-test rest water level is achieved.

Pumps must be provided for the lower yield testing with discharge capacities ranging from 2 l/s to 35 l/s. The pumps used for the high yield testing must have discharge capacities ranging from 10 l/s and 60 l/s. Conduit or other suitable piping not exceeding 20 mm in diameter is to be installed with the pump column to facilitate dipmeter measurements of water levels by the Contractor during these tests.

All discharge from the pump is to be piped into specified areas as advised on site by the Engineer or ECO. The pump outlet must be connected to a discharge pipe of appropriate length, depending on the situation of the test site, the selected discharge site and the duration of the test.

Water samples shall be collected by the Contractor in the manner prescribed by the Engineer on site. The Contractor must ensure whilst testing that regular checks of Electrical Conductivity (EC), Temperature (T) and pH are undertaken to monitor the water quality. At least three water samples must be taken during the Constant Discharge (CD) Test. These must be taken after the first hour of pumping, in the middle of the CD test or at a time specified by the Engineer on site, and immediately before the pump is switched off at the end of the CD test. Should the EC, Temperature or pH vary by more than 10% during the course of a pump test, the Contractor must collect a water sample and note the time at sample collection, the minutes since the test began, the current discharge rate, the water level and any additional information specified by the Engineer on site. The water sample bottles are to be clearly labelled using an indelible waterproof pen and listing the borehole identification number as provided by the Engineer, the date and the time of sample collection.

Water level measurements in the abstraction and injection borehole and pump discharge rates are to be measured by the Contractor at time intervals as specified by the Engineer, on the prescribed forms. Failure to comply with the Specifications may result in abandonment of tests at the expense of the Contractor.

5.2 Measurement and payment

The test pumping and recovery shall be measured and paid by duration in hours and or days and shall include all material and personnel required to undertake the pumping and the measurements.

6 INJECTION TESTING

6.1 Description

Test-pumping is to comprise step-drawdown, constant head and recovery tests. The specifications will be detailed per test, but the following is envisaged for all drilled MAR boreholes:

- A minimum of 4 x 60 minute steps with subsequent recovery. The duration of the steps might be longer in specific circumstances. The injection rate of the last step (highest rate/pressure) must be chosen in such a manner that the water level does not surface/daylight.
- A standard Constant Head/Injection (CH) test (minimum 72 hours) with subsequent recovery to establish aquifer parameters and borehole injection yield. The injection head (pressure) will be given by the Engineer prior to commencing the test.

The step tests and/or constant head test may be terminated by the Engineer should the water level surface and cause flooding during any of the tests or for any reasons deemed necessary by the Engineer. The constant head test will be started at a time specified by the Engineer. No standing time will be payable for recovery periods.

The recovery test is to commence immediately following completion of both the step test and the constant head test. In all boreholes, recovery will be measured until full recovery is achieved after the constant head test. Where recovery has not yet reached the original rest water level after a period equal in length to that of testing, then recovery will be measured until a level within 5% of the pre-test rest water level is achieved.

Pumps must be provided for the lower yield testing with injection capacities ranging from 2 l/s to 35 l/s. The pumps used for the high yield testing must have injection capacities ranging from 10 l/s and 60 l/s. Injection testing must include the pressure capacity of up to 1 bar and flow rates between gravity and 40 l/s. Conduit or other suitable piping not exceeding 20 mm in diameter is to be installed with the pump column to facilitate dipmeter measurements of water levels by the Contractor during these tests. A surface pressure gauge and logger should be installed on the MAR borehole for manual and automatic monitoring of pressures. The wellhead should have an air valve to allow for the release of air during the test.

Should any discharge be required then it must be piped into specified areas as advised on site by the Engineer or ECO.

Water samples shall be collected by the Contractor in the manner prescribed by the Engineer on site. The Contractor must ensure whilst testing that regular checks of Electrical Conductivity (EC), Temperature (T) and pH are undertaken to monitor the water quality. At least three water samples must be taken during the Constant Head (CH) Test. These must be taken after the first hour of injecting, in the middle of the CH test or at a time specified by the Engineer on site, and immediately before the test ends. Should the EC, Temperature or pH vary by more than 10% during the course of a test, the Contractor must collect a water sample and note the time at sample collection, the minutes since the test began, the current injection rate, the water level and any additional information specified by the Engineer on site. The water sample bottles are to be clearly labelled using an indelible waterproof pen and listing the borehole identification number as provided by the Engineer, the date and the time of sample collection.

Water level measurements in the injection borehole and injection rates and pressure are to be measured by the Contractor at time intervals as specified by the Engineer, on the prescribed forms. Failure to comply with the Specifications may result in abandonment of tests at the expense of the Contractor.

6.2 Measurement and payment

The injection testing and recovery shall be measured and paid by duration in hours and or days and shall include all material and personnel required to undertake the pumping and the measurements.

7 ARTESIAN FLOW TEST

7.1 Description

The artesian exploration boreholes will be tested through flow tests utilizing the artesian pressure in the aquifer. The tests comprise a step test of a minimum of 4 steps of 120 minutes each at different hydraulic

heads between 5 bar and 0 bar (valve fully open). The hydraulic head in the borehole shall be measured with a pressure gauge and kept constant for the duration of each step via a throttling valve. The varying flow rate shall be measured with a flow meter.

The last step shall be extended for at least one week, after which the borehole shall be shut-in and the recovery in artesian pressure shall be recorded. Automatic digital recording devices shall be employed for both the artesian pressure and the flow rate. The equipment shall be approved by the Engineer.

7.2 Measurement and payment

The flow testing and recovery shall be measured and paid by duration in hours and or days and shall include all material and personnel required to run the tests and undertake the measurements.

8 WATER LEVEL MEASUREMENTS IN SURROUNDING BOREHOLES

8.1 Description

The water levels in selected surrounding boreholes shall be measured during the constant rate/head tests and recovery tests. Depending on the distance of the monitoring boreholes to the abstraction/injection borehole, automatic digital recording devices should be employed, if not already installed. The equipment shall be approved by the Engineer.

8.2 Measurement and payment

The water level measurements shall be measured by duration in days per monitoring borehole and shall include all material and personnel required to undertake the measurements. Payment shall distinguish between manual and automated measurements.

9 TRACER TEST

9.1 Description

A tracer test will include injecting a tracer (Uranine or Rhodamine or similar and approved by the Engineer) in one borehole and then monitoring its detection at another borehole quantitatively and qualitatively using a fluometer. The tracer test is an extra over to a constant discharge test which will be charged for separately.

9.2 Measurement and payment

The tracer test measurements will be according to establishing the required equipment, including all material and personnel required to undertake the tracer test, at the borehole site, the quantity and type of dye used, the duration of the test for detection monitoring and then the reporting of the data per test. Payment shall distinguish between the establishment of equipment (no), the injection of the dye (no), the quantity and type of dye (g), the detection monitoring (days) and the reporting of the data (no).

10 REPORTING AND DATA DELIVERY

10.1 Description

All the required reports must be completed by the Contractor as specified. Reports include the Daily Pump Test Data Record and the Water Sample Information Sheets. All measurements recorded in field sheets shall be typed in a report format and provided in both hardcopy printout and electronic/digital format.

10.2 Measurement and payment

The data capturing and provision of digital data shall be measured and paid by number of boreholes tested and shall include all material and personnel required to undertake the work.

11 STANDING TIME OF PUMPING TEST RIG

11.1 Description

Should the Contractor at any time during the Contract period be required to discontinue work on instruction of the Engineer pending the issue of instructions, approval or decisions by the Engineer, and to the extent that the Contractor's workers and equipment cannot be otherwise usefully employed, he shall be entitled to compensation for such time lost during normal working hours. Standing time shall only be in respect of major units of equipment such as pumping test rigs.

It is stressed that standing time during normal working hours is only applicable should the work be stopped on instruction of the Engineer, or where decisions are being awaited from the Engineer. Where this can be foreseen, it shall be expected of the Contractor to notify the Engineer one full working day ahead that he will require instructions, approval or other decisions at a certain time. Without such prior notice, no standing time compensation shall be considered. In emergency instances where a decision can only be made once the Engineer has visited the site, the Contractor will not be entitled to claim standing time for the first 12 working hours after notifying the Engineer. No claim will be permitted for standing time due to inclement or abnormal weather conditions.

11.2 Measurement

Standing time shall only be measured for payment of periods in excess of one hour. The actual measurement will be made for the full period during which standing time was agreed for any specific unit of plant measured to the nearest hour.

11.3 Payment

The price tendered for each hour of standing time shall include full compensation for all revenue lost and any costs whatsoever thus incurred. Only claims for standing time which falls within the specifications of this subsection shall be paid for.

No standing time shall be payable if the work is stopped by the Engineer for the purpose of requiring the Contractor to make necessary repairs to his equipment, to make good unsatisfactory work or to provide proper alternative equipment or workmen.

SPEC Z: STANDARD SPECIFICATIONS FOR CLEANING AND REHABILITATION OF BOREHOLES

1 ESTABLISHMENT OF DRILL/PUMP RIG(S) AND ANCILLARY EQUIPMENT IN THE PROJECT AREA

1.1 Description

This subsection addresses the establishment in the project area of drill or pump rig(s), ancillary equipment and materials necessary to undertake the work and successfully complete the Contract. It includes the dismantling and removal of the rig(s) and ancillary equipment and materials following completion of the project or termination of the contract, whichever comes first.

A required rig shall be regarded as a machine of the required type, properly mounted and in full working order, together with all ancillary equipment (compressors, pumps, tools and other accessories) needed to execute the required work properly and efficiently.

It is anticipated that the required rigs will be one (1) drill rig with airlift capacity of 20 bar and/or one (1) pump rig with a pump capacity of > 10 l/s. Should additional rigs be required, written approval from the Engineer shall be obtained before establishment of each additional rig.

1.2 Measurement

The quantity to be paid for the establishment of rig(s) in the project area shall be made according to the type and number of rigs employed by the Contractor for the work as indicated in the Schedule of Quantities, and certified by the Engineer in writing following their deployment to a work site.

1.3 Payment

The price tendered and specified for each rig shall include full compensation for the supply and transport of the rig and all accompanying equipment, materials, tools and accessories needed for its operation, to and from the project area at the start and end of the contract respectively. Payment shall distinguish between the different types of drill/pump rig as indicated in the Schedule of Quantities.

The Contractor will be entitled to claim the price tendered for each rig established in the project area at the start of a works project, and the price tendered for each rig de-established following completion or termination of the works or contract. However, should the rig already be in the project area under another Works Project, then it will not be paid for again.

2 SET UP AND REMOVAL OF RIG AT EACH BOREHOLE

2.1 Description

This subsection addresses the setting up of individual drill/pump rigs at each work site, and their subsequent removal after completion of the testing. The rates tendered shall be deemed to include for the access of personnel and transport to and the subsequent removal of labour, plant or any other incidentals necessary for the operations from each borehole position. Distinction shall be made between the type and size of rig used at each borehole.

The type of rig to be employed at any borehole shall define the payment rate under which the set up and removal will be made, subject to the approval of the Engineer. Should the Contractor utilize a rig type different to that specified and approved by the Engineer, payment shall be made according to the type originally specified unless the Contractor can prove that the use of the rig type originally specified was impractical.

The work area will be cleared prior to the set up and will be clearly marked. This area shall not be exceeded without prior discussion with and written approval from the Engineer or ECO.

The following shall be noted:

- (a) The Contractor shall take all steps necessary to protect existing survey pegs, reference pegs, benchmarks and work area demarcation markings, and shall re-establish such at own expense should they be disturbed as a result of activities on site.
- (b) The Contractor shall be responsible for the safety of any survey beacon or benchmark encountered on site, as well as for any costs incurred in replacing damaged beacons or benchmarks, and attention is drawn to Sections 35 and 36 of the Land Survey Act (Act No. 9 of

1927, as amended) which makes the removal of any beacon or benchmark an offence and provides for the correct procedure to be adopted where moving is required.

Before cleaning and rehabilitation commences at any hole, the Engineer's or ECO's approval of the set up of the rig will be required, and after completion of the hole, the rig shall not be removed without the Engineer's approval. For this approval before and after the works, the Contractor must allow the Engineer, except if other arrangements have been negotiated, a waiting period of 12 working hours (each) before any standing time in accordance with subsection 8 may be claimed.

2.2 Measurement

The set ups ordered by the Engineer shall be measured by number for the type of rig employed. The moving of the rig between boreholes within one km radius shall be included in the cost for the set-up. The unit of measurement for the distance moved between boreholes, by the shortest practicable route as approved by the Engineer, shall be per kilometre measured, and shall be paid extra over the set up.

2.3 Payment

The price tendered and paid for shall include the supply, transport and placement of all materials, access to the borehole by personnel, supervision, labour, plant, equipment, tools and other incidentals necessary for the preparation of each borehole site, the erection of the rig with all accessories necessary to carry out the operations required at the hole and the subsequent removal from that borehole, including the removal of all embankments, platforms and any other temporary works.

3 REMOVAL AND CLEANING OF EXISTING EQUIPMENT

3.1 Description

This subsection addresses the removal, re-installation, mechanical and chemical cleaning of existing equipment which may comprise of a security cage, pump, monitoring equipment and rising main. It must be noted that a crane will be required for this work.

3.2 Measurement and payment

The removal, re-installation and pressure cleaning of existing equipment shall be measured and paid by the number of boreholes and shall include all material and personnel required to undertake the works.

4 INSTALLATION OF EQUIPMENT

4.1 Description

This subsection addresses the installation of the required equipment in the borehole. This shall include installation of the pump or cleaning tool at the required depth, the installation of any measurement device and the laying out of the discharge pipe. It includes the dismantling and removal of the pump and connection of the pump to the engine and discharge pipe in a safe manner so that the work can be conducted without interruption.

The discharge pipe or layflat shall be laid from the pump to a tank to collect the discharged water for disposal at a registered disposal facility. At the beginning of the discharge pipe a flow meter shall be installed for continuous measurements of the discharge rate as approved by the Engineer. The flow meter shall preferably not be of the propeller type, but of the ultrasonic (clamp on) flow type supplied with batteries.

4.2 Measurement

The installation shall be measured by number for each borehole up to a defined depth. Any installation beyond that depth, as might be required and instructed by the Engineer, shall be measured in metres and paid for extra over the installation and removal cost.

The laying out of the discharge pipe shall be measured in metres, to an accuracy of 10 m. The costs for provision and installation of the flow meter and discharge collector tank shall be measured separately from the cost for the discharge pipe.

4.3 Payment

The price tendered for the installation and removal of the pump shall be deemed to cover all labour, materials and plant associated with successfully completing the work.

The price tendered for the supply and installation of layflat pipes and flow meters shall be deemed to cover all labour, materials and plant associated with successfully completing the work.

5 MECHANICAL BOREHOLE CLEANING

5.1 Description

This subsection addresses the mechanical cleaning of boreholes, which could comprise re-drilling through collapsed rocks or material dumped into the borehole, high-pressure cleaning of borehole wall and or casing and brushing of casing.

5.2 Measurement and payment

The mechanical cleaning shall be measured and paid by duration in hours and shall include all material and personnel required to undertake the works and removal of debris through pumping or airlifting.

The re-drilling shall be measured and paid by metres drilled, depending upon drilling diameter employed.

6 CHEMICAL BOREHOLE CLEANING

6.1 Description

This subsection addresses the chemical cleaning of boreholes through application of specific chemicals such as sulphuric acid and special agents.

6.2 Measurement and payment

The chemical cleaning shall be measured and paid by the amount of chemicals used and the duration in hours and shall include all material and personnel required to undertake the works and removal of chemicals and debris through pumping.

The collection and disposal of abstracted water shall be measured and paid by the volume in cubic metres.

7 BOREHOLE CAMERA AND PROFILING

7.1 Description

The inspection of the borehole prior to and after the cleaning shall be carried out using a down-hole camera, water quality multisonde and down-hole flow meter, as instructed by the Engineer. The down-hole camera shall be able to view and record images from the borehole facing downwards and sideways against the borehole wall. The equipment shall be approved by the Engineer.

7.2 Measurement and payment

The down-hole survey shall be measured by length of the borehole section investigated in metres. Moving several times over the same section to get optimal imagery and measurements will not be paid extra. Payment shall distinguish between the type of survey.

8 REPORTING AND DATA DELIVERY

8.1 Description

All the required reports must be completed by the Contractor as specified. Reports include the Daily Pump Test Data Record and the Water Sample Information Sheets. All measurements recorded in field sheets shall be typed in a report format and provided in both hardcopy printout and electronic/digital format.

8.2 Measurement and payment

The data capturing and provision of digital data shall be measured and paid by number of boreholes tested and shall include all material and personnel required to undertake the work.

9 STANDING TIME OF RIG

9.1 Description

Should the Contractor at any time during the Contract period be required to discontinue work on instruction of the Engineer pending the issue of instructions, approval or decisions by the Engineer, and to the extent

that the Contractor's workers and equipment cannot be otherwise usefully employed, he shall be entitled to compensation for such time lost during normal working hours. Standing time shall only be in respect of major units of equipment such as pumping test rigs.

It is stressed that standing time during normal working hours is only applicable should the work be stopped on instruction of the Engineer, or where decisions are being awaited from the Engineer. Where this can be foreseen, it shall be expected of the Contractor to notify the Engineer one full working day ahead that he will require instructions, approval or other decisions at a certain time. Without such prior notice, no standing time compensation shall be considered. In emergency instances where a decision can only be made once the Engineer has visited the site, the Contractor will not be entitled to claim standing time for the first 12 working hours after notifying the Engineer. No claim will be permitted for standing time due to inclement or abnormal weather conditions.

9.2 Measurement

Standing time shall only be measured for payment of periods in excess of one hour. The actual measurement will be made for the full period during which standing time was agreed for any specific unit of plant measured to the nearest hour.

9.3 Payment

The price tendered for each hour of standing time shall include full compensation for all revenue lost and any costs whatsoever thus incurred. Only claims for standing time which falls within the specifications of this subsection shall be paid for.

No standing time shall be payable if the work is stopped by the Engineer for the purpose of requiring the Contractor to make necessary repairs to his equipment, to make good unsatisfactory work or to provide proper alternative equipment or workmen.

CITY OF CAPE TOWN

**WATER AND SANITATION
CONTRACT NO. 4Q/2021/22**

**TERM TENDER FOR DRILLING, TESTING AND REHABILITATION OF BOREHOLES IN PRIMARY
AQUIFERS IN CAPE TOWN**

C3.7 Annexes

CONTENTS

Annex 1: Monthly Project Labour Report

Annex 2: B-BBEE Sub-Contract Expenditure Report

Annex 3: Joint Venture Expenditure Report

Annex 4: Targeted Labour Contract Participation Expenditure Report

Annex 5: Targeted Enterprises Contract Participation Expenditure Report

ANNEX 1

CITY OF CAPE TOWN MONTHLY PROJECT LABOUR REPORT



Instructions for completing and submitting forms

General

- 1 The Monthly Project Labour Reports must be completed in full, using typed, proper case characters; alternatively, should a computer not be available, handwritten in black ink.
- 2 Incomplete / incorrect / illegible forms will not be accepted.
- 3 Any conditions relating to targeted labour stipulated in the Contract (in the case of contracted out services or works) shall apply to the completion and submission of these forms.
- 4 This document is available in Microsoft Excel format upon request from the City's EPWP office, tel 021 400 9406, email EPWPLR@capetown.gov.za.

Project Details

- 5 If a field is not applicable insert the letters: NA
- 6 Only the Project Number supplied by the Corporate EPWP Office must be inserted.
The Project Number can be obtained from the Coordinator or Project Manager or from the e-mail address in point 4 above.
- 7 On completion of the contract or works project the anticipated end date must be updated to reflect the actual end date.

Beneficiary Details and Work Information

- 8 Care must be taken to ensure that beneficiary details correspond accurately with the beneficiary's ID document.

- 9 A new beneficiary is one in respect of which a new employment contract is signed in the current month. A certified ID copy must accompany this labour report on submission.
- 10 Was the beneficiary sourced from the City's job seeker database?
- 11 The contract end date as stated in the beneficiary's employment contract.
- 12 Where a beneficiary has not worked in a particular month, the beneficiary's name shall not be reflected on this form at all for the month in question.
- 13 Training will be recorded separately from normal working days and together shall not exceed the maximum of 23 days per month
- 14 Workers earning more than the maximum daily rate (currently R450 excluding any benefits) shall not be reflected on this form at all.

Submission of Forms

- 15 Signed hardcopy forms must be scanned and submitted to the City's project manager in electronic (.pdf) format, together with the completed form in Microsoft Excel format.
- 16 Scanned copies of all applicable supporting documentation must be submitted along with each monthly project labour report. Copies of employment contracts and ID documents are only required in respect of new beneficiaries.
- 17 If a computer is not available hardcopy forms and supporting documentation will be accepted.

PROJECT DETAILS

Numbers in cells below e.g (6) refer to the relevant instruction above for completing and submitting forms

CONTRACT OR WORKS PROJECT NAME: (6)		EPWP SUPPLIED PROJECT NUMBER: (6)										
DIRECTORATE:		DEPARTMENT:										
CONTRACTOR OR VENDOR NAME:		CONTRACTOR OR VENDOR E-MAIL ADDRESS:										
CONTRACTOR OR VENDOR CONTACT PERSON:		CONTRACTOR OR VENDOR TEL. NUMBER:										
		CELL WORK										
PROJECT LABOUR REPORT CURRENT MONTH (mark with "X")												
JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR

ACTUAL START DATE (yyyy/mm/dd)						ANTICIPATED / ACTUAL END DATE (yyyy/mm/dd) (7)					
TOTAL PROJECT EXPENDITURE / VALUE OF WORK DONE TO-DATE (INCLUDING ALL COSTS, BUT EXCLUDING VAT)											
R											

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MONTHLY PROJECT LABOUR REPORT



BENEFICIARY DETAILS AND WORK INFORMATION

CONTRACT OR WORKS PROJECT NUMBER:
--

Year	Month

Sheet		
1	of	

No.	(8) First name	(8) Surname	(8) ID number	(9) New Beneficiary (Y/N)	Gender (M/F)	Disabled (Y/N)	(10) Job seeker database (Y/N)	Contract start date (DDMMYY)	(11) Contract end date (DDMMYY)	(12) No. days worked this month (excl. training)	(13) Training days	(14) Rate of pay per day (R – c)
1												
2												
3												
4												
5												
6												
7												
8												
9												
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												

0 0 R -

Declared by Contractor or Vendor to be true and correct:	Name		Signature	
	Date			

Received by Employer's Agent / Representative:	Name		Signature	
	Date			

ANNEX 2

CITY OF CAPE TOWN

CONTRACT NO. AND NAME:

CONTRACTOR:

B-BBEE SUB-CONTRACT EXPENDITURE REPORT BASED ON PAYMENT CERTIFICATE NO.

Value of the contract (as defined in the Preference Schedule) (P*)	R	B-BBEE Status Level of Prime Contractor	
---	---	---	--

Name of Sub-contractor (list all)	B-BBEE Status Level of Sub-contractor ¹	Total value of Sub-contract (excl. VAT) ¹	Value of Sub-contract work to date (excl. VAT) ¹	Value of Sub-contract work to Sub-contractors with a lower B-BBEE Status Level than Prime Contractor
Sub-contractor A		R	R	R
Sub-contractor B		R	R	R
Sub-contractor C		R	R	R

¹Documentary evidence to be provided

Total:	R
Expressed as a percentage of P*	%

Signatures

Declared by Contractor to be true and correct:

Date:

Verified by Employer's Agent / Representative:

Date:

ANNEX 3

CITY OF CAPE TOWN

CONTRACT NO. AND NAME:

CONTRACTOR:

JOINT VENTURE EXPENDITURE REPORT BASED ON PAYMENT CERTIFICATE NO.

Value of the contract (as defined in the Preference Schedule) (P*)	R	B-BBEE Status Level of Joint Venture	
--	---	--------------------------------------	--

Name of Joint Venture partner (list all)	B-BBEE Status Level of each JV partner as at contract award	Percentage contribution of JV partner per JV Agreement ¹ A	Total value of JV partner's contribution (excl. VAT) ¹ B = A% x P*	Value of JV partner's contribution to date (excl. VAT) ¹ C	Value of JV partner's contribution as a percentage of the work executed to date D = C/P*x100
JV Partner A		%	R	R	%
JV Partner B		%	R	R	%
JV Partner C		%	R	R	%

¹Documentary evidence to be provided

Signatures

Declared by Contractor to be true and correct:

Date:

Verified by Employer's Agent / Representative

Date:

Part C4: Site information

	Pages
C4 Site information	358 - 404

CITY OF CAPE TOWN

**WATER AND SANITATION
CONTRACT NO. 4Q/2021/22**

**TERM TENDER FOR DRILLING, TESTING AND REHABILITATION OF BOREHOLES IN PRIMARY
AQUIFERS IN CAPE TOWN**

C4 Site Information

CONTENTS

1. GENERAL
2. WORKS PROJECTS
3. DRAWINGS
4. HEALTH AND SAFETY REQUIREMENTS

1. GENERAL

The sites for the Works are those areas which may be identified within the City of Cape Town municipal area in which Works Projects are to be executed.

The Atlantis and Cape Flats Aquifers consists of Tertiary to Quaternary fluvial, marine and aeolian sedimentary deposits of the Sandveld Group which unconformably overlie weathered Malmesbury Group (shale, greywacke) and Cape Granite Suite basement rocks.

In general the Witzands area is underlain by fine to medium grained sands of the Witzands formation, medium to coarse sands of the Springfontein Formation and clay interspersed with medium-coarse sands and shells of the Varswater formation. The hinterland has increased heterogeneity, organic materials, clay and calcrete lenses. Silwerstroom is characterised by medium-fine sands and silt. Drilling conditions in Silwerstroom are particularly challenging due to the abundance and unpredictability of fine material (i.e. fine sand and silt). The aquifer has inherent iron bacteria which causes biofouling and poses considerable operational challenges. This dictates that while maximum borehole yields can be in excess of ~30 l/s, boreholes are recommended to be pumped at lower yields and carefully managed to mitigate the frequency and effects of biofouling.

The Cape Flats Aquifer is generally underlain by the medium to coarse grained sands of the Springfontein Formation with clay and organic rich layers interspersed with gravels of the Elandsfontein Formation within the palaeochannel that occurs in the Philippi, Hanover Park and Bishop Lavis areas. Along the coastline the Springfontein Formation is underlain by the marine shells and gravels of the Varswater Formation. Towards the east, Swartklip area, calcretes of the Langebaan Formation may be intersected. Lenses of calcrete, clay and organic rich material can be as thick as 5 meters in areas and on occasions fine grained sand as been intersected. In general the CFA is 30-50 m thick with yields ranging from 3 to greater than 50 l/s. Biofouling has not been studied in as much detail as for Atlantis but will likely be prevalent throughout the CFA as well.

2. WORKS PROJECTS

Site specific information will be specified, as required, in the Works Project contract document for a particular Works Project. An example of such a Works Project Document is available upon request to the Employer.

3. DRAWINGS

- 3.1 A typical man-hole cover, made of DN 1250 precast concrete manhole rings with a lockable ductile iron lid (Securex Y-560C or similar) (page 348).
- 3.2 A typical production, injection and exploration borehole log (pages 349 – 351).

4. HEALTH AND SAFETY REQUIREMENTS

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4.1 Project specific health and safety requirements (pages 352 – 393)
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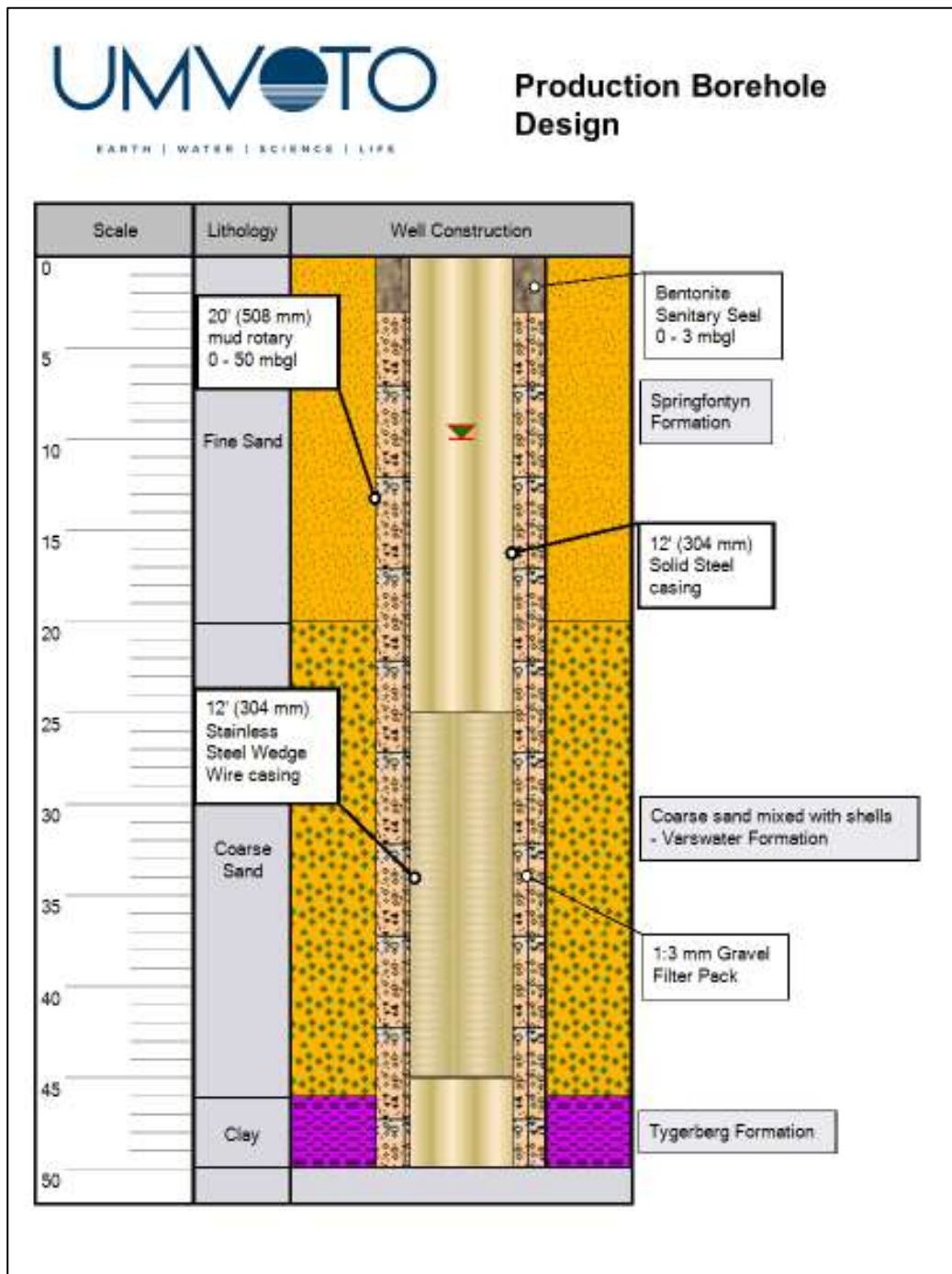
WATER AND SANITATION
CONTRACT NO. 4Q/2021/22

**TERM TENDER FOR DRILLING, TESTING AND REHABILITATION OF BOREHOLES IN PRIMARY
AQUIFERS IN CAPE TOWN**

C4 Site Information

3.1 Drawings – Manhole Cover

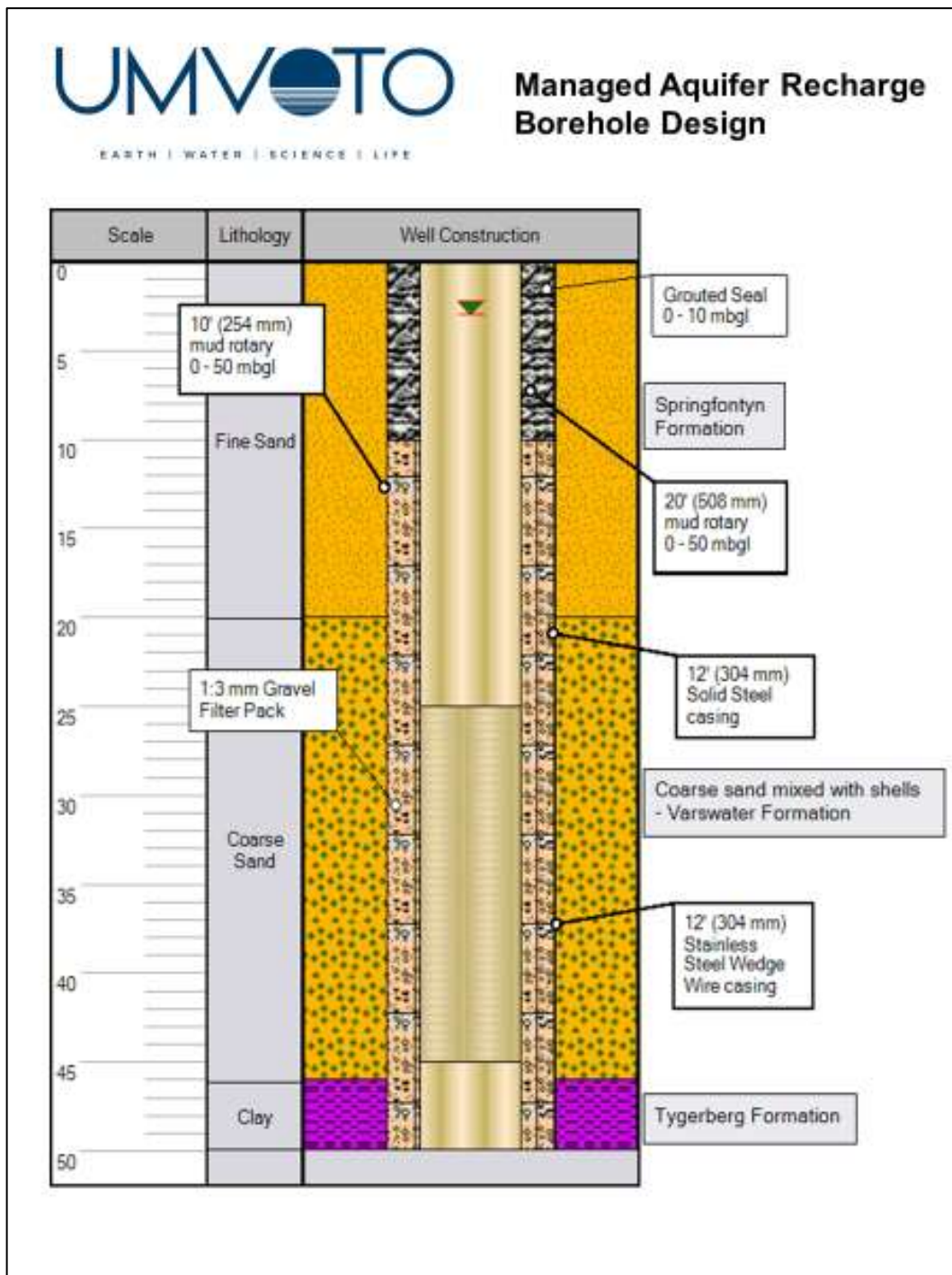
3.2 Drawings – Production Borehole Log



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C4 Site Information

3.2 Drawings – MAR Borehole Log



CITY OF CAPE TOWN

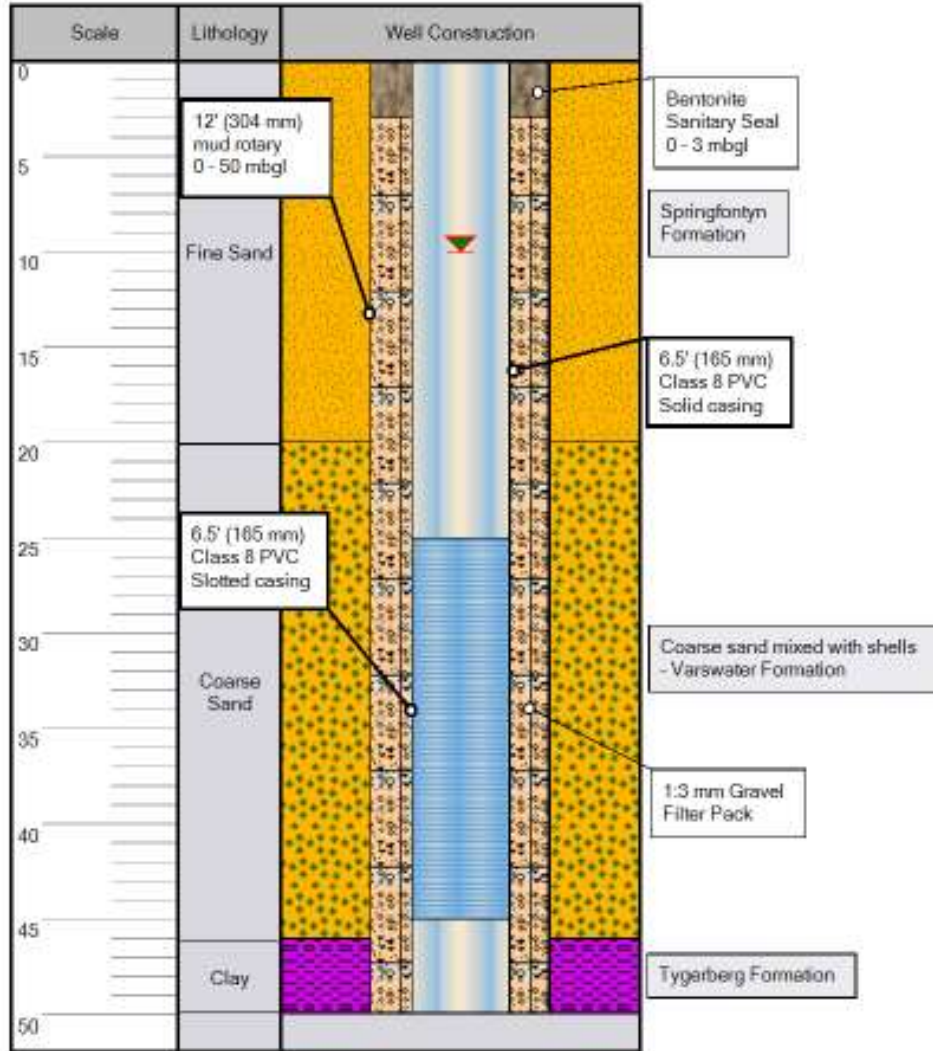
**WATER AND SANITATION
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**TERM TENDER FOR DRILLING, TESTING AND REHABILITATION OF BOREHOLES IN PRIMARY
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C4 Site Information

3.2 Drawings – Exploration Borehole Log

Exploration Borehole Design



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AQUIFERS IN CAPE TOWN

C4 Site Information

4.1 H&S Requirements – Site Specific H&S Requirements

BASELINE HEALTH & SAFETY RISK ASSESSMENT AND PROJECT HEALTH & SAFETY SPECIFICATIONS DOCUMENT

PROJECT:

Drilling and Testing

Date: May 2020



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Part C4: Site Information
Reference No. 4Q/2021/22

Site Specific H&S Requirements



FOREWORD

These health & safety specifications have been compiled in terms of the Occupational Health & Safety Act no. 85 of 1993 and incorporated Regulations.

Please take note of the R60m exemption for the permit as per CIDB ratings for 2019.

It must be clear that this document is a management tool and should be used by the Principal Contractor and Contractors in order to comply with the aforementioned Act and regulations.

Should there be any contradiction between this document and the Act, the Act must take preference except where explicitly stated.

Similarly where this document is silent on a specific health & safety requirement, the Act must be used as the minimum requirement.

Should you be unclear about anything set out in this document, please contact this office.

Ensuring you of our best intentions and service at all times.

André Burger

Occupational Health and Safety Agent – PrCHSA 028/2015 | SACPCMP

The first mention of Occupational Safety can be found in the Old Testament:

Deu 22:8 “When thou buildest a new house, then thou shalt make a battlement for thy roof, that thou bring not blood upon thine house, if any man fall from thence.”



HEALTH AND SAFETY SPECIFICATIONS FOR

Drilling and Testing of boreholes

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1. INTRODUCTION AND BACKGROUND

1.1. **Background to the Health and Safety Specifications (also termed These Specifications)**

The Construction Regulations 2014 places the onus on the Client to prepare a baseline risk profile and health & safety specifications highlighting hazards not successfully eliminated during design. The Client also has the opportunity to set the tone and standard of occupational health & safety on the construction site.

1.2. **Responsibility and Accountability**

It is imperative to understand the process of determining legal accountability as the OHS Act is the only criminal Act still administered by the Department of Labour. It *assumes* that the CEO is overall accountable even though he/she may delegate some of his/her responsibilities. This principle is entrenched in Section 37(1) of the Act and is set out below for your benefit. This is generally referred to as the REASONABLE MAN TEST.

SECTION 37: Acts or omissions by Employees or Mandataries

- (1) Whenever an employee does or omits to do any act which it would be an offence in terms of this Act for the employer of such employee or a user to do or omit to do, then, unless it is proved that -
 - (a) in doing or omitting to do that act the employee was acting without the connivance or permission of the employer or any such user;
 - (b) it was not under any condition or in any circumstance within the scope of the authority of the employee to do or omit to do an act, whether lawful or unlawful, of the character of the act or omission charged; and
 - (c) all reasonable steps were taken by the employer or any such user to prevent any act or omission of the kind in question, *the employer himself shall be presumed to have done or omitted to do that act, and shall be liable to be convicted and sentenced in respect thereof; and the fact that he issued instructions forbidding any act or omission of the kind in question shall not, of itself, be accepted as sufficient proof that he took all reasonable steps to prevent the act or omission.*

1.3. **Purpose of the Health and Safety Specifications**

The purpose of the H&S specifications document is to assist in achieving compliance with the Occupational Health & Safety Act 85/1993 (OHS Act), Regulations and in particular the Construction Regulations (CR's) in order to prevent or as far as possible reduce incidents and injuries. **Note that the CR's 2014 were promulgated on the 7th February 2014 and are enforceable on this project.** These specifications should act as the basis for the drafting of the Principal Contractor and Contractors' construction phase health & safety plans.

The health & safety specifications document sets out the requirements to be followed by the **Principal Contractor who will be appointed to do the borehole drilling and testing, as well as its sub-contractors** so that the health & safety of all persons (including the public) potentially at risk may receive the same priority as other facets of the project e.g. cost, programme, environment, quality, etc.

1.4. **Implementation of the Health and Safety Specifications (Drafting of the Contractors' Health & Safety Plans)**

This health & safety specifications document forms an integral part of the contract and the **Principal Contractor and its Contractors** appointed are expected to make use of it when compiling their project-specific construction-phase health & safety plans. The Principal Contractor must forward a copy of these specifications to all Contractors at their bidding stages so that they can in turn prepare health & safety plans relating to their specific operations.

2. OCCUPATIONAL HEALTH & SAFETY MANAGEMENT SYSTEM ELEMENTS

2.1 Scope of the Project

These Specifications set out the requirements for eliminating or if this is not possible, for minimising as far as reasonably practicable, the risk of incidents and injuries occurring on this contract with the following scope of works:

The Works carried out by the Contractor under this Contract comprise mainly of the following:

- (a) Exploration drilling and establishment of monitoring boreholes in sedimentary rock and basement environments in several areas marked by the Engineer, using sonic, auger, core, rotary mud or percussion drilling technology. The final number of boreholes, drilling methodology and drilling depths of each site will depend on the hydrogeological conditions encountered.
- (b) Rotary mud drilling in sedimentary rock environments in several areas to establish standard and wide diameter production and MAR boreholes. The final number of boreholes and drilling depths at each site will depend on the results of the exploration boreholes and the hydrogeological conditions encountered.
- (c) The supply and installation of casings, well screens, couplings, end caps and all other materials such as specified and required for the work.
- (d) The placing of gravel packs around screens, installation of grout seals, plinths, etc.
- (e) Construction of concrete plinths and manholes to secure the boreholes.
- (f) Test pumping of the boreholes.
- (g) Injection testing under pressure and gravity of MAR boreholes
- (h) Cleaning and rehabilitation of existing boreholes (where required).
- (i) Downhole geophysical surveys of boreholes (where possible, as indicated by the Engineer).
- (j) Environmental management of the drilling areas during construction.
- (k) Compliance with the requirements of the OHS Act.

As well as ...

• Drilling in the Cape Flats and Atlantis

Drilling of exploration, monitoring, production and MAR boreholes using various drilling techniques such as rotary mud, percussion, rotary core, sonic and auger.

Activities include the actual drilling, installing casing (steel, stainless steel, PVC), development of the borehole using compressed air and the installation of manholes and plinths. On occasions access to site may require clearing of vegetation and sand.

• Test-pumping

Test-pumping of a borehole which includes the installation of a pumping down the borehole and the discharge via a layout further afield. The pumps are generally run via generators.

Injection testing where water is pumped from one borehole or another source (fire hydrant) into an injection borehole under a pressure of up to 1 bar.

During all test and injection pumping, neighbouring boreholes are monitored manually using a dip meter and the discharge rate is measured using a flow meter, v-notch or drum system. On occasions access to site may require clearing of vegetation and sand.

• Downhole Geophysics and camera surveys

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Lowering of geophysical probes and cameras down the borehole on a cable.

- **Rehabilitation of boreholes**

Mechanical rehabilitation includes the drilling through any blockages or the physical jetting or brushing of the casing by lowering a brush or jetting tool down the borehole.

Chemical rehabilitation includes pouring chemicals such as sulfamic acid, sulphuric acid, hyperchloride acid or boresaver into the borehole. This is allowed to remain in the borehole for a number of hours before it is pumped out of the borehole into a tank for disposal. On occasions access to site may require clearing of vegetation and sand.

The description of the Works is not necessarily complete and shall not limit the work to be carried out by the Contractor under this Contract.

The health & safety specifications document includes an identification of hazards by the appointed H&S Agent as well as public protection protocols and specific construction related minimum safety and health requirements, control measures and procedures which need to be taken into account when: pricing the project; programming your activities and trades; compiling your project-specific health & safety plan; compiling your preliminary risk assessment document; compiling your baseline fall protection plan; and producing activity-specific health & safety risk assessment documentation.

The scope also addresses legal compliance, hazard identification and risk assessment, risk control, and the promotion of a health and safety culture for those personnel working on the project. The health & safety specifications also make provision for the protection of those persons other than employees i.e. site visitors and members of the public.

2.2 Interpretations

2.2.1 Application

This specifications document is a legal compliance document compiled in terms of the OHS Act and is therefore binding. The document must be read in conjunction with other relevant legislation including: **The Occupational Health & Safety Act 85/1993; Construction Regulations 2014; all other regulations and codes incorporated into the OHS Act; the civil engineer's specification document; all engineers drawings, specifications, notes and guidelines; the geo-tech science report; project tender documentation; the local authority's by-laws and requirements.**

2.2.2 Definitions

The definitions as listed in the OHS Act 85/1993 and Construction Regulations (2014) shall apply

- CHSA – Construction Health & Safety Agent = Pr.CHSA
- Contractors include sub-contractors and principal contractors.
- Contractor's Construction Manager as defined in the Construction Regulations 2014 [CR 8(1)] as the Construction Manager. This is not the Client's Project Manager / site representative.
- Directs – Any Contractor appointed directly by the construction Client.
- Principal Agent = P/Agent = Client Representative.
- Principal Contractor includes any Direct Contractor appointed on the project.

As well as

- **Consequence**

The outcome of an unwanted event (risk scenario) expressed qualitatively or quantitatively. It is usual to consider this in terms of the maximum reasonable potential outcome.

- **Control Measure (or Control)**

An act, object (engineered) or system (combination of act and object) intended to prevent or mitigate an unwanted event (risk scenario).

- **Critical Control**

A control measure that is crucial to preventing an unwanted event (risk scenario) or mitigating the consequences of an unwanted event. The absence or failure of a critical control would significantly increase the risk despite the existence of other control measures. In addition, a control measure that prevents more than one unwanted event or mitigates more than one consequence is usually classified as critical.

- **Hazard**

A source of potential harm in terms of human injury or ill health, or a combination of these. A hazard is typically an energy source.

- **Hierarchy of Controls**

A sequence of control measures, arranged in order of decreasing effectiveness, used to eliminate or minimise exposure to workplace health and safety hazards:

- i. Elimination – Completely removing a hazard or risk scenario from the workplace.
- ii. Substitution – Replacing an activity, process, substance or energy with a less hazardous alternative.
- iii. Engineering Controls – Designing control measures into processes and / or equipment (e.g. mechanical aids, interlocks, pressure relief systems, extraction, and ventilation) or isolating a hazard from persons through the provision of barriers, machine guarding, or insulation.
- iv. Administrative Controls – Establishing appropriate policies, procedures and work practices to reduce the exposure of persons to a hazard. This may include the provision of specific training and supervision.
- v. Personal Protective Equipment – Providing suitable and properly maintained PPE to cover and protect persons from a hazard (i.e. prevent contact with the hazard).

- **Likelihood**

A description of probability or frequency, in relation to the chance that an unwanted event (risk scenario) will occur.

- **Risk (Rating)**

A combination of the likelihood of the occurrence of an unwanted event (risk scenario) and the severity of injury or ill health that can be caused by the event.

- **Risk Assessment**

A process of evaluating the risk scenarios arising from identified hazards, and identifying control measures that are as effective as possible in order to manage the risks to levels that are as low as is reasonably practicable.

- **Risk Management**

1. The systematic application of management policies, processes and procedures to:
2. Identifying hazards;
3. Analysing and evaluating the associated risks;
4. Controlling the risks through the implementation of control measures; and
5. Monitoring the risks and related control measures on an ongoing basis.

2.3 Minimum Administrative Requirements

2.3.1 Notification of Intention to Commence Construction Work & Construction Work Permit

The Principal Contractor must notify the Provincial Director of the Department of Labour in writing at least 7 days before construction work commences. A copy of this notification must be held in the Principal

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Contractor's health & safety file on site. The fax transmission slip will serve as proof of notification.

Notifications can also be submitted via email to: fezeka.ngalo@labour.gov.za

The requirement for a construction work permit is not foreseen on the contract due to the value being less than R60m.

2.3.2 Assignment of the Principal Contractor's / Contractors' Responsible Persons to Supervise and Co-ordinate Health and Safety on Site

The Principal Contractor must make supervisory appointments as well as other relevant appointments in writing (as stipulated by the OHS Act and Construction Regulations). See attached **Annexure 'B'** for more detail on which health & safety management appointments are relevant on this project.

2.3.3 Competence of the Principal Contractors' / Contractors' Appointed Competent Persons

The Principal Contractor and Contractors' competent persons for the various risk management portfolios must fulfil the criteria as stipulated in terms of the definition 'Competent Person' in accordance with the Construction Regulations. Proof of competence to be attached to each appointment letter kept in safety file.

These persons must also have a knowledge of the OHS Act and relevant Regulations (CR 2014 requirement). Proof of the same to be kept with each appointment.

2.3.4 Compensation for Occupational Injuries and Diseases Act 130 of 1993 (COIDA)

The Principal Contractor must have in its possession a letter of good standing issued by its Compensation Assuror as proof of registration. Contractors must also hold proof of workman's compensation assurance registration in the form of a letter of good standing and forward a copy to the Principal Contractor before they begin work on site. Contractors must be in good standing at all times while carrying out work on site.

2.3.5 Health and Safety Organogram

The Principal Contractor must prepare an organogram outlining their site health & safety management structure including all appointed risk management competent persons. In cases where appointments have not yet been made, the organogram shall reflect the intended positions. The organogram must be updated when there are changes in the Site Management Structure, and dated accordingly. The organogram merely serves as a quick reference to who is responsible for what risk portfolio in what area on site.

2.3.6 Preliminary Hazard Identification and Risk Assessments (HIRA's), Activity-Specific Risk Assessments, and Risk Assessment Reviews

The P/Contractor's risk assessments must take into account the Client (CoCT)'s baseline health & safety risk profile and designers risk assessment (separate addendum).

Detailed hazard identification and risk assessment processes must be followed for all work to be performed as well as for all associated equipment and facilities.

The contractor must ensure that effective procedures and assessment systems are in place to control hazards and to mitigate risks to levels that are as low as is reasonably practicable.

The risk assessment processes must be applied to:

- The full life cycle of the project;
- Routine and non-routine activities;
- Planned or unplanned changes;
- All employees, sub-contractors, suppliers and visitors; and
- All infrastructure, equipment and materials.

The risk assessment processes and methodologies must be appropriate for the nature and scale of the risks, and must be implemented by competent persons.

The process of analysing and managing risk must include the following:

- Establishing the context of the risk assessment;
- Identifying hazards and determining possible risk scenarios (unwanted events);
- Evaluating risks and assigning ratings (classification);
- Recording the risk analysis in a risk register;
- Managing risks according to their classification (prioritising for action);
- Identifying and implementing control measures (through the application of the Hierarchy of Controls) to ensure that risks are managed to levels that are as low as is reasonably practicable (ALARP);
- Developing action plans for reducing risk levels (where possible);
- Verifying the completion of actions;
- Re-evaluating the risks and classifications as appropriate; and
- Reviewing and updating the risk register.

2.3.6.1 Baseline Risk Assessments

Prior to site establishment, the contractor must conduct a detailed Baseline Risk Assessment identifying foreseeable hazards and risk scenarios associated with the contractor's scope of work on the project. Details concerning proposed control measures must be included. The risk assessment process must be facilitated by a competent person who has been appointed in writing and must involve the participation of the contractor's site management representatives, health and safety reps, supervisory personnel and technical experts (as required). An attendance register must be completed and retained. The Baseline Risk Assessment must be reviewed by the project management representative.

When carrying out a Baseline Risk Assessment or a Task-Based Risk Assessment, Hazard (Energy) Types must be specified in accordance with the categorisation. Risk scenarios must be described indicating the manner in which a person may come into contact with, or be exposed to, a specific hazard.

An initial risk rating must be assigned to each risk scenario without taking any control measures into consideration. Control measures for managing the risks to levels that are as low as is reasonably practicable must then be identified for implementation on the project.

Risk ratings must be assigned qualitatively using consequence and likelihood scales and descriptors

A Risk Register comprised of all significant risks (i.e. risks rated as high or critical) identified for the project must be compiled using the information contained in the project Baseline Risk Assessment as well as the

contractor's Baseline Risk Assessment. Key control measures for managing each of these risks must be specified in the register.

For the significant risks in particular, action plans must be developed for reducing the risk levels (where possible).

The project Risk Register will be reviewed and, if necessary, updated:

- On a six monthly basis during construction;

- When changes are made to a design and / or the construction scope, schedule, methods, etc. that result in a change to the risk profile; and

- Following an incident.

The contractor must ensure that the hazards, risk scenarios and control measures identified in the contractor's Baseline and Task-Based Risk Assessments are taken into consideration when developing, implementing and maintaining the various elements of the contractor's health and safety management system for the project (e.g. competence, training and awareness requirements).

All persons potentially affected must be made aware of the hazards, risk scenarios and control measures identified in the contractor's risk assessments. This must be done through training, Toolbox Talks, and Daily Safe Task Instructions.

2.3.6.2 Task-Based Risk Assessments

The contractor must carry out detailed project-specific Task-Based Risk Assessments prior to the commencement of any work. The risk assessment process must be facilitated by a competent person who has been appointed in writing. The contractor's site management representatives, H&S Rep, supervisory personnel, technical experts (as required) and workforce personnel directly involved with the task being examined must participate in the risk assessment process. An attendance register must be completed and retained.

Please Note: Under no circumstances may a Contractor's Health and Safety Officer perform a risk assessment in isolation. The active participation of all persons referred to above is mandatory.

A Task-Based Risk Assessment must at least:

- Be accompanied by a Work Method Statement (describing in sufficient detail how the specific job or task is to be performed in a logical and sequential manner);

- Provide a breakdown of the job or task into specific steps;

- Identify the hazards and potential risk scenarios associated with each step;

- Include consideration of possible exposure to noise, heat, dust, fumes, vapours, gases, chemicals, radiation, vibration, ergonomic stressors, or any other occupational health hazard or stressor;

- Describe the control measures that will be implemented to ensure that the risks are managed to levels that are as low as is reasonably practicable; and

- Assign an initial risk rating (without taking any control measures into consideration) to each risk scenario.

A Task-Based Risk Assessment must be reviewed and, if necessary, updated:

On an annual basis (as a minimum);
When changes are made to the associated Work Method Statement; and
Following an incident.

2.3.6.3 Pre-Task Hazard Assessments

Daily Safe Task Instructions.

2.3.6.4 Safe Work Procedures

- The contractor must develop, document and implement Safe Work Procedures for all activities involving significant health or safety risk. These procedures must detail the control measures required to effectively manage the health and safety risks associated with the work activities.
- Each Safe Work Procedure must be consistent with the Task-Based Risk Assessment completed for the activity.
- Every person engaged in an activity for which a Safe Work Procedure has been developed must receive suitable training on the procedure.
- Furthermore, the contractor must develop, document, communicate and implement formal procedures, work instructions and / or programmes for the operation, maintenance, inspection and testing of all plant and equipment (including protective systems and devices) brought onto the project site.

2.3.6.5 Planned Task Observations

All contractor and sub-contractor supervisors must perform Planned Task Observations (PTO's) to verify that the control measures that have been identified in Safe Work Procedures (and associated Risk Assessments) are being adhered to and are being properly implemented, and to provide guidance where deviations are noted.

Each supervisor must complete at least one PTO per week involving one or more employees in his work team.

When an unsafe act or condition is identified, the supervisor must coach the work team to correct the act or condition in line with the Safe Work Procedure.

Where valid changes to the work method are identified, the supervisor must ensure that the Safe Work Procedure and Risk Assessment are updated to reflect the current practice.

Contractors must conduct their own hazard identifications and risk assessments specific to their operations and forward copies to the Principal Contractor for assessment and acceptance. The Principal Contractor when required must report on the status of its Contractors' risk assessments to the Client/H&S Agent at monthly audits or more often as the case may be.

The Principal Contractor must ensure that contractors inform, instruct and train their workers regarding any hazards, the associated risks and the related safe work procedures to be implemented before any work commences and thereafter at regular intervals as the risks change and as new risks develop. Contractors must conduct their own risk assessment training and keep proof in the form of attendance registers.

2.3.7 General Record Keeping

The Principal Contractor must keep and maintain all the necessary Health and Safety records to demonstrate compliance with these Specifications, with the OHS Act 85/1993, and with the Construction Regulations. Principal Contractor must also ensure that all records of incidents/injuries, emergency procedures, training,

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planned maintenance inspections, monthly contractor audits, etc. are kept in the health & safety file(s) held in the site office. The Principal Contractor must also ensure that their Contractors keep their own health & safety files, maintain the files and make them available on request (the file must include the Contractor's health & safety plan and all relevant records). Such 'Contractor health & safety files' must be audited by the Principal Contractor on a monthly basis with audit reports kept as proof.

2.3.8 Injury / Incident Reporting and Investigation

Injuries are to be categorised into first aid; medical; disabling (lost day); and reportable (Section 24). When reporting injuries to the Client/H&S Agent, these categories must be used. The Principal Contractor must investigate all injuries, with an annexure 1 investigation report being completed and filed for all injuries requiring treatment over and above first aid. The Principal Contractor must report on the 4 categories of injuries at monthly project progress meetings. Contractors must investigate injuries and incidents involving their employees and forward a copy of the 'annexure 1' investigation report to the Principal Contractor concerned forthwith. The Principal Contractor must report all injuries to the Client/Safety Agent in the form of an injury report, at least monthly (at audits).

All incidents reportable in terms of the provisions of Section 24 of the OHS Act must be reported to the local Dept. of Labour in the prescribed manner (Dept. of Labour contact number: Cape Town 021 441 8000 / 021 441 5500 or fezeka.ngalo@labour.gov.za) as well as the OHS Agent.

2.3.9 Consolidation of Health & Safety Documentation

It is the duty of the Principal Contractor to ensure that all documentation required to be kept or generated during the construction stage is consolidated into one set of documents that must be handed over to the Client upon completion of the construction work.

These consolidated health & safety file(s) should include all instructions/guidelines/specifications/information from the design team that will be required for the continued safe operation and maintenance of the new structure(s) or part(s) thereof.

2.3.10 Offences and Penalties

Penalties may be imposed on the Principal Contractor and Contractors for ongoing non-compliance with the provisions of the Client's health & safety specifications, the Principal Contractor's health & safety plan, and site health & safety procedures and rules, including: **Consultants rules, procedures, and specifications; Client-specific rules/protocols. The P/Contractor can also impose penalties on its sub-contractors and on other Directs within its areas of responsibility.** Non-compliances identified during H&S Agent audits, inspections, surveys and visits will be categorised into one of three levels based on frequency and severity. These will be as follows:

1. **Life threatening situation** - a prohibition notice/order will be issued by means of a written instruction in the site instruction book or an explanation/detail in an audit report/e-mail. The activity in question must then be seized immediately and corrective measures taken to the satisfaction of the H&S Agent after which permission will be given to resume the activity.
2. **Injury foreseen** – a contravention notice will be issued by means of a written instruction in the site instruction book or an explanation/detail in an audit report/e-mail with a time frame for compliance stipulated. Failure to comply within the time frame may result in up to a R2000 penalty per non-

compliance item per day that the non-compliance persists. Ongoing non-compliance may also result in a further issue of a prohibition notice/order.

3. **Ongoing contravention for similar non-compliances** - a contravention notice will be issued with a time frame for compliance stipulated. Failure to comply within the time frame may result in up to a R2000 penalty per non-compliance item per day that the non-compliance persists. On-going non-compliance may also result in a further issue of a prohibition notice/order.
 4. **Minor or no injury foreseen** – an improvement notice will be issued. The corrective measures stipulated in a written instruction in the site instruction book or an explanation/detail in an audit report/e-mail must be taken.
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2.4 Principal Contractor, Contractors and Sub-contractors

2.4.1 The Principal Contractor and Contractors' Requirements

The Principal Contractor must ensure that all Contractors appointed by it comply with these Specifications as well as with the OHS Act, the Construction Regulations, and other relevant legislation including project-specific rules and guidelines documentation that may relate to the activities directly or indirectly. A Contractor when appointing other Contractors as 'Sub-contractors', shall mutatis mutandis ensure compliance as if it was the Principal Contractor.

The Principal Contractor may only allow a Contractor to begin work on site after receiving a suitable/coherent health & safety plan which must include a project-specific hazard identification, risk assessments and safe work procedures documentation. The Principal Contractor must audit each of its contractors on a monthly basis, with audit reports kept in the health & safety file on site. **The audit must include an administrative assessment of H&S documentation as well as a physical inspection of the contractor's site activities.**

A Principal Contractor must stop any Contractor from carrying out construction work that is not in accordance with the Principal Contractor's and/or its Contractor's health & safety plans or if there is an immediate threat to the health and safety of persons.

- A Principal Contractor shall take all reasonable steps necessary to ensure co-operation between all contractors including other Principal Contractors to enable each of those contractors to comply with the provisions of the Construction Regulations;
- A Principal Contractor shall take all reasonable steps to ensure that each contractor's health and safety plan is implemented and maintained on the construction site: Provided that the steps taken shall include periodic audits at intervals mutually agreed upon between the Principal Contractor and contractors, but at least once every month;
- A Principal Contractor must ensure that where changes are brought about to the design and construction, that sufficient health and safety information and appropriate resources are made available to contractors so as to allow them to execute the work safely;
- A Principal Contractor must ensure that every contractor is registered and in good standing with a recognised compensation fund or with a licensed compensation insurer prior to work commencing on site;
- A Principal Contractor must ensure that potential contractors submitting tenders have made provision for the cost of health and safety measures during the construction process;
- A Principal Contractor shall discuss and negotiate with the contractor the contents of the health and safety plan and shall finally approve that plan for implementation;

- A Principal Contractor shall hand over a consolidated health and safety file to the client upon completion of the construction work and shall include a record of all drawings, designs, materials used and other similar information concerning the completed structure;
- A Principal Contractor may only appoint a contractor to perform construction work when such Principal Contractor is reasonably satisfied that the contractor he or she intends to appoint, has the necessary competencies and resources to perform the construction work safely.

2.4.2 Principal Contractor / Contractor Competency Assessment

The Principal Contractor must be reasonably satisfied that the contractors it intends to appoint have the necessary competencies and resources to safely conduct the work they will be appointed for. This should be established at tender stage and before appointments are made. One of the preferred ways of determining whether a contractor is competent is to ask for a previous safety plan as compiled for another similar project. Once the contractor is appointed, but before it begins work on site a site-specific safety plan must be discussed and negotiated with the Principal Contractor. Such health & safety plan must be approved for implementation by the Principal Contractor.

2.4.3 Pricing for Occupational Health & Safety Compliance

All parties bidding for work on this construction project must ensure that they have made provision for the cost of complying with this Specifications document as well as with the OHS Act and incorporated Regulations as a minimum requirement in their tender documentation. It must also be taken into consideration that time is money, which implies that sufficient time must be allowed for the implementation of the minimum OHS standards. No additional claims will be entertained at a later stage should a compliance requirement be prescribed in the OHS Act, incorporated regulations or in this Specifications document unless due to design changes which would require additional resources. Refer to Annexure "D"

2.4.4 Contractors' Health & Safety Plans

2.4.4.1 Contractors' Health & Safety File (s)

Such Files must contain at least the following documentation / records:

- H&S Plan, risk assessments, HIRA look-ahead programme, fall protection plan;
- Notification of Construction work and copy of construction permit when applicable;
- Copy of the OHS Act and relevant Regulations;
- Emergency plan and telephone numbers;
- H&S inductions records (including visitor inductions), HIRA training, H&S information session records (toolbox talks);
- Management appointments and management organogram for the project (latest update);
- Proof of competence – various personnel and operators;
- Inspection registers – various project-specific planned maintenance inspections, load test certificates, service records, etc.;
- Injury and incident investigation reports and first aid dressing book;
- Safety officer inspection reports;
- Audit reports – monthly audits on sub-contractors;
- Sub-contractor H&S Plan assessments and formal approvals;
- Material safety data sheets – haz chem.;
- PPE issue records;

- Health & safety meeting minutes and attendance registers;
 - Medical assessment certificates – workers;
 - Disciplinary records and unsafe act/condition warning notices issued.
-

2.5 Client identified Hazards and Potentially Hazardous Situations

2.5.1 H&S Agent-identified Hazards / Hazardous Activities

The following items have been identified by the H&S Agent as potential hazards for this construction project and must be incorporated in the Principal Contractors' and Contractors' health & safety plans where applicable to that contractor's work. **Note that these hazards/activities do not include all usual hazards/activities which should be foreseen by the specific Contractor involved.**

1. Traffic and pedestrian routes to any specific location.
2. Protection of the public – existing roadway and/or pedestrian walkways.
3. Construction vehicles entering and exiting site.
4. Construction related materials on roadways e.g. sand, stone, etc.
5. Site camp/office establishment including the offloading of office containers, and equipment.
6. Detection, identification and location of existing underground electrical services and other services and utilities.
7. Noise related to equipment used
8. Dust generated during construction activities
9. Lifting machines, equipment, tackle.
10. Access ladders – extension ladders and the like.
11. Temporary electrical installations if required.
12. Hazardous chemicals such as: solvents, cement, grout, fuels, oils, etc.
13. Ergonomic hazards such as: work above shoulders; repetitive work; manual lifting; etc.
14. Working in elevated positions
15. Working with heavy plant
16. COVID – 19 disease

These hazards should be used as a starting point by the Principal Contractor and their Contractors so as to elaborate on their own hazard identifications and risk assessments in terms of Section 8 of the OHS Act and General Safety Regulations 2(1).

2.5.2 Unforeseeable Hazards

The Principal Contractor must immediately notify Contractors as well as the Client/Safety Agent, in writing, of any hazardous or potentially hazardous situations that may arise during the performance of construction activities so that the necessary precautions may be taken before such work begins.

2.6 Site Operational Requirements

2.6.1 Health and Safety Representative(s)

At least one health & safety representative is required by every Contractor who has more than 20 employees on a site. Where the total workforce on site is more than 20, the P/Contractor will need to appoint an H&S representative. The Principal Contractor must ensure that Health and Safety Representative(s) are appointed under consultation with the employees. The H&S representatives must be competent to carry out their functions. The appointments must be in writing. The Health and Safety Representatives should carry out monthly inspections, keep records of the inspections and report all findings to the Construction Manager or Safety Officer forthwith and at monthly health & safety committee meetings.

2.6.2 Health and Safety Meetings

The Principal Contractor must ensure that project health and safety meetings are held monthly with minutes kept. **Meetings must be chaired by the Principal Contractor's Responsible Person [CR 8(1) person] or suitable CR 8(2) Person if CR 8(1) is not available.** Further, CR 8(2), CR 8(7), and CR 8(8) appointees must attend such monthly meetings. **All sub-contractor site managers/supervisors must be in attendance.** Project H&S meetings will be required as soon as the site team exceeds 20 persons and or more than one sub-contractor is on site and then every month thereafter.

All sub-contractors' Responsible Persons [CR 8(7)], Health & Safety Representatives, and safety officers must attend the Principal Contractor's monthly health & safety meetings.

The following topics must be tabled at meetings: management appointments and risk management portfolios; sub-contractor legal compliance issues; injuries and incidents; hazards and risk assessments (present and foreseen); health & safety procedures; method statements for upcoming activities; planned inspections and registers/record keeping, etc. The meeting chairperson must sign off and date the minutes.

2.6.3 Health and Safety Training

2.6.3.1 Induction

The **Principal Contractor will need to ensure that all site personnel including all sub-contractors undergo a site-specific health & safety induction training session before any worker starts work on the project (termed a 'site-wide' H&S induction session).** A record of attendance must be kept in each contractor's health & safety file. Note that all contractors need to induct their own personnel as to their own activity-specific hazards, risks and safe work procedures.

2.6.3.2 Awareness

The Principal Contractor must ensure that, on-site, periodic toolbox health & safety talks take place at least once every two weeks or more often depending on the particular contractor's risk assessment programme requirements. All site personnel including all sub-contractors must attend health & safety talks at such intervals and keep proof thereof. These talks should deal with risks relevant to the construction work at hand i.e. they should be based on the job-specific risk assessments and safe work procedures. Records of attendance must be kept in the health & safety file. All contractors' employees must attend health & safety awareness toolbox talks carried out by their own supervisors, the attendance registers must be copied to the Principal Contractor together with information on the topics/risks discussed at the session.

2.6.3.3 Competence

All competent persons must have the knowledge, experience, training, and qualifications specific to the work they have been appointed to supervise, control and/or carry out. This must be assessed on a regular basis e.g. training, evaluation, periodic audits, progress meetings, etc. The Principal Contractor is responsible to ensure that Competent Contractors are appointed to carry out construction work on site.

2.6.4 Health & Safety Audits, Monitoring and Reporting

The Principal Contractor is obligated to conduct monthly audits on all Contractors appointed by them and keep audit reports in its health & safety file. Contractors have to audit their sub-contractors and keep records of these audits in *their* health & safety files, made available on request. The H&S Agent will conduct monthly audits on the **Principal Contractor's health & safety management system and sub-contractors' H&S systems** to ensure that contractors are working in accordance with the agreed safety & health requirements/procedures. Refer to Attached **Annexure 'C'** for more details regarding these audits.

In addition to the agreed Client H&S audits on the Principal Contractor, the H&S Agent will require a formal written report to be compiled by the Principal Contractor. This will be the official response to the safety agents report and must be submitted within 3 working days from receipt of the audit report. This report should outline the steps the Principal Contractor has taken or will be taking in order to comply with the noted deviations.

2.6.5 Medical Fitness of Personnel

Contractors must ensure that all personnel undergo medical fitness assessments specific to the work they carry out and the hazards they are/will be exposed to. Such assessments must be conducted by a **certified occupational health practitioner** as required by the Construction Regulations 2014. Should a questionnaire be used as part of the assessment tool then such questionnaire must be administered by a **certified occupational health practitioner**.

Proof of these medical fitness assessments must be available on site in the site H&S file.

Note that the CR's 2014 requires all Contractor personnel to undergo medical assessments based on the work they undertake (not merely work in elevated positions).

2.6.6 Emergency Procedures

The Principal Contractor must prepare an Emergency Procedure prior to commencement on site. The procedure/plan must take into consideration the hazards and potential incidents posed by work to be carried out on this project. The procedure must detail the response plan including the following key elements:

- List of key competent personnel;
- Details of emergency services;
- Actions or steps to be taken in the event of the specific types of emergencies;
- Evacuation procedures;
- Returning the site to an acceptable state, ready for continuing operations

Emergency procedure(s) must include, but shall not be limited to: fire; chemical spills; injury to employees; damage to material/equipment/plant; use of hazardous substances; bomb threats; major incidents/injuries; evacuation; rescue from elevated positions; etc. The Principal Contractor must advise the Client in writing forthwith, of any emergency situations, together with a record of action taken/action to be taken. A contact list of all service providers (Fire Department, Ambulance, Police, Medical and Hospital, etc.) must be maintained and made available to site personnel. The emergency plan may need to be reviewed from time to time as conditions/environment changes.

2.6.7 First Aid Boxes and First Aid Equipment

All Contractors with more than 5 employees shall supply their own first aid box. Contractors with more than 10 employees must have their own trained, certified first aider on site at all times. **The Principal Contractor will however need to have a first aid box together with splints, eye wash, and a burn kit available in its main office or other suitable position on site. A first aider will be required to be available on site as soon as the total workforce exceeds 10 inclusive of sub-contractor personnel.** Copies of valid certificates are to be kept on site. The Principal Contractor must ensure that any contractor working after hours has the necessary first aid and first aider on duty.

2.6.8 Personal Protective Equipment (PPE) and Clothing

Contractors must ensure that all site workers are issued with and wear the appropriate PPE as indicated in their own risk assessments. The Contractors must make provision and keep adequate quantities of SANS approved PPE on site at all times according to their risk assessments e.g. hard hats, ear plugs/muffs, gloves, dust masks, goggles/specs, gum boots, safety harnesses etc.

Safety harnesses are mandatory wherever work takes place in an elevated position where safe working platforms or ladders are not possible. **The Client requires 100% fall protection to be implemented and maintained by all contractors working in fall risk positions e.g. masts of drill rigs.**

Eye protection must be worn by those working where there is a risk of eye injury. Even those workers in close proximity to these operations will also be required to wear such eye protection.

Hard hats will be required by those working in areas where there is a risk of head injury due to falling/striking objects. **Hard hats are foreseen to be applicable to all persons who will be working in the bulk excavation due to the risk of falling objects and overhead work such as lateral support, excavators, and the like.**

Safe footwear will be required as decided upon after a risk assessment has been carried out by the respective contractor.

Hand protection must be taken into consideration when assessing the risks associated with certain activities with the aim of minimising the risk of hand injuries.

Hearing protection is required where noise zones are envisaged and/or where activities emit noise higher than 85dB(A). **Work within the bulk excavation will more than likely be considered a noise zone and should be sign-posted as such due to the use of various plant and machinery.**

Respiratory protection is required during activities where dust and other airborne vapours/gases/fibres are emitted.

High visibility vests will have to be worn by contractors working in close proximity to construction vehicles and mobile plant.

Visitor PPE must be available in the site office and must at least consist of hard hats, high vis vests and ear plugs.

2.6.9 Occupational Health and Safety (OHS) Signage

H&S notices and signs should include but not be limited to: 'construction work - no unauthorised entry', 'beware of overhead work', 'hard hat area due to overhead work', 'report to site office', 'beware of mobile plant and vehicles' to be posted up at the entrance to site. **Signage must also be posted up at strategic locations to warn the public of any diversions, alternative through-ways and other irregularities caused by the construction work.** Signs are also required as per legislation e.g. fall hazards, location of fire extinguishers

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and first-aid box, scaffolding (safe / unsafe) and other potential risk areas/operations such as exposed edges and openings where persons are at risk of falling – **it will be the duty of the Principal Contractor to post up these task-specific safety/health notices and warning signs.** Health & safety signage must be well maintained including weekly inspections, cleaning, replacement and repair.

2.6.10 Public and Site Visitor Health & Safety

Public walkways and roadways must be kept clean and free of excessive construction materials so as to prevent any negative impact on the public. Public roadways and walkways will have to be cleaned on a regular basis – daily inspections to be conducted by the Principal Contractor with action to be taken without delay (daily). No loading/offloading or other construction activities may take place outside the designated construction site unless authorised by the **Client's P/Agent.**

Site visitors must be briefed on the hazards they may be exposed to as well as what measures are in place or should be taken to minimise these hazards. The Construction Regulations require that a record of these 'inductions' be kept on site. **It will be the duty of the Principal Contractor to manage all site H&S inductions including site visitors.**

Visitor hard hats, high visibility vests, and ear plugs must be made available in the site office or other suitable location and issued to visitors before they are exposed to the relevant site hazards.

2.6.11 Night Work (Before and After Normal Hours)

The Principal Contractor must abide by the working time prescriptions set out by the Client.

The Principal Contractor must ensure that adequate lighting is provided to allow for work to be carried out safely at all times in all areas.

First aid facilities and supervision must be present during all afterhours work.

Work activities during dawn and dusk and at night time will require additional public protection safety measures to be taken e.g. vehicles entering and leaving site, traffic accommodation, pedestrian accommodation, etc.

2.6.12 Transport of Workers

The Principal Contractor and sub-contractors may not transport persons:

- together with goods or tools unless there is an appropriate area or section to store the tools or equipment;
- in a non-enclosed vehicle, e.g. truck unless there is a canopy (properly covering the back and top) with suitable seating area. Workers shall not be permitted to stand or sit at the edge of the transporting vehicle;
- in bakkies unless they are closed/covered and have the correct number of seats for the passengers being transported.

2.6.13 Construction Health & Safety Officer

The Principal Contractor co-ordinating earthworks and lateral support operations will need to appoint a part-time **construction health & safety officer** [in terms of Construction Regulation 8(5) 2014]. **It is foreseen**

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that this person dedicates at least two full days per month to the contract. Note that any Contractors appointed by the P/Contractor will also need their own appointed part-time safety officers in terms of CR 8(5).

The following **health & safety officer related duties** will be required to be carried out:

- a) Health & safety audits and inspections including administrative and physical audits of all Contractors' health & safety plans, files and activities, and record findings in the form of audit reports to be kept in the health & safety file;
- b) Fortnightly inspection reports – site hazard survey findings recorded and actions taken recorded;
- c) Assess, and finally approving sub-contractor H&S plans;
- d) Maintain and co-ordinate the Principal Contractor's health & safety management plan and file;
- e) Investigate near misses, incidents and injuries;
- f) Co-ordinate the function of reviewing the hazard identifications and risk assessments;
- g) Assisting with method statements and safe work procedures and checking whether the responsible persons follow these safe work procedures;
- h) Enforcing discipline on the site and checking on compliance with safety procedures, standards and rules;
- i) Co-ordinating health & safety induction training and two-weekly safety awareness sessions;
- j) Implement and enforce the site hot work permit system;
- k) Ensure that public protection protocols are adequate and well maintained;
- l) Conduct planned job observations to check whether workers are carrying out activities in accordance with the safe work procedures;
- m) Fire risk assessments and enforcement;

The appointed H&S Officer will need to be competent in terms of training, experience, knowledge of construction and health & safety and will need to be qualified in terms of the SACPCMP (South African Council for Project & Construction Management Professions) requirements (became applicable from August 2015).

2.7 Physical Requirements

2.7.1 Deliveries, Waste Removal, Stacking/Storage of Materials

The Principal Contractor and other relevant contractors must ensure that there are appointed stacking supervisors and all materials, plant and equipment is stacked and stored safely on the site. No construction materials or equipment may be stacked or stored in public areas unless authorised by the client and fenced off as per the client's requirements. Waste materials must be kept within designated construction zones and removed on a regular basis. All spoil and materials must be stacked and stored far enough away from the edges of excavations.

The Principal Contractor will be responsible for co-ordinating and managing this function. Flagmen will be required where delivery vehicles need to reverse into on-coming traffic lanes.

Access to the sites is generally along existing roads or dirt tracks. However, access to some sites could be problematic especially if wet conditions are encountered. Certain of the drill sites might not be located along

access tracks and will require construction of access tracks to the sites. The new access tracks are generally shorter than 100 m.

2.7.2 Fire Extinguishers and Fire Fighting Equipment

The Principal Contractor and its Contractors must provide adequate, regularly serviced fire-fighting equipment located at strategic points on site e.g. site office, plant, store, hot work activities. **Such extinguishers should be suitable for all classes of fire foreseen.** The appropriate notices and signs must be posted up as required. **The Principal Contractor will need to conduct a preliminary fire risk assessment of the site and office compound as soon as possible after setting up on site. Should any questions arise as to the validity of such fire risk assessment conducted by the P/Contractor, the local Fire Department's fire prevention division must be consulted for assistance with such site fire risk assessments to ensure that the necessary fire-fighting equipment is adequate during the construction agent. Such fire risk assessment will have to be reviewed at least monthly and after any incident and/or before any new hot work activity.** Wherever *'hot work' is taking place, additional fire extinguishers must be on hand. Contractors are responsible for ensuring compliance with hot work procedures and must be in possession of method statements detailing the safe working procedures.

*'Hot work' includes all work that generates a spark or flame.

2.8 Plant, Machinery and Equipment

2.8.1 Construction Vehicles & Mobile Plant

"Construction Plant" includes all types of plant including but not limited to, lifting machines, equipment and tackle, earthworks plant, construction vehicles, compaction plant, piling and lateral support plant, pumps, etc.

The Principal Contractor must ensure that such plant complies with the requirements of the OHS Act, Construction Regulations and any manufacturers' specifications. The Principal Contractor must inspect and keep records of inspections on construction vehicles and mobile plant used on site. Only authorised/competent persons in the possession of the necessary **training certificates** and in possession of a **certificate of medical fitness (valid for one year) may operate construction vehicles and mobile plant.** Appropriate PPE and clothing must be provided and maintained in good condition at all times.

Reverse alarms and strobe lights must be installed on construction vehicles i.e. trucks, digger loaders, etc.

Any vehicle or mobile plant using any public road must be roadworthy and carry a license proving this. Likewise any operator of such construction vehicle or mobile plant will have to carry the necessary driver's license.

2.8.2 Pressurized Equipment (PE) and Gas Bottles

The Principal Contractor must comply with the Vessels under Pressure Regulations, including:

- Providing competency and awareness training to the operators/users;
- Providing the relevant PPE and clothing;
- Inspecting equipment regularly (every 3 months) and keeping records of these inspections;
- Providing appropriate fire-fighting equipment (Fire Extinguishers) on hand;

- Ensuring that oxygen and acetylene bottles are secured in an upright position, do not show signs of corrosion or damage and have flash back arrestors fitted on both torch & bottle ends of hoses.
- Operators must be competent and proven as such.

2.8.3 Hired Plant and Machinery

The Principal Contractor must ensure that any hired plant and machinery used on site is safe for use and complies with the minimum legislated requirements. The necessary requirements as stipulated by the OHS Act and Construction Regulations shall apply. The Principal Contractor shall ensure that operators hired with machinery are competent and that competency and medical certificates are kept on site in the health & safety file. Any load test requirements and inspections in terms of legislation must be complied with and copies of load test certificates and inspections must be kept in the health & safety file. All relevant contractors must ensure the same when they hire plant and machinery.

2.8.4 Ladders and Ladder Work

The Principal Contractor must ensure that all ladders are: inspected daily with monthly records kept; in good safe working order; the correct height for the task; extend at least 1m above the landing; fastened and secured; and at a safe angle. Stepladders must be safe for use, must be the **correct height for the task and the top two rungs may not be used**. Records of inspections must be kept in a register on site. Contractors using their own ladders must ensure the same. Take note of the ladder regulation promulgated under the General Safety Regulations.

2.8.5 General Machinery

The Principal Contractor must ensure compliance with the Driven Machinery Regulations 2015 and General Machinery Regulations, as well as the Electrical Machinery Regulations, which includes carrying out risk assessments on the machines, inspecting machinery regularly, appointing a competent person to inspect and ensure maintenance, issuing PPE and relevant clothing, and training those who use machinery.

2.8.6 Electrical Installations and Portable Electrical Tools

The consulting engineers will ensure as far as possible that the P/Contractor is made aware of the positions of all electrical installations and other services. The Principal Contractor must notify the engineer concerned should it not be sure of the location of any particular service.

The Principal Contractor and contractors must comply with the Electrical Installation Regulations, the Electrical Machinery Regulations and the Construction Regulations.

The Principal Contractor must keep a copy of the Certificate of Electrical Compliance (CoC) for its temporary electrical power supply and installation (should one be supplied). A revised CoC is required whenever the installation is altered or changed in any way. All temporary electrical installations must be inspected at least weekly by a competent person appointed in writing with records kept. Portable electrical tools and equipment

must be visually inspected daily by a competent person (trained by an electrician or suitable person to carry out visual inspections on electrical tools and extension leads) before use, with records kept as proof.

2.9 Occupational Health

2.9.1 Industrial Hygiene (Exposure to Physical and Chemical Stress Factors)

Exposure of workers to occupational health hazards and risks is very common in any work environment, especially in construction. Occupational exposure is a major problem and all Contractors must ensure that proper health and hygiene measures are put in place to prevent exposure to these hazards. Prevent inhalation, ingestion, and adsorption through the skin of hazardous chemical substances.

2.9.1.1 Noise induced hearing loss is a highly underrated occupational condition. Occupational noise emitted by construction machinery and power tools must be controlled as far as possible by implementing engineering solutions such as noise dampening, regular maintenance, servicing and inspection, screening off the noise, and reducing the number of persons exposed. Personal protective equipment such as earmuffs and earplugs must also be used in conjunction with engineering controls so as to reduce noise exposure to below the acceptable levels. **Each and every contractor is required to identify sources of noise which could impact on its personnel, assess the levels of noise, followed by implementing the necessary control measures to reduce the noise to acceptable levels [below 85dB(A)]. This must be clearly set out in the Contractor's hearing conservation programme contemplated in the NIHL Regulations.**

2.9.1.2 Ergonomics is the study of how workers relate to their workstations. We advise the Principal Contractor and Contractors to take this into consideration when conducting risk assessments, thereby improving the worker-task relationship, which will in turn improve productivity and reduce chronic conditions such as back strains, joint problems and mental fatigue, amongst others.

2.9.1.3 Dust control (silica dust) – The Principal Contractor must ensure that dust control measures are implemented and enforced **in order to minimise the levels of exposure to below the legal limits. Nuisance dust must also be controlled by means of damping down stock piles and operations.**

2.9.2 Hazardous Chemical Substances (HCS)

The Principal Contractor must provide the necessary training and information as far as the use, transport, and storage of HCS. The Principal Contractor and contractors must ensure that the use, transport, and storage of HCS are carried out as prescribed in the HCS Regulations. The Principal Contractor and contractors must ensure that all hazardous chemicals on site have been assessed for risk (written risk assessments for each hazardous chemical in terms of HCSR 5(3) and have Material Safety Data Sheets (MSDS) available and the users are made aware of the hazards and precautions that need to be taken when using the chemicals. The

First Aiders must be made aware of the MSDS's and how to treat HCS incidents appropriately. Copies of the MSDS's must be kept in the first aid box and in the store. All containers must be clearly labelled.

Flammable substances must be stored separately, away from other materials, and in a well-ventilated area (appropriate cross ventilation). A competent person should be appointed to be in control of this portfolio.

Stores must be well ventilated, preventing the build-up of flammable and toxic gases/vapours.

No bulk storage of chemicals and similar substances are permitted on this premises – maximum of 40 litres per substance. Should substances have to be held in larger quantities, the contractor concerned will have to notify the local fire department which will have to conduct the necessary inspection and assessment of the site and report accordingly.

Plant and machinery may only be serviced and repaired in designated areas where control measures can be effectively implemented to prevent spills, leaks and other environmental contamination. Drip trays must be used.

2.9.3 Welfare Facilities

The Principal Contractor must ensure that sufficient toilets (1 toilet per 30 workers), hand washing facilities, soap, toilet paper, and hand drying material are made available at the site in accordance with the Construction Regulations.

Workers must not be exposed to hazardous materials/substances while eating and must be provided with adequate, sheltered eating areas complete with benches and tables. Stores may not double up a change rooms or mess areas.

Adequate undercover facilities must be made available for workers.

2.9.4 COVID - 19

Compliance with Disaster Management Act, 2002 Gazette number 43258 and DoL Gazette number 43257 dated 29 April 2020 as amended.

Due to the perceived high risk nature of the virus in question with regard to its apparent contagiousness and relatively high morbidity and mortality rate, as well as its spread on construction sites, we believe that contractors need to revise their project specific health & safety plans and the assessment of their activity risks so as to integrate the associated control measures into the daily management of the project.

The following guidelines serve to assist contractors with devising project plans to minimise the spread of the virus.

1. Training and information:

As with general 'site-wide' H&S induction which is carried out by the principal contractor, it would be expected that all site personnel are informed of the COVID-19 site management procedures by the principal contractor in the form of formal information sessions held with small groups at a time. The 1st sessions are to be held on the day that the site commences its operations after lockdown. The observation of the 2m social distancing protocols would need to be enforced. It is then also required that daily info sessions are held by each subcontractor, reminding its personnel of the risks and health/ hygiene protocols to be implemented and enforced.

2. Travel:

It is requested that employees are provided with face masks to be used by them during travel whether it be public or private. The restrictions on social distancing during commuting after lockdown are not yet known however these would need to be explained to employees.

3. Site access control and screening on entry:

It is advised that site access is formalised so as to include a screening station manned by a site clerk or other suitable person who will question persons on entry and as far as possible make use of a non-touch thermometer as a form of screening. Social distancing would need to be maintained at 2m as advised by best practise information available currently. Such screening would apply to all persons entering site, including site visitors. Note that it is required for visitors to site to be limited to only those necessary e.g. inspections by the appointed consultants and the like.

It is advised that personnel remain on during the day do not visit shops and other public places unnecessarily.

The use of breathalysers and biometric readers need to be taken out of service during the next while so as to minimise the contact transmission risks associated therewith.

Question screening would need to ascertain whether the person has come into contact with a 'positive case' and/or whether the person is suffering any of the classic symptoms i.e. cough, flu-like sore muscles, fever, night sweats or shivering, shortness of breath, sore throat.

The temperature screening would be to ascertain whether the person has a potential fever i.e. two readings of more than 37.5°Celsius, 15 minutes apart. After the 1st elevated reading, the person would need to be sent to the isolation zone to undergo the 2nd temperature screening and further questioning. A person with a temperature of over 38°Celsius would need the National Institute of Communicable Diseases (NICD) to be contacted. Contact them on 0800 029 999.

The site would need to identify an isolation area/zone in which such potential infected employees would be kept before deciding on transport to a health facility for further assessment or for dispatch to their home for self-isolation. Note that the assistance of the NICD will assist with the decision as to seek further assessment or to send home for self-isolation. Persons waiting at the isolation zone would need to wear a face mask and have properly sanitized hands and arms.

Persons having passed the screening would need to sanitise their hands and lower arms properly at the screening station and then move to their change areas where they would need to collect their personal protective equipment.

4. General site areas – touch/contact points

Common touch points such as balustrades, door handles, electrical equipment, chair arm rests, clock machines/cards, and the like would need to be cleaned/sanitised regularly. It is thus advised that dedicated cleaning staff be employed where necessary to ensure such things as replenishing sanitising stations and soap dispensers, cleaning elevators, balustrades, etc., and cleaning toilets and associated surfaces.

The use of elevators where at all possible should be limited as these are small, enclosed spaces. Should they need to be used, the number of personnel must be limited based on the size of the elevator. Push button panels and the like need to be sanitised regularly. A sanitising station also needs to be located within the elevator.

5. Social distancing:

Social distancing is advised to be at 2m. This would need to be implemented and enforced by site management.

The principal contractor would need to identify 'hot spots' on site where high volumes of personnel gather such as changing areas, mess areas, stores and the like. These would need to be reviewed and

perhaps even reconfigured so as to reduce such gatherings to the 2m distancing and to smaller groups.

It is further required that gatherings on site such as meetings, info sessions, task discussions and the like are minimised to essential persons and that distancing is observed at all times. The reason for the distancing is simply to minimise the transmission of the virus through the air (sputum droplets due to coughing, sneezing, spitting while talking) from one person to the next.

Social distancing also needs to be implemented on public transport and at home i.e. away from the workplace. This is easier said than done ;however we await the next set of instructions from our Government wrt post lock-down or lockdown easing social distancing, travel, and gatherings.

6. Personal hygiene:

Apart from the sanitising station on entry to site, the principal contractor would need to ensure that other strategic sanitising stations are set up allowing for regular sanitising of persons' hands. Such stations also need to be set up outside offices, stores, meeting rooms and the like. It is advised that sanitising be done at least once per hour.

Adequate numbers of ablution facilities and hand washing basins need to be provided with soap and hand drying paper or similar. Hands need to be washed before eating, after eating, after using the ablutions, on entry to site, and before exiting site, as well as the regular sanitising of hands during the day.

Info posters need to be posted up at ablutions and at sanitising stations reminding personnel of the risks and hygiene measures to be implemented and enforced, on site, during travel, at home, and in public spaces.

7. Personal protective equipment and clothing:

It is advised, in line with common practise now, that personnel wear face masks as far as possible especially in areas where distancing is difficult and where work is in enclosed spaces. We also await further direction from our Government on this control measure. It is however advised that personnel making use of transport, whether public or private, wear face masks at all times.

Face masks and gloves should be sanitised at the end of each day and stored adequately. Overalls would also need to remain at work.

8. Ventilation:

Workplaces would need to be adequately ventilated so as to minimise the concentration of viral loads in such areas. Small, enclosed spaces such as elevators would require the use of face masks.

9. Meetings and other forums:

Meetings and other gatherings would need to be limited to the very necessary and should limit the number of persons so as to observe the social distancing requirements. We await further guidance from our Government wrt numbers that form a gathering as per definition. The use of face masks would be a consideration if not a requirement in the short-term during meetings and the like.

10. Management of persons suspected of having been exposed to the virus:

Persons who have contracted the disease -

This is someone who has tested positive to the COVID-19 strain of the virus. Such person will need to be isolated for at least 14 days after which a medical certificate needs to be attained to show that such person may return to work.

Persons who may have come into contact with such person, especially those involved on site need to be tracked, traced, and screened so as to decide on self-isolation or testing.

Suspected exposure -

A person who has an elevated temperature of over 38°Celsius i.e. two successive screenings 15 minutes apart needs to be sent home for self-isolation. Such person needs to wear a mask and must

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be contacted by his employer (contractor) before the end of the day to assess the person's condition and to advise the person as to whether further health assessment is necessary. A person with a temperature of over 38°C needs the NICD to be contacted for assistance i.e. whether a health assessment is required or whether the person needs to go directly home for self-isolation. This person's contacts need to be tracked and recorded.

Should a person have come into contact (within 2m) with a confirmed positive case, even if such case only became positive after such contact, the person needs to call the NICD hot line and go directly home for isolation or follow other directions from the NICD which could include a screening or even a test.

2.9.5 Alcohol and other Drugs

No alcohol and/or other drugs will be allowed on site. No person may be under the influence of alcohol or any other drugs while on the construction site. Any person on prescription medication must inform his/her superior, who shall in turn report this to its Principal Contractor forthwith. Any person suffering from any illness/condition that may have a negative effect on his/her /anyone else's health or safety performance must report this to his/her superior, who shall in turn report this to its Principal Contractor forthwith. Any person suspected of being under the influence of alcohol or other drugs must be sent home immediately, to report back the next day for a preliminary inquiry. The Contractor concerned must follow a full disciplinary procedure and a copy of the disciplinary action must be forwarded to its Principal Contractor for its records.

2.10 Duties of Designers

A designer must ensure that he/she complies with the requirements of the Construction Regulations. Designers have a duty both to assist in health and safety during construction as well as post construction to ensure safe occupation of the structures concerned. This will include informing the [Principal Contractor](#) in writing of any known or anticipated dangers or hazards relating to the construction work, and making available all relevant information required for the safe execution of the work upon being designed or when the design is subsequently altered.

Designers must ensure that the following information is included in a report and made available to the Principal Contractor:

- i) The health & safety information pertaining to the design of the relevant structure(s) that may affect the pricing of the construction work
- ii) The loading that any structure is designed to withstand; and
- iii) The geotechnical science aspects where appropriate.

With reference to the contract, a written report will be required from each Designer addressing the information set out below (in terms of Construction Regulation 6). The Construction Regulations (CR's) requires Designers (see definition of Designer in CR 1) to make certain information available to the Client (H&S Agent) and Contractors with the aim of 'designing out hazards' as far as possible. The aim of the report(s) would be to address the various headings (set out below) as best possible in an effort to make as much information available to the contractors so that they can improve their H&S management on the actual site.

Items to be addressed by Designers in terms of CR 6:

1. Anticipated or known dangers or hazards (known at this stage) relating to the construction work, foreseen by the Designer, including the relevant information required for the safe execution of the work. This must also include health & safety information about the design which could have an influence on the pricing of the work.
2. Dangerous substances/materials foreseen which cannot be avoided during this particular type of construction.

3. Dangerous procedures foreseen which cannot be avoided.
4. Hazards and risks relating to the subsequent maintenance of the structure/building foreseen and resulting safe work procedures advised.
5. Site inspections to verify whether construction of the relevant work is being carried in accordance with the designs and procedures. How will this be handled by you and your team on the project?
6. The stoppage of contractors where required (by the Designer) - the envisaged protocol to be followed to stop an activity or process on site. How will this be handled by you and your team on the project?
7. The application of ergonomic principles during design - how has and will this be implemented by the respective Designers?
8. Design of temporary works if applicable on this portion of the project e.g. shoring and bracing of excavations if required. You may merely need to refer to the temporary works designer as being a separate entity, appointed by the P/Contractor.
9. The loading that a structure can withstand (in this case the lateral support structure) and/or is designed to withstand - details on this must be included. Please pay special attention to the definition of 'structure' in Construction Regulation 1.
10. Geotechnical-science aspects where appropriate. You may merely have to refer to the geo-tech report and make this available to me and to the Contractors.

Note that no guidance notes have yet been made available from the Department of Labour and the above list therefore represents the Agent's interpretation of the Regulations.

These Health & Safety Specifications were developed by

Eppen-Burger & Associates cc

Prepared by André Burger, construction health & safety agent

PrCHSA/028/2015 – SACPCMP

Drilling and Testing

Date: May 2020

PRIMARY HEALTH AND SAFETY COMPLIANCE

Project: Aquifer Drilling and Testing

ANNEXURE A

The Principal Contractor must submit compliance with Annexure 'A' before commencing work on site. Compliance with Annexure 'A' must be maintained and proven to the H&S Agent at audits.

HSS Item No.	Requirement	Legal Reference	Compliance required:
A1	Health & Safety Plan (H&S plan)	Constructions Regs.	Within two weeks of receipt of these Specifications and before work commences.
A2	Notification of Intention to Commence Construction / Building Work	Complete Schedule 1 (Construction Regs)	At least seven days before commencement on site. Fax transmission slip or similar proof in file
A3	Assignment of Responsible Persons to Supervise Construction Work	OHS Act ~ Section 16(2) appointee ~ Construction Manager, Alternate Manager; Assistants, and Activity Supervisors.	Before commencement on site.
A4	Compensation for Occupational Injuries and Diseases – proof of registration	COIDA	Before commencement on site.
A5	Preliminary Hazard Identification and safe work procedures	Construction Regs.	Together with H&S plan.
A6	Fall protection plan (first draft) as defined in the Construction regulations	Construction Regs.	Together with H&S plan.
A7	Method statements required before work starts. <u>See 'annexure D' below.</u> Certain method statements will be required at the outset.	Construction Regs.	Before particular activity begins: See annexure 'D' below for guidance to 'primary

			method statement compliance'.
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HSS = health & safety specifications

OHS Act = occupational health & safety Act

CR = construction regulations

COIDA = compensation for occupational injuries and diseases Act

ASSIGNMENT OF PRINCIPAL CONTRACTOR'S AND CONTRACTORS'

RESPONSIBLE PERSONS

Project: Aquifer Drilling and Testing

ANNEXURE B

The Principal Contractor must make all the management appointments as set out below. Compliance with annexure 'B' to be maintained and proven to the safety agent at audits (Further appointments could become necessary as the project progresses).

Item	Appointment	Legal Reference	Requirement
B1	CEO Assignee or Construction Work Manager	CR 8(1)	A competent person to assist the CEO in achieving compliance with the OHS Act – P/Contractor's / Contractor's Responsible Person. Managing all the construction work on a single site, including the duty of ensuring occupational health and safety compliance.
B2	Construction Work Supervisor	CR 8(7)	A full time competent person to supervise and be responsible for health & safety related issues on site. The person is appointed by the Construction Manager CR 8(1)
B3	Subordinate Construction Work Supervisors	CR 8(8)	A full time competent person(s) to assist the CR 8(7) appointee with daily supervision of construction work safety. One of the CR 8(8) appointees must be designated to fulfil the role of the CR 8(7) when such person is not on site. Make this clear in the appointment letter.
B4	Health & Safety Representative(s)	Section 17	A competent person(s) to be appointed to represent the workforce in H&S matters. Reps may attend safety meetings, conduct monthly site audits, attend incident/injury investigations and make recommendations as far as H&S goes.
B5	Health & Safety Committee Member(s)	Section 19	H&S reps, site supervisors/foremen and the safety officer should make up the committee, with the CR 8(7) appointee chairing the committee.
B6	Incident Investigator	GAR 9	A competent person to head up the investigation team and co-ordinate incident/injury investigations on site.
B7	Risk assessment co-ordinator	CR 9	A competent person to co-ordinate the drafting/ reviewing/distribution of risk assessments on behalf of the Principal Contractor. The same applies to Contractors.

B8	Fall protection plan co-ordinator	CR 10	A competent person to co-ordinate the drafting/reviewing/distribution the fall protection plan. The same applies to Contractors. SAQA 229994 accreditation
B9	Emergency plan co-ordinator	CR27	A competent person to co-ordinate the drafting/reviewing/distribution of the site emergency procedures/evacuation plan. Such person must be fulltime on site so as to take charge of emergency situations.
B10	First Aider(s)	GSR 3	A certificated person to address first aid situations and take charge of injuries.
B11	Lifting machine and lifting tackle supervisor	DMR 18	A competent P/Contractor employee to co-ordinate the management of lifting machines and tackle, ensuring that such equipment is safe for use at all times, inspected when necessary and repaired when required. The operators, banks men and contractors to liases with this person.
B12	Scaffolding inspector	SANS 10085 - 2004	A competent person to inspect scaffolding before use and every time after bad weather, etc.
B13	Scaffold co-ordinator (P/Contractor employee)	SANS 10085 – 2004 Section 15.3	A competent P/Contractor employee to supervise all scaffolding on site, ensuring that scaffolds are safe for use, inspected, extended/alterd, repaired when required and that all trades are co-ordinated and authorised to work on such scaffolds.
B14	Scaffolding erector	SANS 10085 - 2004	A competent person(s) to erect scaffolding – leader of the scaffold team.
B15	Ladder inspector	GSR 13A	A competent person to inspect ladders daily and ensure they are safe for use, keeping monthly record.
B16	Stacking supervisor	CR 28	A competent person to supervise all stacking and storage operations.
B17	Temporary electrical installations inspector	CR 24	A competent person to inspect all temporary electrical installations. Including weekly inspections and record keeping.
B22	Fire-fighting equipment inspector	CR 29	A competent person to co-ordinate & inspect fire-fighting equipment. Including ad-hoc checks and monthly inspections with records kept.
B18	Construction vehicles & mobile plant supervisor	CR 23	A competent person(s) to co-ordinate the safety of all construction vehicles & mobile plant. Ensuring that daily inspections are done and records kept, that safety measures are in place, that operators are certified and authorised to operate and that maintenance and services are carried out when required.
B19	Construction safety officer	CR 8(5)	A competent person to fulfil the functions as set out in these HSS.
B20	Hazardous chemical substances controller	HCSR 5 Spec 2.10.2	A competent person to be appointed to supervise and control the use of hazardous chemical substances.

GENERAL COMPLIANCE REQUIREMENTS

Project: Aquifer Drilling and Testing

ANNEXURE C

The Principal Contractor and Contractors must comply with but not be limited to the requirements tabled below: Prove compliance with annexure 'C' at audits conducted by the safety agent.

Item & Weight	What	When	Output	Reviewed by Client
C1 20	Construction-phase Health & Safety Plan	Monthly review	Principal Contractor to indicate the status of Contractors' health & safety plans.	
C2 10	Health & Safety File(s)	Open file when construction begins and maintain throughout.	Have file on hand at audits. Contractors to report on their file at monthly health & safety audits by the Principal Contractor.	
C3 10	OHS Act and relevant Regulations	Monthly review	To be kept in the health & safety file on site.	
C4 20	Induction training	Every worker before he/she starts work.	Attendance registers to be kept.	
C5 10	Awareness Training (Tool Box Talks)	At least weekly	Attendance registers to be kept.	
C6 10	Health & Safety Meetings	Monthly	Meeting minutes to be kept.	
C7 20	Health & Safety Reports	Monthly	Report covering: <ul style="list-style-type: none"> • Incidents / injuries and investigations • Non conformances by employees & Contractors - reports • Internal H&S audit reports 	
C8 40	Audits on contractors	Monthly	Report covering <ul style="list-style-type: none"> • H&S File/Plan • WCA status • Appointment letters • Section 37(2) agreements 	

			<ul style="list-style-type: none"> • Risk assessment and method statements • Physical site inspection • Any other contractor specific requirements 	
C9 10	Emergency procedures	Monthly evaluation of procedure	Compile written procedure as well as tel. numbers.	
C10 40	Risk assessments & fall protection plan	Updated and signed off at least monthly.	Documented risk assessments to be available.	
C11 40	Method statements (Safe work procedures)	Drawn up and distributed before workers are exposed to the risks.	Documented set of safe work procedures (method statements) reviewed and signed off.	
C12 30	General Inspections	Daily	Report OHS Act compliance: <ul style="list-style-type: none"> • Portable electrical tools • Explosive powered tools • Mobile Plant • Hoarding • Stacking & Storage 	
C13 30	General Inspections	Weekly	<ul style="list-style-type: none"> • Scaffolding • Temporary Electrical Installations 	
C14 20	General Inspections	Monthly	<ul style="list-style-type: none"> • Fire fighting equipment • Ladders • First-aid box(es) 	
C15 30	General Inspections	3-monthly	<ul style="list-style-type: none"> • Lifting tackle • Oxy-acetylene cutting & welding sets • Fall prevention and arrest equipment 	
C16 40	General Inspections	6-monthly	<ul style="list-style-type: none"> • Lifting machines 	
C17 40	Load tests / performance tests	Annually / once erected, before use	<ul style="list-style-type: none"> • Lifting machines 	
C18 10	List of Contractors	List to be updated weekly	Compile a list of Contractors: Name, supervisor, company tel. numbers and trade.	
C19 10	Workman's Compensation	Ongoing	Compile a list of Contractors' workman's compensation proof of good standing.	
C20 10	Construction site rules & Section 37(2) Mandatary Agreements	Ongoing	Compile a list of all signed up Mandataries. Proof of agreement documents to be kept in H&S file.	
C21	Medicals	Annual renewal	Compile a list of workers who was subjected to medical examinations	

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20			for activities specific to their work on annexure 3	

OCCUPATIONAL HEALTH & SAFETY – HEALTH & SAFETY COSTS TO BE INCLUDED IN THE PRINCIPAL CONTRACTORS’ PRICE

Project: Aquifer Drilling and Testing

ANNEXURE D

In terms of the Construction Regulations (2014), it is the Client’s duty to ensure that the cost for health & safety has been provided for by the Principal Contractor, before appointment. Acting on behalf of our Client, we require the following health & safety costs to be provided for by the Contractors.

It must be made very clear that these are just some of the health & safety costs to be included in your tender price. It is the duty of the Principal Contractors and their Contractors to ensure that all aspects of the Occupational Health & safety Act 85/1993 and Construction Regulations are catered for.

No.	ITEM	DETAILS	PRICE budgeted by Contractor
1	Personal protective equip. (PPE)	1.1 Safe footwear 1.2 Hard hats 1.3 High vis vests 1.4 General PPE as required (hearing Protection, eye protection, etc.). All as per risk assessments by P/Contractor and Contractors 1.5 Lockable, clean areas to store PPE.	
2	H&S induction training	2.1 All workers, Directs, and visitors – <u>Principal Contractor</u> to induct all personnel and visitors during the construction phase. This may include induction of direct contractor personnel and tenant contractor personnel at end of the project if required. 2.2 Induction officer to be designated. This could be the site supervisor or similar competent person designated to site.	
3	First aid management	3.1 First aid box, splints, eye wash, burn kit 3.2 First aider by P/Contractor as soon as total workforce exceeds 10.	
4	First aid training	4.1 Training of first aider(s).	

6	Access control, security and site hoarding	6.1 Gate(s) 6.2 Chains and locks 6.3 Signage and notices 6.4 Fencing to a height of 1.8m and maintenance thereof. 6.5 General area lighting for safety and security reasons	
7	Traffic and pedestrian management	7.1 Facility to clean construction vehicles when leaving site (excessive mud from wheels and chassis). Truck must also be inspected for any loose materials and whether loads are stabilised	
8	H&S officer – P/Contractor	8.1 Monthly rate. Two full days per month dedicated to the contract. 8.2 Safety administration – files and paperwork. 8.3 Consolidated H&S documentation at end of the project including all sub-contractor documentation 8.4 Desk, computer, office, telephone, printer, email access. 8.5 Camera and cell phone.	
9	Fire-fighting equip.	9.1 Fire extinguishers as per fire risk assessment by P/Contractors. 9.2 Flammable store – ventilated area separate from other stores.	
10	Electrical compliance	10.1 Temporary electrical connection and supply if required. 10.2 Temporary electrical boards – safety thereof. 10.3 Inspection of installation – weekly. 10.4 Temporary lighting for work areas.	
11	Temporary access and work platforms	11.1 Ladders 11.2 Safe access to elevated position – separate personnel access from the plant access.	
12	Welfare facilities	12.1 Toilets. 12.2 Soap. 12.3 Change area. 12.4 Drinking water. 12.5 Toilet paper. 12.6 Lockable containers for PPE. 12.7 Electrical supply and plug points for cooking and hot water. 12.8 Lights.	
13	COVID-19	13.1 2x face cloth masks per person 13.2 No touch thermometer 13.3 Hand sanitizer 13.4 Screening officer	

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		13.5 Screening station 13.6 Information signage	
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BASELINE HEALTH & SAFETY RISK PROFILE & RISK RATING MATRIX

Project: Aquifer Drilling and Testing

a) ANNEXURE E

Contractors must ensure that they include an assessment of the activities listed below in their health & safety plan and baseline risk assessment documents. This list is not exhaustive and only includes the activities foreseen by the Client as posing a substantial risk of injury and/or property damage. The risk ratings (E, H, M, L) are an indication of the perceived inherent risk (injury and/or property damage) assessed by the Client based on: severity of injury/damage and likelihood of injury/damage.

The following health & safety control categories must be considered by Contractors and Designers depending on the level of risk (E, H, M, L):

1. Eliminate the hazard (remove the activity altogether)
2. Substitute the hazard (replace the activity with a suitable alternative)
3. Supervision: 3(a) Trade/activity-specific supervision; 3(b) Section/area-specific supervision
4. Written method statement (step-by-step sequence of events incl. the H&S interventions)
5. Engineering controls (barriers, screens, guards, covers, electronics, public protection, etc.)
6. Training: 6(a) H&S Induction; 6(b) HIRA training session; 6(c) Competence training; 6(d) OHS Act training; 6(e) Daily safety task instructions (DSTi's)
7. Planned task observations (PTO's)
8. Inspections and records/registers (preventative maintenance)
9. Sign and notices
10. Personal protective equipment (PPE)

Which H&S control categories to consider:

Extreme risk: make use of all categories 1 – 10

High risk: 3 – 10

Moderate: 3, 4, 5, 6(a)(b), 7, 8, 9, 10

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Part C4: Site Information

Reference No. **4Q/2021/22**

Site Specific H&S Requirements

Low: 3(b), 6(a), 9, 10

Activity no.	Activity / Task / Situation	Assessed Risk – rating (inherent risk)	Health & Safety control categories to be considered by Contractors and Designers plus some pertinent issues to be considered:	Designers' input
001	Site camp/office establishment including site access control and fencing.	Medium	<u>Control categories:</u> 3, 4, 5, 6(a)(b), 7, 8, 9, 10 - Emphasis on strict written safe work procedures and training of drivers. - Truck-mounted crane use and safety: HIRA training, inspections and registers, etc. - Controlled gate access and site fencing to be erected before work starts – 1.8m high.	-
002	Identification and detection of existing services such as electrical, water, sewer.	High	<u>Control categories:</u> 3 – 10 - As-built drawings / way leaves indicating the existing services must be clear and accurate. - Where doubt exists, detection methods must be used. - Any uncertainty as the exact location of electrical services must be clarified with the respective authorities. The use of detection equipment may be necessary	- As-built drawings to be made available. - Regular site inspections by designers. - Way-leaves from local authorities.
003	Noise & dust	Moderate	<u>Control categories:</u> 3, 4, 5, 6(a)(b), 7, 8, 9, 10 - Dust suppression methods could be required - Medical surveillance for noise zone employees.	- Designers to take this into account when deciding on construction methods.
004	Construction vehicles and mobile plant	High	<u>Control categories:</u> 3 – 10 - Reverse alarms to be checked daily. - Vehicle to be inspected by the driver before departing to ensure stability / securing of load and that vehicles are free of excessive mud. - High visibility vests to be worn by all on site. - Persons and vehicle access ways and entrances to site must be separated. - Strobe amber lights	-
005	The use of access ladders	High	<u>Control categories:</u> 3 – 10 - The top two rungs/steps may not be worked on.	-

			- Ladders to extend well past the area being accessed and at the required angle.	
006	Hazardous chemicals and flammable substances use and storage	Moderate	<u>Control categories:</u> 3, 4, 5, 6(a)(b), 7, 8, 9, 10 - Emphasis on storage and ventilation. - An inventory is required from the P/contractor including all chemical substances being used/stored by sub-contractors. Monthly review. - Material safety data sheets to be available for all haz. chem. substances being used.	-
007	Temporary electrical installation	Moderate	<u>Control categories:</u> 3, 4, 5, 6(a)(b), 7, 8, 9, 10 - Electrical contractor to provide a written lock-out procedure to be implemented during work on any temporary electrical installations. - The temporary builders supply must be installed and signed off by an installation electrician. - Temporary supply installations must be supervised and inspected weekly by the appointed responsible person(s).	- Electrician to design the temporary electrical installation and issue a CoC after testing.
008	Portable electrical tools including small plant, generators, leads, etc.	Moderate	<u>Control categories:</u> 3, 4, 5, 6(a)(b), 7, 8, 9, 10 - Trained operators of electrical tools and small plant. - Daily inspections of electrical tools and small plant.	-
009	Working in elevated positions	High	<u>Control categories:</u> 3 – 10 - Erecting and dismantling of drill rigs - Fall protection plan to be compiled by competent person. - Over under work situations – objects falling below - risk assessment to be location specific	Fall protection plan developer to have SAQA 229994 course
010	Drilling Rigs	High	<u>Control categories:</u> 3 – 10 - Machine guarding of drill rigs - operational requirements Load test of lifting equipment	
011	Wildlife, snakes, scorpions, etc	Medium	<u>Control categories:</u> 3 – 10 - Training and awareness as well as first-aider must have specific knowledge	
012	Covid-19	High	<u>Control categories:</u> 3 – 10	

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			- Disaster management Act - Dept Labour Regulations	
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Risk Rating Matrix						
Consequence of occurrence (Severity)		Likelihood of occurrence				
	-People, -Property, -Environment	5 - Very likely	4 - Good chance	3 - Likely	2 - Unlikely	1 - Very unlikely
		The threat is expected to occur (once per week, say)	The threat will quite commonly occur (once per month, say)	The threat may occur occasionally (once per year, say)	The threat could occur infrequently (1 in 10 years, say)	The threat may occur in exceptional circumstances (1 in 30 years, say)
A - Disastrous	-Single or multiple fatality. -Virtual complete loss of plant, system, structure(s). -Permanent widespread ecological damage, not able to be remediated.	Extreme	Extreme	Extreme	Extreme	High
B - Critical	-Disabling injury (LTI) resulting in a Section 24 injury or occupational illness i.e. amputation, loss of consciousness, etc. -Extensive damage to plant or system – section 24 incident. -Heavy ecological damage, costly, lengthy remediation.	Extreme	Extreme	Extreme	High	High
C - Serious	-Any lost time injury (LTI) resulting in one or more consecutive days off work. -Significant damage to plant or system. -Major ecological damage but able to be remediated.	Extreme	High	High	Moderate	Moderate
D - Significant	-A medical treatment injury (MTI) i.e. any injury resulting in a worker requiring medical treatment other than first aid, but not being booked off work. -Damages impact on budget and program. -Localised ecological damage, easily remediated.	High	High	Moderate	Low	Low

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E - Minor	<ul style="list-style-type: none"> -Minor First Aid Injury or an injury not requiring treatment. -Minor damage to plant or system. -Negligible ecological damage, may or may not require any remediation. 	Moderate	Moderate	Low	Low	Low
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Proof of Contractor H&S competence and resources in terms of the Construction Regulations 2014

Drilling and Testing

ANNEXURE F

Construction Regulation 5(1)(h) requires the Client to assess every Principal Contractor's competence and resources to carry out the work in question safely and without negative effects to the health of its personnel and/or other persons who could be affected by the construction work in question.

It is with this in mind that the following questions are posed. **It is requested that the respondent answers all the questions below and provides the necessary supporting documentation as part of their tender submission.**

1. Company profile or similar, detailing such information as: years in existence; experience and qualifications of senior company officials; support systems e.g. plant yard, maintenance workshops, in-house plant, etc.
2. CIDB (Construction Industry Development Board) grading if any.
3. Registration with any industry associations e.g. SAFCEC or MBA.
4. Previous contracts of similar scope and complexity to the one in question. Note that your appointment as the Principal Contractor will include the oversight and co-ordination of other trades based on the specific scope of work set out in the tender. Have you managed such trades before?
5. A copy of a preliminary risk assessment document and health & safety plan compiled for a similar project within the past two years which was approved by a Client's Health & Safety Agent. Proof required.
6. An H&S audit conducted on a sub-contractor within the past two years – audit report required.
7. The contents of a typical company health & safety file – index page will do (must carry company logo or similar).
8. What calibre of construction manager and foreman would you envisage placing on this project – experience, qualification, knowledge, and training? It is understood that you may not have these persons earmarked at this time however a mere indication of the competence of such person will do.
9. Does your company employ a safety officer or do you consult with an outside safety consultant? Are these persons registered with the SACPCMP (South African Council for Project & Construction Management Professions) – proof will be required?
10. Proof of valid workman's compensation will be required in the form of a letter of good standing. Public liability insurance will also need to be proven.

ANNEXURE G

Drilling and Testing

Acknowledgement of receipt:

I, _____ representing

_____ Principal Contractor /

Contractor have received the Health and Safety Specifications in good order and shall

ensure that the Principal Contractor / Contractor and its personnel comply with all

obligations / requirements / specifications in respect thereof. This document is legally

binding in terms of Regulation 5 of the Construction Regulations (2014).

Signature of Principal Contractor / Contractor

Date

Signature of Client / Client's Agent

Date

Comments:

