LANGEBERG
MUNISIPALITEIT MUNICIPALITY MASIPALA

TENDER NO.: T41/2022

REFURBISHMENT AND UPGRADE OF ROBERTSON WASTEWATER TREATMENT WORKS

PROCUREMENT DOCUMENT

NAME OF TENDERER:	
TOTAL BID PRICE (Inclusive of VAT) :	
B-BBEE status level of contribution:	

June 2022

PREPARED AND ISSUED BY:

LANGEBERG
MUNISIPALITEIT MUNICIPALITY MASIPALA

Directorate: Finance:
Supply Chain Management Unit
Langeberg Municipality,
PO Box 17, LANGEBERG, 7599

CONTACT FOR ENQUIRIES REGARDING SPECIFICATIONS:

wec CONSULT
CONSULTING ENGINEERS & PROJECT MANAGERS

WEC-CONSULT (Pty) Ltd
PO BOX 12861
DIE BOORD
7613

Tel. Number: (021) 886 6895
Fax Number: (021) 882 8207

LANGEBERG
MUNISIPALITEIT MUNICIPALITY MASIPALA

T1.1 TENDER NOTICE & INVITATION TO TENDER

BID NOTICE

LANGEBERG MUNICIPALITY HEREBY INVITES YOU TO TENDER FOR T41/2022: REFURBISHMENT AND UPGRADE OF ROBERTSON WASTEWATER TREATMENT WORKS

TENDER NUMBER: **T41/2022**
DESCRIPTION: **REFURBISHMENT AND UPGRADE OF ROBERTSON WASTEWATER TREATMENT WORKS**

The project entails the construction of a new inlet works, construction of a new MLE reactor, construction of a 24m diameter secondary settling tank with rotating bridge, construction of SST's division box with sluice gates and RAS pump station with submersibles pumps, construction of a new motor control center (MCC) and a generator room with a new generator, construction of new dewatering and office building, supply and install a mechanical screen at inlet works, supply and installation of all new mechanical equipment for the MLE Reactor as well as the new SST and Various Pump Stations, Supply and Install of complete Mechanical dewatering equipment, demolishing of the existing old concrete structures, construction of various small concrete structures and associated pipework and roadwork.

CLOSING DATE: **22 July 2022**
CLOSING TIME: 12h00: Bids will be opened in public at 28 Main Road, Ashton.

CIDB: The following CIDB class of construction works will be applicable to the Tender, in accordance with the sum tendered or value determined in accordance with regulation 25(7A) of the Construction Industry Development Regulations, 2004 (As Amended) – on 23 May 2019.
Class of Construction Works: 7ME or 7CE or higher.

INFORMATION:
Tender Specifications: Francois Harris at 021 8866895; email: harris@wec-consult.co.za
SCM Requirements: S Ngcongolo email: Sngconcolo@langeberg.gov.za

Documents: Documents will be downloadable from the Langeberg Municipal Website www.langeberg.gov.za from date Monday 20 June 2022

Tender documents must be downloaded before the clarification meeting in order to make sure of the eligibility criteria of the contract.

Compulsory clarification meeting:
A compulsory tender information meeting and site inspection will be held on **24 June 2022 at 10h00,** where the tenderers will meet at the Robertson Sewage Treatment Plant for a discussion on the tender, procedures and scope of the works. The attendance certificate of the information meeting and site meeting will be signed before and after the site meeting. Persons not present at the end of the site meeting will be disqualified. All Covid-19 regulations will be followed and must be complied with by all parties attending the meeting. All tenderers must bring their own pen, social distance will be maintained and the wearing of masks is compulsory.

Local production and content is applicable to this bid. Bidders must use the exchange rate published by the South African Reserve Bank (SARB) at **12:00 on 18 July 2022.** The guidance document for the calculation of local content is included in the bid document and is also available on the municipality's website by following the Supply Chain Management link. If raw material or input to be used for a specific item is not available locally, bidders should obtain written authorisation from the DTI should there be a need to import such raw material or input. A copy of the authorisation letter must be submitted together with this tender document at the closing date and time of bid. **Please note that the requirements in terms of local production and content are fully contained in the tender document.**

Tenders may only be submitted on the Tender documentation issued by Langeberg Municipality and must be valid for **120 days** after tender closing. Late, electronic format, telephonic or faxed Tenders will not be considered, and Langeberg Municipality does not bind itself to accept the lowest, part of or any Tender.

Sealed Tenders, with "**T41/2022 REFURBISHMENT AND UPGRADE OF ROBERTSON WASTEWATER TREATMENT WORKS,"** clearly endorsed on the envelope, must be deposited in the Tender box at the offices of the Langeberg Municipality, 28 Main Road, Ashton. The Tender box is accessible from Mondays until Fridays from 08:00 until 16:30. This excludes weekends and public holidays. Tenders must be accompanied by the fully completed Tender documents in black ink and must not be dismantled. Tenders not accompanied by a complete Tender document, will not be considered.

NOTE: This tender will be evaluated in terms of the General Conditions of Contract, Supply Chain Management Policy, relevant specification and local content as depicted in the document and also the Preferential Procurement Regulations, 2017 that was promulgated by the Minister of Finance on 20 January 2017 in Government Gazette No 40553.

The preferential points system applied is as follows:

Price	**90**
B-BBEE status level of contribution	**10**
Total points for Price and B-BBEE	**100**

The following conditions to Tender exist (failure to comply may result in your Tender being disqualified):

1. This Tender is subject to the general conditions of contract (CIDB) and special conditions for Tendering.

2. Relevant terms of reference;

3. Tenderers must be registered on the Central supplier database (CSD) if they wish to conduct business with the municipality.

4. No award will be made to tenderers whose tax status is non-compliant;

5. Tenders submitted must be in a sealed envelope clearly marked with the Tender number, placed in the tender box before closing time. Failure will result in the tender being invalid;

Description of services, works or goods	Min. threshold
Electrical & Telecom Cables	90%
Valves products	70%
Conveyance Pipes	80 - 100%
Steel Products	100%
Pumps, Medium Voltage (MV) Motor and Associated Accessories	70%
Plastic Pipes	100%
Cement	100%

MUNICIPAL MANAGER
MUNICIPAL OFFICES
PRIVATE BAG X2
ASHTON
6715
TEL: 023 626 8200

LANGEBERG
MUNISIPALITEIT MUNICIPALITY MASIPALA

PART A
INVITATION TO BID

YOU ARE HEREBY INVITED TO BID FOR REQUIREMENTS OF THE (*NAME OF MUNICIPALITY/ MUNICIPAL ENTITY*)					
BID NUMBER:	**T41/2022**	CLOSING DATE:	**22 July 2022**	CLOSING TIME:	**12H00**
DESCRIPTION	**REFURBISHMENT AND UPGRADE OF ROBERTSON WASTEWATER TREATMENT WORKS**				
THE SUCCESSFUL BIDDER WILL BE REQUIRED TO FILL IN AND SIGN A WRITTEN CONTRACT FORM (MBD7).					

BID RESPONSE DOCUMENTS MAY BE DEPOSITED IN THE BID BOX SITUATED AT *(STREET ADDRESS)*

LANGEBERG MUNICIPALITY, PLEIN STREET, LANGEBERG					
SUPPLIER INFORMATION					
NAME OF BIDDER					
POSTAL ADDRESS					
STREET ADDRESS					
TELEPHONE NUMBER	CODE		NUMBER		
CELLPHONE NUMBER					
FACSIMILE NUMBER	CODE		NUMBER		
E-MAIL ADDRESS					
VAT REGISTRATION NUMBER					
TAX COMPLIANCE STATUS	TCS PIN:		**OR**	CSD No:	
B-BBEE STATUS LEVEL VERIFICATION CERTIFICATE [TICK APPLICABLE BOX]	☐ Yes ☐ No		B-BBEE STATUS LEVEL SWORN AFFIDAVIT	☐ Yes ☐ No	
[A B-BBEE STATUS LEVEL VERIFICATION CERTIFICATE/ SWORN AFFIDAVIT (FOR EMES & QSEs) MUST BE SUBMITTED IN ORDER TO QUALIFY FOR PREFERENCE POINTS FOR B-BBEE]					
1. ARE YOU THE ACCREDITED REPRESENTATIVE **IN SOUTH AFRICA FOR THE GOODS /SERVICES /WORKS OFFERED?**	☐Yes ☐No [IF YES ENCLOSE PROOF]		**2.** ARE YOU A FOREIGN BASED SUPPLIER FOR **THE GOODS /SERVICES /WORKS OFFERED?**	☐Yes ☐No [IF YES, ANSWER PART B:3]	
3. TOTAL NUMBER OF ITEMS OFFERED			**4. TOTAL BID PRICE**	**R**	
5. SIGNATURE OF BIDDER	……		**6. DATE**		
7. CAPACITY UNDER WHICH THIS BID IS SIGNED					

BIDDING PROCEDURE ENQUIRIES MAY BE DIRECTED TO:		**TECHNICAL INFORMATION MAY BE DIRECTED TO:**	
DEPARTMENT	SUPPLY CHAIN MANAGEMENT	CONTACT PERSON	Francois Harris
CONTACT PERSON	S Ngcongolo	TELEPHONE NUMBER	021 886689
TELEPHONE NUMBER	E-mail Enquiries Only	FACSIMILE NUMBER	N/A
FACSIMILE NUMBER	N/A	E-MAIL ADDRESS	harris@wec-consult.co.za
E-MAIL ADDRESS	SNgcongolo@langberg.gov.za		

LANGEBERG
MUNISIPALITEIT MUNICIPALITY MASIPALA

PART B
TERMS AND CONDITIONS FOR BIDDING

1. BID SUBMISSION:
1.1. BIDS MUST BE DELIVERED BY THE STIPULATED TIME TO THE CORRECT ADDRESS. LATE BIDS WILL NOT BE ACCEPTED FOR CONSIDERATION.
1.2. **ALL BIDS MUST BE SUBMITTED ON THE OFFICIAL FORMS PROVIDED– (NOT TO BE RE-TYPED) OR ONLINE**
1.3. THIS BID IS SUBJECT TO THE PREFERENTIAL PROCUREMENT POLICY FRAMEWORK ACT AND THE PREFERENTIAL PROCUREMENT REGULATIONS, 2017, THE GENERAL CONDITIONS OF CONTRACT (GCC) AND, IF APPLICABLE, ANY OTHER SPECIAL CONDITIONS OF CONTRACT.
2. TAX COMPLIANCE REQUIREMENTS
2.1 BIDDERS MUST ENSURE COMPLIANCE WITH THEIR TAX OBLIGATIONS.
2.2 BIDDERS ARE REQUIRED TO SUBMIT THEIR UNIQUE PERSONAL IDENTIFICATION NUMBER (PIN) ISSUED BY SARS TO ENABLE THE ORGAN OF STATE TO VIEW THE TAXPAYER'S PROFILE AND TAX STATUS.
2.3 APPLICATION FOR THE TAX COMPLIANCE STATUS (TCS) CERTIFICATE OR PIN MAY ALSO BE MADE VIA E-FILING. IN ORDER TO USE THIS PROVISION, TAXPAYERS WILL NEED TO REGISTER WITH SARS AS E-FILERS THROUGH THE WEBSITE WWW.SARS.GOV.ZA.
2.4 FOREIGN SUPPLIERS MUST COMPLETE THE PRE-AWARD QUESTIONNAIRE IN PART B:3.
2.5 BIDDERS MAY ALSO SUBMIT A PRINTED TCS CERTIFICATE TOGETHER WITH THE BID.
2.6 IN BIDS WHERE CONSORTIA / JOINT VENTURES / SUB-CONTRACTORS ARE INVOLVED, EACH PARTY MUST SUBMIT A SEPARATE TCS CERTIFICATE / PIN / CSD NUMBER.
2.7 WHERE NO TCS IS AVAILABLE BUT THE BIDDER IS REGISTERED ON THE CENTRAL SUPPLIER DATABASE (CSD), A CSD NUMBER MUST BE PROVIDED.
3. QUESTIONNAIRE TO BIDDING FOREIGN SUPPLIERS
3.1. IS THE ENTITY A RESIDENT OF THE REPUBLIC OF SOUTH AFRICA (RSA)? ☐ YES ☐ NO
3.2. DOES THE ENTITY HAVE A BRANCH IN THE RSA? ☐ YES ☐ NO
3.3. DOES THE ENTITY HAVE A PERMANENT ESTABLISHMENT IN THE RSA? ☐ YES ☐ NO
3.4. DOES THE ENTITY HAVE ANY SOURCE OF INCOME IN THE RSA? ☐ YES ☐ NO
3.5. IS THE ENTITY LIABLE IN THE RSA FOR ANY FORM OF TAXATION? ☐ YES ☐ NO
IF THE ANSWER IS "NO" TO ALL OF THE ABOVE, THEN IT IS NOT A REQUIREMENT TO REGISTER FOR A TAX COMPLIANCE STATUS SYSTEM PIN CODE FROM THE SOUTH AFRICAN REVENUE SERVICE (SARS) AND IF NOT REGISTER AS PER 2.3 ABOVE.

NB: FAILURE TO PROVIDE ANY OF THE ABOVE PARTICULARS MAY RENDER THE BID INVALID.
NO BIDS WILL BE CONSIDERED FROM PERSONS IN THE SERVICE OF THE STATE.

SIGNATURE OF BIDDER: ……

CAPACITY UNDER WHICH THIS BID IS SIGNED: ……

DATE: ……...

Contents	
Number	**Heading**
The Tender	
Part T1: Tendering procedures	
T1.1	Tender Notice and Invitation to Tender
T1.2	Tender Data
Part T2: Returnable documents	
T2.1	List of Returnable Documents
T2.2	Returnable Schedules
The Contract	
Part C1: Agreement and Contract Data	
C1.1	Form of Offer and Acceptance
C1.2	Contract Data
C1.3	Form of Guarantee
C1.4	Occupational Health and Safety Agreement
C1.5	Protection of the Environment Declaration
C1.6	Insurance Broker's Warranty
C1.7	Declaration by Tenderer
C1.8	Contract of Temporary Employment as Community Liaison Officer
Part C2: Pricing data	
C2.1	Pricing Instructions
C2.2	Pricing Schedule Declaration
C2.3	Bill of Quantities / Schedule(s) of Rates
Part C3: Scope of Work	
C3.1	Description of the Works
C3.2	Engineering
C3.3	Procurement
C3.4	Construction – Works Specifications (Civil Work, Building Work, Mechanical and Electrical Works)
C3.5	Management
C3.6	Annexures
Annex 1	Construction Health and Safety Specification
Annex 2	Construction Environmental Management Plan
Annex 3	Monthly Project Labour Report
Annex 4	B-BBEE Sub-contract Expenditure Report
Annex 5	Joint Venture Expenditure Report
Annex 6	Targeted Labour Contract Participation Expenditure Report
Annex 7	Schedule of Plant and Materials

Annex 8	Mechanical and Electrical Data Sheets
Annex 9	Mechanical and Electrical Standard Specifications
Part C4: Site information	
C4	Site Information
Part C5: Drawings	
C5	Drawings

PART T1: TENDERING PROCEDURES

T1.2 TENDER DATA

The conditions of tender are the Standard Conditions of Tender as contained in Annex C of Government Gazette No. 42622 of 8 August 2019, Construction Industry Development Board (CIDB) Standard for Uniformity in Construction Procurement. (see www.cidb.org.za) which are reproduced without amendment or alteration for the convenience of tenderers as an Annex to this Tender Data.

The Standard Conditions of Tender make several references to the Tender Data for details that apply specifically to this tender. The Tender Data shall have precedence in the interpretation of any ambiguity or inconsistency between it and the standard conditions of tender. Each item of data given below is cross-referenced to the clause in the Standard Conditions of Tender to which it mainly applies.

The following variations, amendments and additions to the Standard Conditions of Tender as set out in the Tender Data below shall apply to this tender:

Clause Number **Tender Data**

C.1 General

C1.1 Actions

Add the following:
The parties agree that this tender, its evaluation and acceptance and any resulting contract shall also be subject to the Employer's Supply Chain Management Policy ('SCM Policy') that was applicable on the date the tender was advertised, save that if the Employer adopts a new SCM Policy which contemplates that any clause therein would apply to the contract emanating from this tender, such clause shall also be applicable to that contract. Please refer to this document contained on the Employer's website.

Abuse of the supply chain management system is not permitted and may result in the tender being rejected, 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.

The Employer is the **LANGEBERG MUNICIPALITY**, represented by

Mr. Maynard Johnson
Technical Director

C1.2 Tender Documents:
Add the following:
"The following documents form part of this contract:

VOLUME 1: The General Conditions of Contract for Construction Works (Third Edition) 2015 as published by the South African Institution of Civil Engineering. This publication is available and tenderers must obtain copies at their own cost 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.

VOLUME 2: The South African Bureau of Standards Standardized Specification for Civil Engineering Construction SANS 1200 1996, prepared by and obtainable from the South African Bureau of Standards, Private Bag X191, Pretoria 0001, Tel: (012) 428 6929, Fax: (012) 428 6928, Web site: www.stansa.co.za.

Volumes 1 and 2 may also be inspected, by appointment, at the offices of the Employer's Agent during normal office hours.

The tender documents issued by the Employer comprise:

VOLUME 3: The Tender Document (this document), in which is bound:

The Tender

Part T1: Tendering Procedure

T1.1 Tender notice and invitation to tender
T1.2 Tender data

Part T2: Returnable Documents

T2.1 List of returnable documents
T2.2 Returnable schedules

The Contract

Part C1: Agreement and contract data

C1.1 Form of offer and acceptance
C1.2 Contract data
C1.3 Form of Guarantee
C1.4 Occupational Health and Safety Agreement
C1.5 Protection of the Environment Declaration
C1.6 Insurance Broker's Warranty
C1.7 Declaration by Tenderer
C1.8 Contract of Temporary Employment as Community Liaison Officer

Part C2: Pricing Data

C2.1 Pricing Assumptions
C2.2 Pricing Schedule Declaration
C2.3 Bills of Quantities

Part C3: Scope of Work

C3.1 Description of the Works
C3.2 Engineering
C3.3 Procurement
C3.4 Construction
C3.5 Management
C3.6 Annexes

Part C4: Site Information

C4 Site Information

Part C5: Drawings

Volume 3 is deemed the "Returnable Document" which must be returned to the Employer in terms of submitting a tender offer.

C1.3 Communication and employer's agent

Delete the first sentence of the clause and replace with the following:

Verbal or any other form of communication, from the Employer, its employees, agents or advisors during site visits/clarification meetings or at any other time prior to the award of the Contract, will not be regarded as binding on the Employer, unless communicated by the Employer in writing to suppliers by its Municipal Supply Chain Manager or his nominee.

The Employer's Agent is:

Company:	WEC-CONSULT (PTY) LTD
Name:	Mr Francois Harris

Address: WEC-Consult
Unit 24, Oewerpark,
Rokewood Road
Stellenbosch, 7600

Tel: (021) 886 6895
Fax: (021) 882 8207
E-mail: harris@wec-consult.co.za

C.1.5 **Cancellation and Re- Invitation of Tenders**

Add the following after C.1.5.1 d):

e) the parties are unable to negotiate market related pricing.

C.1.6.2 **Competitive negotiation procedure**

Add the following between C.1.6.2 and C.1.6.2.1:

A competitive negotiation procedure will **not** be followed.

C.1.6.3 **Proposal procedure using two-stage system**

Add the following between C.1.6.3 and C.1.6.3.1:

A two-stage system will **not** be followed.

Add the following after C.1.6.3.2.2

C.1.6.4 **Objections, complaints, queries and disputes/ Appeals in terms of Section 62 of the Systems Act/ Access to court**

C.1.6.4.1 **Disputes, objections, complaints, and queries**

In terms of Regulations 49 and 50 of the Local Government: Municipal Finance Management Act, 56 of 2003 – Municipal Supply Chain Management Regulations (Board Notice 868 of 2005):

a) Persons aggrieved by decisions or actions taken by the **LANGEBERG Municipality** in the implementation of its supply chain management system, may lodge within 14 days of the decision or action, a written objection or complaint or query or dispute against the decision or action.

C.1.6.4.2 **Appeals**

a) In terms of Section 62 of the Local Government: Municipal Systems Act, 32 of 2000 a person whose rights are affected by a decision taken by the **LANGEBERG Municipality**, may appeal against that decision by giving written notice of the appeal and reasons to the Municipal Manager within 21 days of the date of the notification of the decision.

b) An appeal must contain the following:
   i) Must be in writing
   ii) It must set out the reasons for the appeal
   iii) It must state in which way the Appellant's rights were affected by the decision;
   iv) It must state the remedy sought; and
   v) It must be accompanied with a copy of the notification advising the person of the decision
c) The relevant **LANGEBERG Municipality** appeal authority must consider the appeal and may confirm, **vary or revoke** the decision that has been appealed, but no such revocation of a decision may detract from any rights that may have accrued as a result of the decision.

C.1.6.4.3 **Right to approach the courts and rights in terms of Promotion of Administrative Justice Act, 3 of 2000 and Promotion of Access to Information Act, 2 of 2000**
The sub-clauses above do not influence any affected person's rights to approach the High Court at any time or its rights in terms of the Promotion of Administrative Justice Act and Promotion of Access to Information Act.

C.1.6.4.4 All requests referring to sub clauses C.1.6.4.1; C.1.6.4.2 and C.1.6.4.3 must be submitted in writing to:
The Municipal Manager - **LANGEBERG** Municipal Offices
Via hand delivery at: LANGEBERG Municipality, 28 Main Road, Ashton

C.1.7 National Treasury Web Based Central Supplier Database (CSD) Registration
Tenderers are required to be registered on the National Treasury Web Based Central Supplier Database (CSD) as a service provider. Tenderers must register as such upon being requested to do so in writing and within the period contained in such a request, failing which no orders can be raised or payments processed from the resulting contract. In the case of Joint Venture partnerships this requirement will apply individually to each party of the Joint Venture.

Tenderers who wish to register on the National Treasury Web Based Central Supplier Database (CSD) may do so via the web address https://secure.csd.gov.za.

It is each tenderer's responsibility to keep all the information on the National Treasury Web Based Central Supplier Database (CSD) updated.

C.2 Tenderer's obligations

C.2.1.1 *Delete the content of this clause and replace with the following:*
Tenderers must submit a tender offer that complies in all aspects to the conditions as detailed in this document. Only those tenders that comply in all aspects with the tender conditions, specifications, pricing instructions and contract conditions will be declared responsive.

Add the following clauses after C.2.1.2:

C.2.1.3 Only those tender submissions from which it can be established that a clear and unambiguous offer has been made to Employer, by whom the offer has been made and what the offer constitutes, will be declared responsive.

C.2.1.4 Only those tenders that satisfy the following criteria will be declared responsive:

C.2.1.4.1 **Registration on Central Supplier Database (CSD)**
Tenderers must be registered at Central Supplier Database (CSD). To register on the CSD tenderers need to utilise their website: https://secure.csd.gov.za/

C.2.1.4.2 **Construction Industry Development Board (CIDB) Registration**
Only those tenderers who are registered with the CIDB, prior to the tender closing time and evaluation of submissions, in a contractor grading designation equal to or higher than

a contractor grading designation determined in accordance with the sum tendered or a value determined in accordance with Regulation 25 (1B) or 25 (7A) of the Construction industry Development Regulations, are eligible to have their tenders evaluated. The estimated class of construction will be **7ME/CE CIDB grading**.

Joint ventures are eligible to submit tenders provided that:

1. every member of the joint venture is registered with the CIDB;
2. the lead partner has a contractor grading designation in the **7ME/CE class** of construction work;
3. the combined contractor grading designation calculated in accordance with the Construction Industry Development Board Regulations is equal to or higher than a contractor grading designation determined in accordance with the sum tendered, estimated as an 7ME/CE class of construction work, or a value determined in accordance with Regulation 25 (1B) or 25 (7A) of the Construction Industry Development Regulations.

For alpha-numerics associated with the contractor grading designations - see **Annex G** included in T1.2.

C.2.1.4.4 **Minimum score for functionality**
Not Applicable to this tender.

C.2.1.4.5 Complies with the stipulated minimum threshold for local production and – content

The Municipality promotes the procurement of goods manufactured by local suppliers. The Department of Trade and Industry and National Treasury has identified specific designated sectors which require local content compliance. The current designated sectors are listed below:

Note: All to be listed including the date that the relevant Sector became effective.

Tenderers are required to ensure that they comply with these designated Sector requirements by ensuring that the products provided to the Municipality are locally manufactured. Failure to meet the minimum stipulated threshold for local production and content will result in a bid being declared non-responsive.

Further details of designated sectors are available on http://www.thedti.gov.za/industrial_development/ip.jsp and http://ocpo.treasury.gov.za/Buyers_Area/Legislation/Pages/Practice-Notes.aspx

In addition to the above:
a) The supplier shall study the terms and conditions as stated in the Local Content Declaration / Annexure C returnable schedule.

C.2.1.4.5.1 The stipulated minimum threshold percentages for local production and content for the designated sectors is a shown below:

The stipulated minimum threshold percentages for local production and content for the Electrical & Telecom Cables (“the designated sector”) is 90% and will include all sub-sectors from the applicable National Treasury Instruction Note.

The stipulated minimum threshold percentages for local production and content for the Valves products and actuators (“the designated sector”) is 70% and will include all sub-sectors from the applicable National Treasury Instruction Note.

The stipulated minimum threshold percentages for local production and content for the Conveyance Pipes (“the designated sector”) is 80% - 100% and will include all sub-sectors from the applicable National Treasury Instruction Note.

The stipulated minimum threshold percentages for local production and content for the Steel Products and Component for Construction ("the designated sector") is 100% and will include all sub-sectors from the applicable National Treasury Instruction Note.

The stipulated minimum threshold percentages for local production and content for the Pumps, Medium Voltage (MV) Motor and Associated Accessories ("the designated sector") is 70% and will include all sub-sectors from the applicable National Treasury Instruction Note.

The stipulated minimum threshold percentages for local production and content for the Plastic Pipes ("the designated sector") is 100% and will include all sub-sectors from the applicable National Treasury Instruction Note.

The stipulated minimum threshold percentages for local production and content for the Cement ("the designated sector") is 100% and will include all sub-sectors from the applicable National Treasury Instruction Note.

C.2.1.4.5.2 Only tenders with locally produced or locally manufactured raw material or input will be considered. If the raw material or input to be used for a specific item is not available locally, bidders should obtain written authorisation from the Department of Trade and Industry (DTI) (Chief Director: Industrial Procurement, tel. 012 394 3927 and fax 012 394 4927) should there be a need to import such raw material or input.C.2.1.4.5.3. A copy of the authorisation letter must be submitted together with the bid document at the closing date and time of the bid.

C.2.1.4.5.4 The Employer is obliged and must ensure that contracts for **the designated sector** are awarded at prices that are market related considering, among others, benchmark prices designated by the DTI for the sector, value for money and economies of scale. Where appropriate, prices may be negotiated with preferred bidders in accordance with provisions for Negotiation with Preferred Bidders as set out in the Municipality's SCM Policy.

For further information relating to the local production and content legislation, bidders may refer to website http://www.thedti.gov.za/industrial_development/ip.jsp, or may contact the Chief Director: Industrial Procurement at the DTI at telephone number (012) 394 3927 and fax (012) 394 4927, the Director: Fleet Procurement, Ms Cathrine Matidza, at telephone number (012) 394 3927 and e-mail CMatidza@thedti.gov.za, or the DTI Contact Centre no 0861 843384.

C.2.1.4.5.5 A bid will be declared non-responsive / disqualified if the **Local Content Declaration** / **Annexure C** returnable schedule as well as the authorisation letter referred to above (if applicable) are not submitted as part of the bid documentation at the closing date and time of the bid.

For further information relating to the local production and content legislation, bidders may refer to website http://www.thedti.gov.za/industrial_development/ip.jsp, or may contact the Chief Director: Industrial Procurement at the DTI at telephone number (012) 394 3927 and fax (012) 394 4927, the Director: Fleet Procurement, Ms Cathrine Matidza, at telephone number (012) 394 3927 and e-mail CMatidza@thedti.gov.za, or the DTI Contact Centre no 0861 843384.

C.2.1.4.7 **Key personnel**

In order to be considered eligible for a contract in terms of this tender, tenderers must meet the following criteria regarding the staff to be employed on the Contract. The Tenderer should provide proof of experience of their key personnel, failing which their tenders will be declared non-responsive.

a) A **Contracts Manager** employed by the tenderer who has managed and completed 4 or more projects in the last 15 years (7ME/CE or higher) at the level of Contracts Manager/Director with at least a BTech or BEng qualification with Professional Registration with the Engineering Council of South Africa (ECSA). The nature of works must include the construction (Mechanical Works) of a wastewater treatment plant of which the scope includes the provision of new equipment for the build, upgrade or expansion of a treatment facility. Note: The CV of Contract Manager to be appended to **Schedule 8, Page 59**, failing which the tender will be declared non-responsive.

b) A **Construction Manager** No. 1 employed by the tenderer who has managed and completed 4 or more projects in the last 15 years (Water Retaining Concrete Structures on projects above R10mil) at the level of Construction Manager with at least a NDip or BTech qualification in Mechanical Engineering. The nature of works must include the construction (Mechanical Work) of a wastewater treatment plant of which the scope includes the provision of new equipment for the build, upgrade, or expansion of a treatment facility. Note: The CV of Construction Manager- Mechanical Services, to be appended to **Schedule 8, Page 59**, failing which the tender will be declared non-responsive.

c) A **Construction Manager** No. 2 employed by the tenderer who has managed and completed 4 or more projects in the last 15 years (>3ML/d or above) at the level of Construction Manager with at least a NDip or BTech qualification in Civil Engineering. The nature of works must include the construction (Civil Works) of a wastewater treatment plant of which the scope includes the provision of new equipment for the build, upgrade or expansion of a treatment facility. Note: The CV of Construction Manager- Civil Services, to be appended to **Schedule 8, Page 66**, failing which the tender will be declared non-responsive.

C.2.1.4.8 **Work experience of tenderer**

In order to be considered eligible for a contract in terms of this tender, tenderers must meet the following criteria regarding the tenderer's work experience in the **last 5 years.**

The tenderer with or without sub-contractors must have completed 2 or more projects comprising of construction (Water Retaining Concrete Works) of a wastewater treatment plant of which the scope includes the provision of new equipment for the build, upgrade or expansion of a treatment facility within the **7CE (Civil works)** or higher value range.

or

The tenderer with or without sub-contractors must have completed 2 or more projects comprising of construction (Mechanical Works) of a wastewater treatment plant of which the scope includes the provision of new equipment for the build, upgrade or expansion of a treatment facility within the **7ME (Mechanical works)** or higher value range.

Note: Proof of the completed projects and contactable references are to be appended to **Schedule 5, Page 56** failing which, the tender will be declared non-responsive.

C.2.1.4.9 **Clarification meeting**

Add the following:

The arrangements for a **compulsory** tenderer's clarification meeting are as stated in the Tender Notice and Invitation to Tender. Failure to provide proof of attendance of this clarification meeting will result in disqualification of the tender. Schedule 2 **(T2-Page 52)** must be signed by employer or employer's agent as proof of attendance, or the signed (signed by attending tenderers) attendance register should be attached to this schedule.

Tenderers should be represented at the clarification meeting by a person who is suitably qualified and experienced to comprehend the implications of the work involved.

C.2.1.4.10 **Good standing with Bargaining Council**

Only those tenders submitted by tenderers who are in good standing with the **Bargaining Council for Metal and Engineering Industries Bargaining Council (MEIBC) or Bargaining Council for the Civil Engineering Industry (BCCEI)** at the time of the tender award will be declared responsive. Tenderers must attach such proof to the schedule titled **Declaration in Respect of Compliance with Labour Legislation** or obtain such upon being requested to do so in writing and within the period contained in such a request, failing which their tenders will be declared non-responsive.

C.2.1.4.11 **Good standing with SARS/Tax Clearance**

Bidders are required to submit their unique personal identification number (pin) issued by SARS to enable the organ of state to view the taxpayer's profile and tax status. Application for the tax compliance status (TCS) certificate or pin may also be made via e-filing. In order to use this provision, taxpayers will need to register with SARS as e-filers through the website www.sars.gov.za. Bidders may also submit a printed TCS certificate together with the bid (valid and original). In Bids where Consortia/Joint Venture/Sub-contractors are involved each party must submit a separate and Original Valid Tax Clearance Certificate.

C.2.3 **Check documents**

Delete the clause and replace with the following:

The Tenderer should check the tender documents on receipt for completeness, missing or duplicated pages, indistinct figures or writing and any obvious errors. The Tenderer must notify the Employer's agent at once of any such problems identified.

C.2.7 **Clarification meeting**

Add the following after the second sentence:

The arrangements for the site visit/clarification meeting are as stated on the General Tender Information page and in the Responsiveness Criteria (if applicable). Failure to provide proof of attendance of this clarification meeting will result in disqualification of the tender. The applicable schedule in the returnable documents must be signed by employer or employer's agent as proof of attendance or the signed (signed by attending tenderers) attendance register should be attached to this schedule.

Tenderers should be represented at the site visit/clarification meeting by a person who is suitably qualified and experienced to comprehend the implications of the work involved. The employer or employer's agent cannot be held liable for any information discussed during the Clarification Meeting not correctly carried forward to the authorised person signing the tender document.

C.2.8 **Seek Clarification**

Add the following after the first sentence:

The tenderer warrants that it has:

a) inspected the Specifications and read and fully understood the Conditions of Contract.
b) read and fully understood the whole text of the Specifications and Price Schedule and thoroughly acquainted itself with the nature of the goods proposed and generally of all matters which may influence the Contract.
c) visited the site(s) where delivery of the proposed works will take place, carefully examined existing conditions, the means of access to the site(s), the conditions under which the delivery is to be made, and acquainted itself with any limitations or restrictions that may be imposed by the Municipal or other Authorities in regard to access and transport of materials, plant and construction equipment to and from the site(s) and made the necessary provisions for any additional costs involved thereby.

d) requested the Employer to clarify the requirements contained in the Specifications and Price Schedule, the exact meaning or interpretation of which is not clearly intelligible to the tenderer.
e) received any notices to the tender documents which have been issued in accordance with the Employer's SCM Policy.

The Employer will therefore not be liable for the payment of any extra costs resulting from any claim submitted by the tenderer arising from any alleged ambiguity or uncertainty contained in the tender document.

C.2.11 **Alterations to documents**

Delete the first sentence and replace with the following:

Do not make any alterations or additions to the tender documents, except to comply with instructions issued by the employer in writing, or necessary to correct errors made by the tenderer.

C.2.12.1 **Alternative tender offers**

Add the following to C.2.12.1 at the end of the first sentence:

If a tenderer wishes to submit an alternative tender offer, he shall do so as a separate offer on a separate set of tender documents. The alternative tender offer shall be submitted in a separate sealed envelope on a separate Form of Offer, both clearly marked "Alternative Tender" in order to distinguish it from the main tender offer.

While it is not necessary to duplicate all parts of the main tender offer, the alternative tender offer shall be supported by the following documents as applicable:

a) the schedule that compares the alternative(s) offered with the requirements of the issued tender documents
b) preliminary designs, calculations, drawings and all other pertinent technical information and characteristics must be submitted with the alternative tender offer, in order to enable the Employer to evaluate the efficacy of the alternatives proposed
c) revised Bills of Quantities, or parts thereof, highlighting the changes made, together with a revised Summary, the total of which has been carried to the Form of Offer
d) details of any proposed amendments to the Pricing Assumptions

An alternative of the highest ranked acceptable main tender offer that is priced higher than the main tender offer may be recommended for award, provided that the ranking of the alternative tender -offer is higher than the ranking of the next ranked acceptable main tender offer.

The Employer's costs in confirming the acceptability of the alternative offer will be, *inter alia*, considered in considering the alternative offer.

The Employer will not be bound to consider alternative tenders and shall have sole discretion in this regard.

If the alternative is accepted, the Contractor shall accept full responsibility that the alternative offer complies in all respects with the Employer's standards and requirements.

C.2.13 **Submitting a tender offer**

Add the following to C.2.13.1 at the end of the first sentence:

C.2.13.1 Where the tendering entity is a joint venture it is recommended that the standard CIDB Joint Venture Agreement be used.

Delete the following word from C.2.13.2 and add the following sentence after the first sentence:

C.2.13.2 Delete "either electronically (if they were issued in electronic format) or". No electronic submissions will not be accepted unless specifically requested by the Employer in writing.

Add the following to C.2.13.3:

C.2.13.3 Parts of each tender offer communicated on paper shall be submitted as an original, plus 0 (nil) copies.

Add the following after the first sentence of C.2.13.4:

C.2.13.4 The tender shall be signed by a person duly authorised to do so. Tenders submitted by joint ventures of two or more firms shall be accompanied by the document of formation of the joint venture, authenticated by a notary public or other official deputed to witness sworn statements, in which is defined precisely the conditions under which the joint venture will function, its period of duration, the persons authorised to represent and obligate it, the participation of the several firms forming the joint venture, and any other information necessary to permit a full appraisal of its functioning.

Delete the clause and replace with the following.

C.2.13.5 The tender submission details are all described on the General Tender Information page.

The Employer's address for delivery of tender offers and identification details to be shown on each tender offer package are:

Location of tender box: Langeberg Municipal Office
Physical address: Langeberg Municipality, Main Street 28, Ashton

Identification details: Tender number: T41/2022

Title of tender: Refurbishment And Upgrade of Robertson Wastewater Treatment Works

Sealed tenders with the name and address of the tenderer, the tender No. and title and the closing date indicated on the envelope, must be placed in the appropriate official tender box at the abovementioned address.

Add the following to C.2.13.6:

C.2.13.6 A two-envelope procedure will **not** be followed (C.3.5).

Add the following new Clauses after C.2.13.9 and before C.2.14:

C.2.13.10 By signing the offer part of C1.1 Form of Offer and Acceptance the tenderer declares that all information provided in the tender submission is true and correct.

C.2.13.11 The Employer shall not formally issue tender documents in electronic format and shall only issue tender documents in hardcopy. An electronic version of the issued tender documents, or elements thereof, may be made available to the tenderer at the Employer's discretion, upon written request in terms of this clause, subject to the following:

a) Electronic copies of the issued tender documents, or parts thereof, will only be provided to tenderers who have been issued with the tender documents as contemplated in C.1.2 in hardcopy.
b) The electronic version shall not be regarded as a substitute for the issued tender documents.
c) The Employer shall not accept tenders submitted in electronic format. Only those tenders that have been completed on the issued hard copy tender document shall be considered.

d) Where Addenda have been issued which amend the Bills of Quantities, then the printed Bills of Quantities shall take these into account. The pages of the issued Bills of Quantities should not be removed from the tender document.

e) The Employer accepts no responsibility or liability arising from any reliance on or use of the electronic version provided in terms of this clause. Tenderers are alerted to the fact that electronic versions of the tender documents may not reflect any notices or addenda that amend the tender document.

f) Any non-compliance with these provisions, including effecting any unauthorised alterations to the tender documents as contemplated in C.2.11, shall render the tender non-responsive. The Employer reserves the right to take any action against such tenderer allowed in law including, in circumstances where the tender had already been awarded, the right to cancel the contract.

g) In requesting the electronic version of the tender documents or parts thereof, the tenderer is deemed to have read, understood and accepted all of the above conditions.

C.2.15 **Closing time**

Add the following to C.2.15.1 after the first sentence:

C.2.15.1 The closing time for submission of tender offers is as stated in the Tender Notice and Invitation to Tender.

C.2.16 **Tender offer validity**

Add the following to C.2.16.1 after the first sentence:

C.2.16.1 The tender offer validity period is **17 weeks (120 days).**

C.2.16.2 *Delete the clause and replace with the following*:
Notwithstanding the period stated above, bids shall remain valid for acceptance for a period of twelve (12) months after the expiry of the original validity period, unless the Municipality is notified in writing of anything to the contrary by the bidder. The validity of bids may be further extended by a period of not more than six months subject to mutual agreement and administrative processes and upon approval by the Municipal Manager.

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

Add the following to C.2.17 at the end of the third sentence:
A tender will be rejected as non-responsive if the tenderer fails to provide any clarification or supporting documents requested by the Employer within the time for submission stated in the Employer's written request for such clarification or documents.

C.2.18 **Provide other material**

Delete the following word in C.2.18.1:

C.2.18.1 notarized

Add the following to C.2.18.1 at the end of the first paragraph:
Provide, on written request by the Employer, where the transaction value (tendered amount) inclusive of VAT **exceeds R 10 million**:

a) audited annual financial statement for the past 3 years, or for the period since establishment if established during the past 3 years, if required by law to prepare annual financial statements for auditing;

b) a certificate signed by the tenderer certifying that the tenderer has no undisputed commitments for municipal services towards a municipality or other service provider in respect of which payment is overdue for more than 30 days;

c) particulars of any contracts awarded to the tenderer by an organ of state during the past five years, including particulars of any material non-compliance or dispute concerning the execution of such contract;

d) a statement indicating whether any portion of the goods or services are expected to be sourced from outside the Republic, and, if so, what portion and whether any portion of payment from the municipality or municipal entity is expected to be transferred out of the Republic.

Each party to a Consortium/Joint Venture shall submit separate certificates/statements in the above regard.

Add the following Clauses after C.2.18.2:

C.2.18.3 Tenderers shall fully cooperate with the Employer's external service provider appointed to perform a due diligence review and risk assessment upon receipt of such written instruction from the Employer. Failure to fully cooperate could result in a tender being declared as non-responsive.

C.2.18.4 **Compliance with Occupational Health and Safety Act, 85 of 1993**

Tenderers are to note the requirements of the Occupational Health and Safety Act, 85 of 1993 and the Construction Regulations, 2014 issued in terms of Section 43 of the Act. The Tenderer shall be deemed to have read and fully understood the requirements of the above Act and Regulations and to have allowed for all costs in compliance therewith.

In this regard the Tenderer shall submit with his tender appended to Schedule 13: Health and Safety Plan in T2.2 : Returnable Schedules, a draft Health and Safety Plan in respect of the Works in sufficient detail to demonstrate the necessary competencies and resources to perform the construction work all in accordance with the Act, Regulations and Health and Safety Specification in Part C3.6 Annexures.

Such Health and Safety Plan shall cover inter-alia the following details:

(1) Management Structure, Site Supervision and Responsible Persons including a succession plan.
(2) Contractor's induction training programme for employees, sub-contractors, and visitors to the Site.
(3) Health and safety precautions and procedures to be adhered to, to ensure compliance with the Act, Regulations and Safety Specifications.
(4) Regular monitoring procedures to be performed.
(5) Regular liaison, consultation, and review meetings with all parties.
(6) Site security, welfare facilities and first aid.
(7) Site rules and fire and emergency procedures.

Tenderers are to note that the Contractor is required to ensure that all sub-contractors or others engaged in the performance of the contract also comply with the above requirements.

The Contractor shall prepare and maintain a Health and Safety File in respect of the project, which shall always be available for inspection on Site and handed over to the Employer on Final Completion of the project.

The Contractor is required to submit to the Employer the Occupational Health and Safety Agreement and a letter of good standing from the Compensation Commissioner, or a licensed compensation insurer, within 14 days after the Commencement Date of the Contract.

C.2.23 **Certificates**

Add the following after the first sentence:
The tenderer is required to submit the following:

C.2.23.1 **Evidence of tax compliance**

Tenderers shall be registered with the South African Revenue Service (SARS) and their tax affairs must be in order and they must be tax compliant subject to the requirements of clause C.2.1.4.3.h. In this regard, it is the responsibility of the Tenderer to submit evidence in the form of a valid Tax Clearance Certificate issued by SARS to the Employer, included with this tender. The tenderer must also provide its Tax Compliance Status PIN number on the **Compulsory Enterprise Questionnaire.**

Each party to a Consortium/Joint Venture shall submit a separate Tax Clearance Certificate.

Before making an award, the Municipality must verify the bidder's tax compliance status. Where the recommended bidder is not tax compliant, the bidder should be notified of the non-compliant status and be requested to submit to the Municipality, within 7 working days, written proof from SARS that they have made arrangement to meet their outstanding tax obligations. The proof of tax compliance submitted by the bidder must be verified by the Municipality via CSD or e-Filing. The Municipality should reject a bid submitted by the bidder if such bidder fails to provide proof of tax compliance within the timeframe stated herein.

Only foreign suppliers who have answered "NO" to all the questions contained in the Questionnaire to Bidding Foreign Suppliers section on the **Details of Tenderer** pages of the tender submission, are not required to register for a tax compliance status with SARS.

C.2.23.2 **Broad-Based Black Economic Empowerment Status Level Documentation**

In order to qualify for preference points, it is the responsibility of the tenderer to submit documentary proof, either as certificates, sworn affidavits or any other requirement prescribed in terms of the B-BBEE Act, of its B-BBEE status level of contribution in accordance with the applicable Codes of good practise as issued by the Department of Trade and Industry, included with the tender submission.

Consortiums/Joint Ventures will qualify for preference points, provided that the **entity** submits the relevant certificate/scorecard in accordance with the applicable codes of good practise. Note that, in the case of unincorporated entities, a verified consolidated B-BBEE scorecard must be submitted in the form of a certificate with the tender.

Tenderers are further referred to the content of the **Preference Schedule** for the full terms and conditions applicable to the awarding of preference points.
The applicable code for this tender is the **Amended Codes for Measuring Broad-Based Black Economic Empowerment in the Construction Sector.**

The tenderer shall indicate in schedule 20 of the **Preference Schedule** the Level of Contribution in respect of the enterprise status or structure of the tendering entity (the supplier).

Add the follow new clause after C.2.23.2

C.2.24 **Proposed Deviations and Qualifications**

Where the tenderer cannot tender in all respects in accordance with the provisions contained in the tender documents, all deviations therefrom shall be clearly and separately listed in the schedule titled **Proposed Deviations and Qualifications by Tenderer** in T2.2 Returnable Schedules, or in a tenderer's covering letter expressly referenced in this schedule.

The tenderer accept that the Employer will examine such deviations in terms of clause C.3.8.2 and shall not be bound to accept any such deviations or qualifications.

It must be clearly stated by the tenderer whether the sum tendered in the Tender Offer includes for all such deviations or qualifications listed or referred to in the schedule titled **Proposed Deviations and Qualifications by Tenderer** or not.

C.3 The Employer's undertakings

C.3.2 Issue Addenda

Delete the first sentence and replace with:
If necessary, issue addenda in writing that may amend or amplify the tender documents to each tenderer during the period from the date the tender documents are available until one week before the tender closing time stated in the Tender Data. The Employer reserves its rights to issue addenda less than one week before the tender closing time in exceptional circumstances.

Add the following to C.3.2 at the end of the paragraph:
Notwithstanding any requests for confirmation of receipt of` Addenda issued, the tenderer shall be deemed to have received such addenda if the employer can show proof of transmission thereof (or a notice in respect thereof) via electronic mail, facsimile or registered post. It is therefore of great importance that the contact details provided during the compulsory clarification meeting is legible and contactable.

C3.4 **Opening of tender submissions**

Add the following to C.3.4.2 at the end of the paragraph:
The location for opening of the tender offers is the Tender Submission Office at the address as stated on the General Tender Information page.

C.3.8 **Test for responsiveness**

C.3.8.2 *Replace the final sentence of C.3.8.2 with the following:*
Reject a non-responsive tender offer, and not allow it to be subsequently made responsive by correction or withdrawal of the material deviation.

Add the following after clause C.3.8.2

C.3.8.3 The Employer reserves the right to accept a tender offer which does not, in the Employer's opinion, materially and/or substantially deviate from the terms, conditions, and specifications of the tender documents.

C.3.9 **Arithmetical errors, omissions and discrepancies**

Add the following after clause C.3.9.4

C.3.9.5 In the event of tendered rates or lump sums being declared by the Employer to be unacceptable to it because they are not priced, either excessively low or high, or not in proper balance with other rates or lump sums, the Tenderer may be required to produce evidence and advance arguments in support of the tendered rates or lump sums objected to. If, after submission of such evidence and any further evidence requested, the Employer is still not satisfied with the tendered rates or lump sums objected to, it may request the tenderer to amend these rates and lump sums along the lines indicated by it.

The Tenderer will then have the option to alter and/or amend the rates and lump sums objected to and such other related amounts as are agreed on by the Employer, but this shall be done without altering the tender offer in accordance with this clause.

Should the Tenderer fail to amend his tender in a manner acceptable to and within the time stated by the Employer, the Employer may declare the tender as non-responsive.

C.3.10 **Clarification of a tender offer**

Delete the clause and replace with the following:
The Employer may, after the closing date, request additional information or clarification from any tenderer, in writing on any matter affecting the evaluation of the tender offer or that could give rise to ambiguity in a contract arising from the tender offer, which written request and related response shall not change or affect their competitive position or the substance of the tenderer's offer. Such request may only be made in writing by the Director: Supply Chain Management using any means as appropriate.

C.3.11 **Evaluation of tender offers**

Add the following Clauses after clause C.3.11.1 and before Clause C.3.12

C.3.11.2 Where the scoring of functionality forms part of a bid process, each member of the Bid Evaluation Committee must individually score functionality. The individual scores must then be interrogated and calibrated if required where there are significant discrepancies. The individual scores must then be added together and averaged to determine the final score.

C.3.11.3 The tender will be evaluated in terms of the requirements of the Preferential Procurement Regulations of 2017 as follows:

C.3.11.3.1 The preference point system applicable to this tender is the 90/10 preference point system.

C.3.11.3.2 Price and preference will be scored, as relevant, to two decimal places.

C.3.11.3.3 Confirm that tenderers are eligible for the preferences claimed in accordance with the provisions of the tender data and reject all claims for preferences where tenderers are not eligible for such preferences.

Points will be awarded to tenderers who are eligible for preferences in terms of the **Preference Schedule** (where preferences are granted in respect of B-BBEE contribution) which is included in T2.2 Returnable Schedules.

The terms and conditions of the **Preference Schedule** shall apply in all respects to the tender evaluation process and any subsequent contract.

In addition, the various deemed B-BBEE Status Level of Contributor in accordance with the relevant Codes can be attained and such tenderers must be awarded the appropriate number of points.

It should be noted that such Deemed B-BBEE Status Level of Contribution can be enhanced or discounted in accordance with the relevant clauses in the applicable Codes.

C.3.11.4 Risk Analysis
Notwithstanding compliance with regard to CIDB registration or any other requirements of the tender, the employer will perform a risk analysis in respect of the following:

a) reasonableness of the financial offer
b) reasonableness of unit rates and prices
c) the tenderer's ability to fulfil its obligations in terms of the tender document, that is, that the tenderer can demonstrate that he/she/it possesses the necessary professional and technical qualifications, professional and technical competence, financial resources (Bank Ratings will be requested), equipment and other physical facilities, managerial capability, reliability, capacity, experience, reputation, personnel to perform the contract, etc.; the Employer reserves the right to consider a tenderer's existing contracts with the Employer in this regard
d) any other matter relating to the submitted bid, the tendering entity, matters of compliance, verification of submitted information and documents.

The conclusions drawn from this risk analysis will be used by the Employer in determining the acceptability of the tender offer in terms of C.3.13.

C.3.13 **Acceptance of tender offer**

Delete first sentence of C.3.13 and replace with the following):
Accept the tender offer, if in the opinion of the employer, it does not present any material risk and only if the tenderer:

Delete C.3.13 a) and replace with the following):
a) is not under restrictions, has any principals who are under restrictions, or is not currently a supplier to whom notice has been served for abuse of the supply chain management system, preventing participation in the employer's procurement.

Add the following below C.3.13 f)
If an award cannot be made in terms of anything contained herein, the Employer reserves the right to consider the next ranked tenderer(s). The Employer does not bind himself to accept the lowest priced tender, highest evaluation points tender or any tender offer. The Employer has the right to accept any part of a tender as he may deem expedient subject to negotiation with the successful tenderer for the whole tender.

C.3.13.1 The Employer reserves the right not to make an award, or revoke an award already made, where the implementation of the contract may result in reputational risk or harm to the Municipality as a result of (inter alia):

b) reports of poor governance and/or unethical behaviour;

c) association with known family of notorious individuals;

d) poor performance issues, known to the Langeberg Municipality;

e) negative social media reports; and

f) adverse assurance (e.g. due diligence) report outcomes.

C.3.13.2 The Employer reserves the right to nominate an alternative bidder at the time when an award is made and in the event that a contract is terminated during the execution thereof, the LANGEBERG MUNICIPALITY may consider the award of the contract, or non-award, to the alternative bidder in terms of the procedures included its SCM Policy.

C.3.13.3 The Employer shall notify the successful tenderer in writing of the decision of the Employer's Bid Adjudication Committee to award the tender to the successful tenderer. No rights shall accrue to the successful tenderer in terms of this notice.

C.3.13.4 The Employer shall, at the same time as notifying the successful tenderer of the Bid Adjudication Committee's decision to award the tender to the successful tenderer, also give written notice to the other tenderers informing them that they have been unsuccessful.

C.3.17 **Provide copies of the contract**

Add the following after the first sentence:
The number of paper copies of the signed contract to be provided by the Employer is one.

Add the following Clauses after C.3.18:

C.3.19 **Negotiations with preferred tenderers**

The Employer may negotiate the final terms of a contract with tenderers identified through a competitive tendering process as preferred tenderers provided that such negotiation:

a) does not allow any preferred tenderer a second or unfair opportunity;
b) is not to the detriment of any other tenderer; and
c) does not lead to a higher price than the tender as submitted.

If negotiations fail to result in acceptable contract terms, the Municipal Manager (or his delegated authority) may terminate the negotiations and cancel the tender or invite the next ranked tenderer for negotiations. The original preferred tenderer should be informed of the reasons for termination of the negotiations. If the decision is to invite the next highest ranked tenderer for negotiations, the failed earlier negotiations may not be reopened by the LANGEBERG MUNICIPALITY.
Minutes of any such negotiations shall be kept for record purposes.

The provisions of this clause will be equally applicable to any invitation to negotiate with any other tenderers.

In terms of the PPPFA Regulations, 2017, tenders must be cancelled in the event that negotiations fail to achieve a market related price with any of the three highest scoring tenderers.

C.3.20 **Claims arising after submission of tender**

No claim for any extras arising out of any doubt or obscurity as to the true intent and meaning of anything shown on the Contract Drawings or contained in the Conditions of Contract, Scope of Work and Pricing Data, will be admitted by the Employer/Employer's Agent after the submission of any tender and the Tenderer shall be deemed to have:

a) inspected the Contract Drawings and read and fully understood the Conditions of Contract.
b) read and fully understood the whole text of the Scope of Work and Pricing Data and thoroughly acquainted himself with the nature of the works proposed and generally of all matters which may influence the Contract.
c) visited the site of the proposed works, carefully examined existing conditions, the means of access to the site, the conditions under which the work is to be done, and acquainted himself with any limitations or restrictions that may be imposed by the Municipal or other Authorities in regard to access and transport of materials, plant and construction equipment to and from the site and made the necessary provisions for any additional costs involved thereby.
d) requested the Employer or his duly authorised agent to make clear the actual requirements of anything shown on the Contract Drawings or anything contained in

the Scope of Work and Pricing Data, the exact meaning or interpretation of which is not clearly intelligible to the Tenderer.

Before submission of any tender, the Tenderer should check the number of pages, and if any are found to be missing or duplicated, or the figures or writing indistinct, or if the Pricing Data contain any obvious errors, the tenderer must apply to the Employer/Employer's Agent at once to have the same rectified, as no liability will be admitted by the Employer/Employer's Agent in respect of errors in any tender due to the foregoing.

e) received any Addenda to the tender documents which have been issued in accordance with the Employer's Supply Chain Management Policy.

C.3.21 General supply chain management conditions applicable to tenders

In terms of its Supply Chain Management Policy the Employer may not consider a tender unless the provider who submitted the tender:

a) has furnished the Employer with that provider's:
   - full name;
   - identification number or company or other registration number; and
   - tax reference number and VAT registration number, if any;

b) has indicated whether:
   - the provider is in the service of the state, or has been in the service of the state in the previous twelve months;
   - the provider is not a natural person, whether any of the directors, managers, principal shareholders or stakeholders is in the service of the state, or has been in the service of the state in the previous twelve months;
   - whether a spouse, child or parent of the provider or of a director, manager, shareholder or stakeholder referred to above is in the service of the state, or has been in the service of the state in the previous twelve months; or

c) irrespective of the procurement process followed, the Employer is prohibited from making an award to:
   - a person who is in the service of the state;
   - a juristic entity of which any director, manager, principal shareholder or stakeholder is in the service of the state;
   - an advisor or consultant contracted with the Employer, or
   - a person, advisor or corporate entity involved with the bid specification committee, or a director of such corporate entity.

The Contract Price shall not be subject to any contract price adjustment, the rates and prices tendered in the bills of quantities shall. In this regard, tenderers shall complete Schedule 1, Part T2.2: Returnable Schedules: Compulsory Enterprise Questionnaire. Failure to complete this Schedule may result in the tender not being considered.

C.3.22 Combating abuse of the Supply Chain Management Policy

In terms of the Municipality's Supply Chain Management Policy, the Employer may reject the tender of any tenderer if that tenderer or any of its directors has:

a) failed to pay municipal rates and taxes or municipal service charges and such rates, taxes and charges are in arrears for more than three months
b) failed, during the last five years, to perform satisfactorily on a previous contract with the Municipality or any other organ of state after written notice was given to that tenderer that performance was unsatisfactory.
c) abused the supply chain management system of the Employer or has committed any improper conduct in relation to this system.
d) been convicted of fraud or corruption during the past five years.
e) willfully neglected, reneged on, or failed to comply with any government, municipal or other public sector contract during the past five years; or

f) been listed with the Register of Tender Defaulters in terms of section 29 of the Prevention and Combating of Corrupt Activities Act (No 12 of 2004) or has been listed on National Treasury's database as a person or juristic entity prohibited from doing business with the public sector.

In this regard, tenderers shall complete Part T2.2: Returnable Schedules: Declaration of Tenderer's Past Supply Chain Management Practices (in terms of the Municipal Finance Management Act). Failure to complete this Schedule may result in the tender not being considered.

C.3.23 UIF payments

The Tenderer shall submit to the Employer a letter from the Industrial Council indicating his good standing with regard to UIF payments upon being requested to do so.

C.3.24 Price variations

Tender document or part thereof. Only those tenders that have been completed on the issued hard copy tender final and binding throughout the period of the contract. However, price adjustments for variations in the costs of special materials may be applicable where the Employer/Employer's Agent specifies such materials and the relevant information in the Contract Data.

Notwithstanding the above, if, as a result of any extension of time granted, the duration of the contract period exceeds one year, the contract will automatically be subject to contract price adjustment for that period by which the extended contract period exceeds such one year.

Adjustment in rates or prices shall be subject to the provisions of Part C1.2: Contract Data.

C.3.25 Requests for contract documents, or parts thereof, in electronic format

The Employer shall not formally issue tender documents in electronic format as contemplated in C.2.13.2 and C.2.13.3 and shall only issue tender documents in hardcopy. An electronic version of the issued tender documents may be made available to the tenderer, upon written request in terms of this clause, subject to the following:

a) Electronic copies of the contract document, or parts thereof, will only be provided to tenderers who have been issued with the tender documents as contemplated in C.1.2 in hardcopy.
b) The electronic version shall not be regarded as a substitute for the issued tender documents.
c) The Employer shall not accept tenders submitted in electronic format. Tenderers may **not** complete and submit a printed copy of the electronic version of the tender document.
d) The Employer accepts no responsibility or liability arising from any reliance on or use of the electronic version provided in terms of this clause. The Employer further does not guarantee that the electronic version corresponds with the issued tender documents in all respects. Tenderers are alerted to the fact that electronic versions of the tender documents may not reflect any notices or addenda that amend the tender document.
e) Any non-compliance with these provisions, including effecting any unauthorised alterations to the tender document as contemplated in C.2.11, shall render the tender invalid. The Employer reserves the right to take any action against such tenderer allowed in law including, in circumstances where the tender had already been awarded, the right to cancel the contract.

f) In requesting the electronic version of the tender document or parts thereof, the tenderer is deemed to have read, understood, and accepted all of the above conditions.

C.3.26 Bidders who do not submit B-BBEE Status Level Verification Certificates or are non-compliant contributors to B-BBEE do not qualify for preference points for B-BBEE but should not be disqualified from the bidding process. They will score points out 90 for price only and zero (0) points out of 10 for B-BBEE. A trust, consortium or joint venture must submit a consolidated B-BBEE Status Level Verification Certificate for every separate bid.

LANGEBERG
MUNISIPALITEIT MUNICIPALITY MASIPALA

Annex C
(normative)
Standard Conditions of Tender

C.1.1 **Actions**

Add the following:

C.1 General

C.1.1 Actions

C.1.1.1 The employer and each tenderer submitting a tender offer shall comply with these conditions of tender. In their dealings with each other, they shall discharge their duties and obligations as set out in C.2 and C.3, timeously and with integrity, and behave equitably, honestly and transparently, comply with all legal obligations and not engage in anticompetitive practices.

C.1.1.2 The employer and the tenderer and all their agents and employees involved in the tender process shall avoid conflicts of interest and where a conflict of interest is perceived or known, declare any such conflict of interest, indicating the nature of such conflict. Tenderers shall declare any potential conflict of interest in their tender submissions. Employees, agents and advisors of the employer shall declare any conflict of interest to whoever is responsible for overseeing the procurement process at the start of any deliberations relating to the procurement process or as soon as they become aware of such conflict and abstain from any decisions where such conflict exists or recuse themselves from the procurement process, as appropriate.

Note:

1) *A conflict of interest may arise due to a conflict of roles which might provide an incentive for improper acts in some circumstances. A conflict of interest can create an appearance of impropriety that can undermine confidence in the ability of that person to act properly in his or her position even if no improper acts result.*
2) *Conflicts of interest in respect of those engaged in the procurement process include direct, indirect or family interests in the tender or outcome of the procurement process and any personal bias, inclination, obligation, allegiance or loyalty which would in any way affect any decisions taken.*

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

C.1.2 Tender Documents

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

C.1.3 Interpretation

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

C.1.3.2 These conditions of tender, the tender data and tender schedules which are required for tender evaluation purposes, shall form part of any contract arising from the invitation to tender.

C.1.3.3 For the purposes of these conditions of tender, the following definitions apply:

a) **conflict of interest** means any situation in which:
   i. someone in a position of trust has competing professional or personal interests which make it difficult to fulfill his or her duties impartially;
   ii. an individual or tenderer is in a position to exploit a professional or official capacity in some way for their personal or corporate benefit; or
   iii. incompatibility or contradictory interests exist between an employee and the tenderer who employs that employee.

b) **comparative offer** means the price after the factors of a non-firm price and all unconditional discounts it can be utilised to have been taken into consideration;

c) **corrupt practice means** the offering, giving, receiving or soliciting of anything of value to influence the action of the employer or his staff or agents in the tender process;

d) **fraudulent practice** means the misrepresentation of the facts in order to influence the tender process or the award of a contract arising from a tender offer to the detriment of the

employer, including collusive practices intended to establish prices at artificial levels;

C.1.4 Communication and employer's agent

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

C.1.5 Cancellation and Re-Invitation of Tenders

C.1.5.1 An employer may, prior to the award of the tender, cancel a tender if-

a) due to changed circumstances, there is no longer a need for the engineering and construction works specified in the invitation;
b) funds are no longer available to cover the total envisaged expenditure; or
c) no acceptable tenders are received.
d) there is a material irregularity in the tender process.

C.1.5.2 The decision to cancel a tender invitation must be published in the same manner in which the original tender invitation was advertised

C.1.5.3 An employer may only with the prior approval of the relevant treasury cancel a tender invitation for the second time.

C.1.6 Procurement procedures

C.1.6.1 General

Unless otherwise stated in the tender data, a contract will, subject to C.3.13, be concluded with the tenderer who in terms of C.3.11 is the highest ranked or the tenderer scoring the highest number of tender evaluation points, as relevant, based on the tender submissions that are received at the closing time for tenders.

C.1.6.2 Competitive negotiation procedure

C.1.6.2.1 Where the tender data require that the competitive negotiation procedure is to be followed, tenderers shall submit tender offers in response to the proposed contract in the first round of submissions. Notwithstanding the requirements of C.3.4, the employer shall announce only the names of the tenderers who make a submission. The requirements of C.8 relating to the material deviations or qualifications which affect the competitive position of tenderers shall not apply.

C.1.6.2.2 All responsive tenderers or at least a minimum of not less than three responsive tenderers that are highest ranked in terms of the evaluation criteria stated in the tender data shall be invited to enter into competitive negotiations based on the principle of equal treatment, keeping confidential the proposed solutions and associated information.

Notwithstanding the provisions of C.2.17, the employer may request that tenders be clarified, specified and fine-tuned in order to improve a tenderer's competitive position provided that such clarification, specification, fine-tuning or additional information does not alter any fundamental aspects of the offers or impose substantial new requirements which restrict or distort competition or have a discriminatory effect.

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

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

C.1.6.3 Proposal procedure using the two stage-system

C.1.6.3.1 Option 1

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

award the contract in terms of these conditions of tender.

C.1.6.3.2 **Option 2**

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

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

C.2 Tenderer's obligations

C.2.1 Eligibility

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

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

C.2.2 Cost of tendering

C.2.2.1 Accept that, unless otherwise stated in the tender data, the employer will not compensate the tenderer for any costs incurred in the preparation and submission of a tender offer, including the costs of any testing necessary to demonstrate that aspects of the offer complies with requirements.

C.2.2.2 The cost of the tender documents charged by the employer shall be limited to the actual cost incurred by the employer for printing the documents. Employers must attempt to make available the tender documents on its website so as not to incur any costs pertaining to the printing of the tender documents.

C.2.3 Check documents

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

C.2.4 Confidentiality and copyright of documents

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

C.2.5 Reference documents

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

C.2.6 Acknowledge addenda

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

C.2.7 Clarification meeting

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

C.2.8 Seek clarification

Request clarification of the tender documents, if necessary, by notifying the employer at least five (5) working days before the closing time stated in the tender data.

C.2.9 Insurance

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

C.2.10 Pricing the tender offer

C.2.10.1 Include in the rates, prices, and the tendered total of the prices (if any) all duties, taxes except Value Added Tax (VAT), and other levies payable by the successful tenderer, such duties, taxes and levies being those applicable fourteen (14) days before the closing time stated in the tender data.

C.2.10.2 Show VAT payable by the employer separately as an addition to the tendered total of the prices.

C.2.10.3 Provide rates and prices that are fixed for the duration of the contract and not subject to adjustment except as provided for in the conditions of contract identified in the contract data.

C.2.10.4 State the rates and prices in Rand unless instructed otherwise in the tender data. The conditions of contract identified in the contract data may provide for part payment in other currencies.

C.2.11 Alterations to documents

Do not make any alterations or additions to the tender documents, except to comply with instructions issued by the employer, or necessary to correct errors made by the tenderer. All signatories to the tender offer shall initial all such alterations.

C.2.12 Alternative tender offers

C.2.12.1 Unless otherwise stated in the tender data, submit alternative tender offers only if a main tender offer, strictly in accordance with all the requirements of the tender documents, is also submitted as well as a schedule that compares the requirements of the tender documents with the alternative requirements that are proposed.

C.2.12.2 Accept that an alternative tender offer must be based only on the criteria stated in the tender data or criteria otherwise acceptable to the employer.

C.2.12.3 An alternative tender offer must only be considered if the main tender offer is the winning tender.

C.2.13 Submitting a tender offer

C.2.13.1 Submit one tender offer only, either as a single tendering entity or as a member in a joint venture to provide the whole of the works identified in the contract data and described in the scope of works, unless stated otherwise in the tender data.

C.2.13.2 Return all returnable documents to the employer after completing them in their entirety, either electronically (if they were issued in electronic format) or by writing legibly in non-erasable ink.

C.2.13.3 Submit the parts of the tender offer communicated on paper as an original plus the number of copies stated in the tender data, with an English translation of any documentation in a language other than English, and the parts communicated electronically in the same format as they were issued by the employer.

C.2.13.4 Sign the original and all copies of the tender offer where required in terms of the tender data. The employer will hold all authorized signatories liable on behalf of the tenderer. Signatories for tenderers proposing to contract as joint ventures shall state which of the signatories is the lead partner whom the employer shall hold liable for the purpose of the tender offer.

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

address.

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

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

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

C.2.13.9 Accept that tender offers submitted by facsimile or e-mail will be rejected by the employer, unless stated others in the tender data.

C.2.14 Information and data to be completed in all respects

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

C.2.15 Closing time

C.2.15.1 Ensure that the employer receives the tender offer at the address specified in the tender data no later than the closing time stated in the tender data. Accept that proof of posting shall not be accepted as proof of delivery.

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

C.2.16 Tender offer validity

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

C.2.16.2 If requested by the employer, consider extending the validity period stated in the tender data for an agreed additional period with or without any conditions attached to such extension.

C.2.16.3 Accept that a tender submission that has been submitted to the employer may only be withdrawn or substituted by giving the employer's agent written notice before the closing time for tenders that a tender is to be withdrawn or substituted. If the validity period stated in C.2.16 lapses before the employer evaluating tender, the contractor reserves the right to review the price based on Consumer Price Index (CPI).

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

C.2.17 Clarification of tender offer after submission

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

Note: *Sub-clause C.2.17 does not preclude the negotiation of the final terms of the contract with a preferred tenderer following a competitive selection process, should the Employer elect to do so.*

C.2.18 Provide other material

C.2.18.1 Provide, on request by the employer, any other material that has a bearing on the tender offer, the tenderer's commercial position (including notarized joint venture agreements), preferencing arrangements, or samples of materials, considered necessary by the employer for the purpose of a full and fair risk assessment.

Should the tenderer not provide the material, or a satisfactory reason as to why it cannot be provided, by the time for submission stated in the employer's request, the employer may regard the tender offer as non-responsive.

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

C.2.19 Inspections, tests and analysis

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

C.2.20 Submit securities, bonds and policies

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

C.2.21 Check final draft

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

C.2.22 Return of other tender documents

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

C.2.23 Certificates

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

C.3 The employer's undertakings

C.3.1 Respond to requests from the tenderer

C.3.1.1 Unless otherwise stated in the tender Data, respond to a request for clarification received up to five (5) working days before the tender closing time stated in the Tender Data and notify all tenderers who collected tender documents.

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

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

C.3.2 Issue Addenda

If necessary, issue addenda that may amend or amplify the tender documents to each tenderer during the period from the date that tender documents are available until three (3) working days before the tender closing time stated in the Tender Data. If, as a result a tenderer applies for an extension to the closing time stated in the Tender Data, the Employer may grant such extension and, shall then notify all tenderers who collected tender documents.

C.3.3 Return late tender offers

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

C.3.4 Opening of tender submissions

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

C.3.4.2 Announce at the meeting held immediately after the opening of tender submissions, at a venue indicated in the tender data, the name of each tenderer whose tender offer is opened and, where applicable, the total of his prices, number of points claimed for its BBBEE status level and time for completion for the main tender offer only.

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

C.3.5 Two-envelope system

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

C.3.5.2 Evaluate functionality of the technical proposals offered by tenderers, then advise tenderers who remain in contention for the award of the contract of the time and place when the financial proposals will be opened. Open only the financial proposals of tenderers, who score in the functionality evaluation more than the minimum number of points for functionality stated in the tender data, and announce the score obtained for the technical proposals and the total price and any points claimed on BBBEE status level. Return unopened financial proposals to tenderers whose technical proposals failed to achieve the minimum number of points for functionality.

C.3.6 Non-disclosure

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

C.3.7 Grounds for rejection and disqualification

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

C.3.8 Test for responsiveness

C.3.8.1 Determine, after opening and before detailed evaluation, whether each tender offer properly received:

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

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

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

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

C.3.9 Arithmetical errors, omissions and discrepancies

C.3.9.1 Check responsive tenders for discrepancies between amounts in words and amounts in figures. Where there is a discrepancy between the amounts in figures and the amount in words, the amount in words shall govern.

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

a) the gross misplacement of the decimal point in any unit rate;
b) omissions made in completing the pricing schedule or bills of quantities; or c) arithmetic errors in:
(i) line item totals resulting from the product of a unit rate and a quantity in bills of quantities or schedules of prices; or
(ii) the summation of the prices.

C.3.9.3 Notify the tenderer of all errors or omissions that are identified in the tender offer and either confirm the tender offer as tendered or accept the corrected total of prices.

C.3.9.4 Where the tenderer elects to confirm the tender offer as tendered, correct the errors as follows:

a) If bills of quantities or pricing schedules apply and there is an error in the line item total resulting from the product of the unit rate and the quantity, the line item total shall govern and the rate shall be corrected. Where there is an obviously gross misplacement of the decimal point in the unit rate, the line ite total as quoted shall govern, and the unit rate shall be corrected.

b) Where there is an error in the total of the prices either as a result of other corrections required by this checking process or in the tenderer's addition of prices, the total of the prices shall govern and the tenderer will be asked to revise selected item prices (and their rates if bills of quantities apply) to achieve the tendered total of the prices.

C.3.10 Clarification of a tender offer

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

C.3.11 Evaluation of tender offers

The Standard Conditions of Tender standardize the procurement processes, methods and procedures from the time that tenders are invited to the time that a contract is awarded. They are generic in nature and are made project specific through choices that are made in developing the Tender Data associated with a specific project.

Conditions of tender are by definition the document that establishes a tenderer's obligations in submitting a tender and the employer's undertakings in soliciting and evaluating tender offers. Such conditions establish the rules from the time a tender is advertised to the time that a contract is awarded and require employers to conduct the process of offer and acceptance in terms of a set of standard procedures.

The CIDB Standard Conditions of Tender are based on a procurement system that satisfies the following system requirements:	
Requirement	**Qualitative interpretation of goal**
Fair	The process of offer and acceptance is conducted impartially without bias, providing simultaneous and timely access to participating parties to the same information.
Equitable	Terms and conditions for performing the work do not unfairly prejudice the interests of the parties.
Transparent	The only grounds for not awarding a contract to a tenderer who satisfies all requirements are restrictions from doing business with the employer, lack of capability or capacity, legal impediments and conflicts of interest.
Competitive	The system provides for appropriate levels of competition to ensure cost effective and best value outcomes.
Cost effective	The processes, procedures and methods are standardized with sufficient flexibility to attain best value outcomes in respect of quality, timing and price, and least resources to effectively manage and control procurement processes.

The activities associated with evaluating tender offers are as follows:

a) Open and record tender offers received
b) Determine whether or not tender offers are complete
c) Determine whether or not tender offers are responsive
d) Evaluate tender offers
e) Determine if there are any grounds for disqualification
f) Determine acceptability of preferred tenderer
g) Prepare a tender evaluation report
h) Confirm the recommendation contained in the tender evaluation report

C.3.11.1 General

The employer must appoint an evaluation panel of not less than three persons conversant with the proposed scope of works to evaluate each responsive tender offer using the tender evaluation methods and associated evaluation criteria and weightings that are specified in the tender data.

C.3.12 Insurance provided by the employer

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

C.3.13 Acceptance of tender offer

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

a) is not under restrictions, or has principals who are under restrictions, preventing participating in the employer's procurement;
b) can, as necessary and in relation to the proposed contract, demonstrate that he or she possesses the professional and technical qualifications, professional and technical competence, financial resources, equipment and other physical facilities, managerial capability, reliability, experience and reputation, expertise and the personnel, to perform the contract;
c) has the legal capacity to enter into the contract;
d) is not; insolvent, in receivership, under Business Rescue as provided for in chapter 6 of the Companies Act No. 2008, bankrupt or being wound up, has his/her affairs administered by a court or a judicial officer, has suspended his/her business activities or is subject to legal proceedings in respect of any of the foregoing;
e) complies with the legal requirements, if any, stated in the tender data; and
f) is able, in the opinion of the employer, to perform the contract free of conflicts of interest.

C.3.14 Prepare contract documents

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

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

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

C.3.15 Complete adjudicator's contract

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

C.3.16 Registration of the award

An employer must, within twenty-one (21) working days from the date on which a contractor's offer to perform a construction works contract is accepted in writing by the employer, register and publish the award on the cidb Register of Projects.

C.3.17 Provide copies of the contracts

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

C.3.18 Provide written reasons for actions taken

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

LANGEBERG
MUNISIPALITEIT MUNICIPALITY MASIPALA

Annex G
(normative)

Alpha-numerics associated with the Contractor Grading Designations

In terms of Government Gazette 42561, dated 5 July 2019, the tender value range as set out in Table 8 in CIDB Regulation 17 has been amended. Table G1 below reflects the amended values that come into effect on 07 October 2019

Table G1: Contractor grading designations and associated parameters applicable after 7 October 2019

Contractor Grading Designation	Tender Value Range designation	Maximum value of contract that a contractor is considered capable of performing (R)
1 (class of construction works)	1	500 000
2 (class of construction works)	2	1 000 000
3 (class of construction works)	3	3 000 000
4 (class of construction works)	4	6 000 000
5 (class of construction works)	5	10 000 000
6 (class of construction works)	6	20 000 000
7 (class of construction works)	7	60 000 000
8 (class of construction works)	8	200 000 000
9 (class of construction works)	9	No Limit

Table G2: Classes of construction work (see next page)

Table G2: Classes of construction work

Description	Designation	Definition	Work types	Examples
Civil engineering works	**CE**	Construction works that are primarily concerned with materials such as steel concrete, earth and rock and their application in the development, extension, installation, maintenance, removal, renovation, alteration, or dismantling of building and engineering infrastructure	Water, sewerage, roads, railways, harbours and transport, urban development and municipal services	Structures such as a cooling tower, bridge, culvert, dam, grandstand, road, railway, reservoir, runway, swimming pool, silo or tunnel The results of operations such as dredging, earthworks and geotechnical processes. Township services, water treatment and supply, sewerage works, sanitation, soil conservation works, irrigation works, stormwater and drainage works, coastal works, ports, harbours, airports and pipelines.
Electrical engineering works (Infrastructure)	**EP**	Construction works that are primarily concerned with development, extension, installation, removal, renovation, alteration or dismantling of engineering infrastructure: a) relating to the generation, transmission and distribution of electricity; or which cannot be classified as EB.	Electrical power generation, transmission, control and distribution equipment and systems.	Power generation Street and area lighting Substations and protection systems Township Reticulations Transmission Lines Supervisory control and data acquisition systems
Electrical engineering works (buildings)	**EB**	Construction works that are primarily concerned with the installation, extension, modification or repair of electrical installations in or on any premises used for the transmission of electricity from a point of control to a point of consumption, including any article forming part of such an installation	All electrical equipment forming an integral and permanent part of buildings and/or structures, including any wiring, cable jointing and laying and electrical overhead line construction	Electrical installations in buildings Electrical reticulations within a plot of land (erf) or building site Standby plant and uninterrupted power supply Verification and certification of electrical installations on premises

General building works	**GB**	Construction works that: Are primarily concerned with the development, extension, installation, renewal, renovation alteration, or dismantling of a permanent shelter for its occupants or contents; or cannot be categorized in terms of the definitions provided for civil engineering works, electrical engineering works, mechanical engineering works, or specialist works.	Buildings and ancillary works other than those categorised as being: civil engineering works; electrical engineering works; mechanical engineering works; or specialist works.	Buildings for domestic, industrial, institutional or commercial occupancies Car ports Fences other than classified as SS Stores Walls

Description	Designation	Definition	Work types	Examples
Mechanical engineering works	**ME**	Construction works that are primarily concerned with the development, extension, installation, removal, alteration, renewal of engineering infrastructure for gas transmission and distribution, solid waste disposal, heating, ventilation and cooling, chemical works, metallurgical works, manufacturing, food processing and, materials handling	Machine systems including those relating to the environment of building interiors. gas transmission and distribution systems pipelines solid waste disposal materials handling, lifting machinery, heating, ventilation and cooling, pumps, continuous process systems chemical works, metallurgical works, manufacturing, food processing such as that in concentrator machinery and apparatus, oil and gas wells, smelters, cyanide plants, acid plants, metallurgical machinery, equipment and apparatus, and works necessary for the beneficiation of metals, minerals, rocks, petroleum and organic substances or other chemical processes.	Air-conditioning and mechanical ventilation Boiler installations and steam distribution Central heating Centralised hot water generation Cranes and hoists Dust and sawdust extraction Compressed air, gas and vacuum installations Conveyor and materials handling installations Continuous process systems involving chemical works, metallurgical works, oil and gas wells, acid plants, metallurgical machinery, equipment and apparatus, and works necessary for the beneficiation of metals, minerals, rocks, petroleum and organic substances and other chemical processes Kitchen equipment Laundry equipment Lift installations and escalators Refrigeration and cold rooms Waste handling systems (including compactors)
Specialist works	**SB**	A subset of construction works identified and defined by the Board that involves specialist capabilities for its execution	The extension, installation, repair, maintenance or renewal, or removal, of asphalt	
	SC		The development, extension, installation, removal, and dismantling, as relevant, associated with building excavations, shaft sinking and lateral earth support	
	SD		The development, extension, installation, repair, renewal, removal, or alteration of corrosion protection systems (cathodic, anodic and electrolytic)	
	SE		Demolition of buildings and engineering infrastructure and blasting	
	SF		The development, extension, installation, renewal, removal, renovation, alteration or dismantling of fire prevention and protection infrastructure (drencher and sprinkler systems and fire installation)	
	SG		The development, extension, installation, renewal, removal, renovation, alteration or dismantling of glazing, curtain walls and shop fronts	
	SH		The development, extension, installation, maintenance, renewal. removal, alteration or dismantling, as relevant, of landscaping, irrigation and horticultural works	
	SI		The development, extension, installation, repair, maintenance, renewal. removal, renovation, alteration or, dismantling of lifts, escalators, travellators and hoisting machinery	

	SJ		The development, installation, removal, or dismantling, as relevant, of piles and other specialized foundations for buildings and structures	
Description	**Designation**	**Definition**	**Work types**	**Examples**
	SK	A subset of construction works identified and defined by the Board that involves specialist capabilities for its execution	The installation, renewal, removal, alteration or dismantling, as relevant, road markings and signage	
	SL		The development, extension, installation, renewal. removal, renovation, alteration or dismantling of structural steelwork and scaffolding	
	SM		Timber buildings and structures	
	SN		The extension, installation, repair, maintenance, renewal, removal, renovation or alteration, as relevant, of the waterproofing of basements, roofs and walls using specialist systems.	
	SO		The development, extension, installation, renewal, removal, alteration or dismantling or demolition of water installations and soil and waste water drainage associated with buildings (wet services, plumbing)	
	SQ		The development, extension, installation, repair, removal, alteration, dismantling or demolition of precast concrete or steel fencing	

T.2 RETURNABLE DOCUMENT

Pages

T2.1 List of Returnable Documents……45

T2.2 Administrative Requirements in Terms of The Supply Chain Management Policy (Returnable Documents) ……..……..……47-134

T2.1 LIST OF RETURNABLE DOCUMENTS

The tenderer must complete the following Returnable Documents in **black ink**:

CONTENTS **PAGE NUMBER**

PART T1: TENDERING PROCEDURES 8

ADMINISTRATIVE REQUIREMENTS IN TERMS OF THE SUPPLY CHAIN MANAGEMENT POLICY 48

RETURNABLE DOCUMENTS CHECKLIST 49

SCHEDULE 1 : COMPULSORY ENTERPRISE QUESTIONNAIRE 51

SCHEDULE 2 : CLARIFICATION MEETING CERTIFICATE 53

SCHEDULE 3 : AUTHORITY TO SIGN A BID 54

SCHEDULE 4 : CERTIFICATE OF AUTHORITY FOR JOINT VENTURES 57

SCHEDULE 5 : SCHEDULE OF WORK EXPERIENCE 58

SCHEDULE 6 : SCHEDULE OF CONSTRUCTION EQUIPMENT 59

SCHEDULE 7 : SCHEDULE OF SUB-CONTRACTORS 60

SCHEDULE 8 : DETAILS OF CONTRACTS MANAGER AND CONSTRUCTION MANAGERS EXPERIENCE 61

Failure to complete this Schedule may result in the Tender not being considered. 61

SCHEDULE 9 : PRELIMINARY PROGRAMME 63

SCHEDULE 10 : BARGAINING COUNCIL CERTIFICATE AND MINIMUM WAGE DECLARATION 64

SCHEDULE 11 : CONFIRMATION OF CONTRACTOR ENTERPRISE REGISTRATION 65

SCHEDULE 12 : CERTIFICATE OF REGISTRATION WITH CIDB 66

SCHEDULE 13 : TENDERER'S BANKING DETAILS 67

SCHEDULE 14 : PROPOSED AMENDMENTS AND QUALIFICATIONS BY THE TENDERER 68

SCHEDULE 15 : RECORD OF ADDENDA TO TENDER DOCUMENT 69

SCHEDULE 16 : MBD 4 – DECLARATION OF INTEREST 70

SCHEDULE 17 : MBD5 – DECLARATION FOR PROCUREMENT ABOVE R10 MILLION (VAT INCLUDED) 73

SCHEDULE 18 : MBD6.1 – PREFERENCE POINTS CLAIM FORM IN TERMS OF THE PREFERENTIAL PROCUREMENT REGULATIONS 2017 – PURCHASES/SERVICES 90/10 74

SCHEDULE 19A : MBD 6.2 – DECLARATION CERTIFICATE FOR LOCAL PRODUCTION AND CONTENT FOR DESIGNATED SECTORS 79

SCHEDULE 19B : MBD 6.2 – DECLARATION CERTIFICATE FOR LOCAL PRODUCTION AND CONTENT FOR DESIGNATED SECTORS 85

SCHEDULE 19C : MBD 6.2 – DECLARATION CERTIFICATE FOR LOCAL PRODUCTION AND CONTENT FOR DESIGNATED SECTORS 92

SCHEDULE 19D : MBD 6.2 – DECLARATION CERTIFICATE FOR LOCAL PRODUCTION AND CONTENT FOR DESIGNATED SECTORS 100

SCHEDULE 19E : MBD 6.2 – DECLARATION CERTIFICATE FOR LOCAL PRODUCTION AND CONTENT FOR DESIGNATED SECTORS 111

SCHEDULE 19F : MBD 6.2 – DECLARATION CERTIFICATE FOR LOCAL PRODUCTION AND CONTENT FOR DESIGNATED SECTORS 118

SCHEDULE 19G : MBD 6.2 – DECLARATION CERTIFICATE FOR LOCAL PRODUCTION AND CONTENT FOR DESIGNATED SECTORS 124

SCHEDULE 20 : MBD 8 – DECLARATION OF BIDDER'S PAST SUPPLY CHAIN MANAGEMENT PRACTICES 130

SCHEDULE 21 : MBD 9 – CERTIFICATE OF INDEPENDENT BID DETERMINATION 132

SCHEDULE 22 : MBD 10 – CERTIFICATE FOR PAYMENT OF MUNICIPAL SERVICES 134

SCHEDULE 23 : COMPENSATION FOR OCCUPATIONAL INJURIES AND DISEASES ACT, 1993 (ACT 130 OF 1993) 135

SCHEDULE 24 : FORM OF INDEMNITY 136

SCHEDULE 25 : SCHEDULE OF PRE-QUALIFICATION CRITERIA SUB-CONTRACTORS 137

SCHEDULE 26 : SCHEDULE OF MECHANICAL AND ELECTRICAL DATA SHEETS 138

Part C1 : AGREEMENTS AND CONTRACT DATA 139

C1.1 FORM OF OFFER AND ACCEPTANCE 140

C1.2: CONTRACT DATA 142

C1.3 FORM OF GUARANTEE 156

C1.4 OCCUPATIONAL HEALTH AND SAFETY AGREEMENT 160

C1.5 PROTECTION OF THE ENVIRONMENT DECLARATION 162

C1.6 INSURANCE BROKER'S WARRANTY 163

C1.7 DECLARATION BY TENDERER 164

C1.8 CONTRACT OF TEMPORARY EMPLOYMENT AS COMMUNITY LIAISON OFFICER 165

PART C2 : Pricing Data 168

C2.1 PRICING INSTRUCTIONS 169

C2.2 : PRICING SCHEDULE DECLARATION 171

C2.3 BILL OF QUANTITIES 172

PART C3 : SCOPE OF WORK 256

C3.1 DESCRIPTION OF THE WORKS cclvii

C3.2 ENGINEERING cclx

3.2.1 DESIGN SERVICES AND ACTIVITY MATRIX cclx

3.2.2 EMPLOYER'S DESIGN cclx

3.2.3 DESIGN BRIEF cclx

3.2.4 DRAWINGS cclx

C3.3 PROCUREMENT cclxii

C3.4 CONSTRUCTION cclxv

PS G 5.7 Subsoil Drain Under Settling Tank Floor cclxxxvi

PS G 5.9 Joining New Concrete To Existing cclxxxvi

PS G 5.11 Mould For Parshall Flume cclxxxvii

PS.M1. SCOPE 343

PS.M2. CONTACT PERSON 343

PS.M3. GENERAL REQUIREMENTS 343

PS.M4. OPERATION AND CONTROL PHILOSOPHY 350

PS.M5. SLUICE GATES, CHANNEL GATES AND STOP LOGS 356

PS.M6. WEIR PLATES 358

PS.M7. MANUAL FRONT RAKE SCREENS 359

PS.M8. MECHANICAL FRONT RAKE SCREENS 360

PS.M9. PERFORATED PLATE SCREEN 366

PS.M10. WASHER COMPACTOR 372

PS.M11. GRIT REMOVAL EQUIPMENT 376

PS.M12. SPIRAL CONVEYOR 381
PS.M13. PARSHALL FLUME 383
PS.M14. SKIP DOLLY SYSTEM 383
PS.M15. SECONDARY SEDIMENTATION 385
PS.M16. BIOLOGICAL REACTOR MIXING EQUIPMENT 393
PS.M17. AXIAL PUMP EQUIPMENT 397
PS.M18. WASTE AND RAS PUMPSTATION 400
PS.M19. BIOLOGICAL REACTOR AERATION EQUIPMENT 404
PS.M20. SLUDGE DEWATERING SYSTEM 408
PS.M21. LIFTING EQUIPMENT 435
PS.M22. DIESEL TANKS 445
PS.M23. TESTING AND COMMISSIONING 446
PS.M24. TRAINING OF EMPLOYERS STAFF 453
PS.E4. ELECTRICITY SUPPLY Error! Bookmark not defined.
PS.E5. DRAWINGS Error! Bookmark not defined.
PS.E6. LV SWITCHBOARDS Error! Bookmark not defined.
C3.5 MANAGEMENT 491
C3.6 ANNEXES 495

SCHEDULE 26 : SCHEDULE OF MECHANICAL AND ELECTRICAL DATA SHEETS 134

ADMINISTRATIVE REQUIREMENTS IN TERMS OF THE SUPPLY CHAIN MANAGEMENT POLICY

RETURNABLE DOCUMENTS CHECKLIST

PLEASE ENSURE THAT THE FOLLOWING FORMS HAVE BEEN DULY COMPLETED AND SIGNED AND THAT ALL DOCUMENTS AS REQUESTED, ARE ATTACHED TO THE TENDER DOCUMENT:

Compulsory Enterprise Questionnaire - Is the form duly completed ?	**Yes**		**No**	
Certificate of Clarification Meeting Attendance - Is the form duly completed and signed by both tenderer and agent of the LANGEBERG Municipality?	**Yes**		**No**	
Authority to Sign a Bid - Is the form duly completed and is a **certified copy** of the **resolution** attached?	**Yes**		**No**	
Certificate of Authority for Joint Ventures - Is the form duly completed?	**Yes**		**No**	
Schedule of Work Experience - Is the form duly completed?	**Yes**		**No**	
Schedule of Construction Equipment - Is the form duly completed?	**Yes**		**No**	
Schedule of Subcontractors - Is the form duly completed?	**Yes**		**No**	
Details of Contract Manager and Site Agent Experience- Is the form duly completed?	**Yes**		**No**	
Preliminary Programme - Is the form duly completed?	**Yes**		**No**	
Bargaining Council Certificate and Minimum Wage Declaration - Is the form duly completed?	**Yes**		**No**	
Confirmation of Contractor Enterprise Registration - Is the form duly completed?	**Yes**		**No**	
Tenderer's Banking Details - Is the form duly completed?	**Yes**		**No**	
Proposed Amendments and Qualifications by The Tenderer - Is the form duly completed?	**Yes**		**No**	
Record of Addenda to Tender Document - Is the form duly completed?	**Yes**		**No**	
MBD 4 (Declaration of Interest) - Is the form duly completed and signed?	**Yes**		**No**	
MBD 5 - Is the form duly completed and signed?	**Yes**		**No**	
MBD 6.1 (Preference points claim form in terms of the preferential procurement regulations 2017 – purchases/services 90/10) - Is the form duly completed and signed? Is a **CERTIFIED** copy of the **B-BBEE Certificate** issued by a Verification Agency accredited by SANAS **or** the **original Sworn Affidavit** attached?	**Yes**		**No**	
MBD 6.2 (Local Content) - Is the forms duly completed and signed? Is a **CERTIFIED** copy of the **B-BBEE Certificate or** the **original B-BBEE Certificate** attached?	**Yes**		**No**	
MBD 8 (Declaration of Past Supply Chain Practices) - Is the form duly completed and signed?	**Yes**		**No**	
MBD 9 (Certificate of Independent Bid Determination) - Is the form duly completed and signed?	**Yes**		**No**	
MBD 10 (Certificate of Payment of Municipal Accounts) - Is the form duly completed and signed? Are the **Identity numbers**, **residential addresses** and **municipal account numbers** of **ALL** members, partners, directors, etc. provided on the form as requested?	**Yes**		**No**	
OHSA (Occupational Health and Safety) - Is the form duly completed and signed?	**Yes**		**No**	

SIGNATURE		NAME (PRINT)	
CAPACITY		DATE	
NAME OF FIRM			

Is a valid **Letter of Good Standing** from the Compensation Commissioner attached?				
Form of Indemnity - Is the form duly completed and signed?	**Yes**		**No**	
Pre-Qualification Criteria Sub-Contractors - Is the form duly completed and signed?	**Yes**		**No**	
Mechanical and Electrical Data Sheets - Is the form duly completed and signed?	**Yes**		**No**	
Part C2: Pricing data				
Pricing Schedule - Is the form duly completed and signed?	**Yes**		**No**	
Form of Offer- Is the form duly completed and signed?	**Yes**		**No**	
Declaration by Tenderer - Is the form duly completed and signed?	**Yes**		**No**	

SIGNATURE		NAME (PRINT)	
CAPACITY		DATE	
NAME OF FIRM			

SCHEDULE 1 : COMPULSORY ENTERPRISE QUESTIONNAIRE

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

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

Address of enterprise: . . . . . .

. . . . . .

. . . . . .

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

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

Section 4: Particulars of sole proprietors and partners in partnerships

Name*	Identity number*	Personal income tax number*

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

Section 5: Particulars of companies and close corporations

Company registration number . . . . . .

Close corporation number . . . . . .

Tax reference number . . . . . .

Section 6: Record of service of the state

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

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

Any of the above boxes are marked, disclose the following:

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

*insert separate page if necessary

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

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

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

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

*insert separate page if necessary

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

i) authorizes the Employer to obtain a tax clearance certificate from the South African Revenue Services that my / our tax matters are in order;

ii) confirms that the neither the name of the enterprise or the name of any partner, manager, director or other person, who wholly or partly exercises, or may exercise, control over the enterprise appears on the Register of Tender Defaulters established in terms of the Prevention and Combating of Corrupt Activities Act of 2004;

iii) confirms that no partner, member, director or other person, who wholly or partly exercises, or may exercise, control over the enterprise appears, has within the last five years been convicted of fraud or corruption;

iv) confirms that I / we are not associated, linked or involved with any other tendering entities submitting tender offers and have no other relationship with any of the tenderers or those responsible for compiling the scope of work that could cause or be interpreted as a conflict of interest;

iv) confirms that the contents of this questionnaire are within my personal knowledge and are to the best of my belief both true and correct.

SCHEDULE 2 : CLARIFICATION MEETING CERTIFICATE

I / We*, the undersigned, certify that I / we* have examined the Site for the Works and its surroundings for which I / we* am / are* submitting this Tender and have, as far as practicable possible, familiarized myself / ourselves* with all information, risks, contingencies and other circumstances which may influence or affect my / our* tender.

* Delete whichever is inapplicable

NAME & SURNAME			
CAPACITY			
NAME OF FIRM			
ADDRESS			
TELEPHONE NO		FAX NO:	
E-MAIL		SIGNATURE	

Attendance of the above person(s) at the Clarification Meeting is confirmed by:

EMPLOYER'S AGENT / REPRESENTATIVE: . (Name). . . . . .

SIGNED BY EMPLOYER'S AGENT / REPRESENTATIVE: . . . . . .

NB: Please note that no latecomers will be allowed.

For all compulsory briefing sessions/site meetings/clarification meetings, bids received from interested bidders that did not attend the meeting or arrived later than predetermined date and time, will be ***disqualified***

SCHEDULE 3 : AUTHORITY TO SIGN A BID

1. SOLE PROPRIETOR (SINGLE OWNER BUSINESS) AND NATURAL PERSON

1.1. I, _____, the undersigned, hereby confirm that I am the sole owner of the business trading as _____.

OR

1.2. I, _____, the undersigned, hereby confirm that I am submitting this tender in my capacity as natural person.

SIGNATURE:		DATE:	
PRINT NAME:			
WITNESS 1:		WITNESS 2:	

2. COMPANIES AND CLOSE CORPORATIONS

2.1. **If a Bidder is a COMPANY**, **a certified copy of the resolution by the board of directors**, duly signed, authorising the person who signs this bid to do so, as well as to sign any contract resulting from this bid and any other documents and correspondence in connection with this bid and/or contract on behalf of the company **must be submitted with this bid,** that is, before the closing time and date of the bid

2.2. In the case of a **CLOSE CORPORATION (CC**) submitting a bid**, a resolution by its members**, authorizing a member or other official of the corporation to sign the documents on their behalf, **shall be included with the bid.**

PARTICULARS OF RESOLUTION BY BOARD OF DIRECTORS OF THE COMPANY/MEMBERS OF THE CC

DATE RESOLUTION WAS TAKEN	
RESOLUTION SIGNED BY (NAME AND SURNAME)	
CAPACITY	
NAME AND SURNAME OF DELEGATED AUTHORISED SIGNATORY	
CAPACITY	
SPECIMEN SIGNATURE	

FULL NAME AND SURNAME OF ALL DIRECTOR(S) / MEMBER (S)			
1.		2.	
3.		4.	
5.		6.	
7.		8.	
9.		10.	

Is a CERTIFIED COPY of the resolution attached?	YES		NO	

SIGNED ON BEHALF OF COMPANY / CC:		DATE:	
PRINT NAME:			
WITNESS 1:		WITNESS 2:	

PARTNERSHIP

We, the undersigned partners in the business trading as _____

hereby authorize Mr/Ms _____ to sign this bid as well as any contract resulting from the bid and any other documents and correspondence in connection with this bid and /or contract for and on behalf of the abovementioned partnership.

The following particulars in respect of every partner must be furnished and signed by every partner:

FULL NAME OF PARTNER	SIGNATURE

SIGNED ON BEHALF OF PARTNERSHIP:		DATE:	
PRINT NAME:			
WITNESS 1:		WITNESS 2:	

3. CONSORTIUM

We, the undersigned consortium partners, hereby authorize_____

_____ (Name of entity) to act as lead consortium partner and further authorize Mr./Ms. _____ To sign this offer as well as any contract resulting from this tender and any other documents and correspondence in connection with this tender and / or contract for and on behalf of the consortium.

The following particulars in respect of each consortium member must be provided and signed by each member:

FULL NAME OF CONSORTIUM MEMBER	ROLE OF CONSORTIUM MEMBER	% PARTICIPATION	SIGNATURE

SIGNED ON BEHALF OF PARTNERSHIP:		DATE:	
PRINT NAME:			
WITNESS 1:		WITNESS 2:	

SCHEDULE 4 : CERTIFICATE OF AUTHORITY FOR JOINT VENTURES

This returnable schedule is to be completed by JOINT VENTURES

We, the undersigned, are submitting this tender offer in joint venture and hereby authorize Mr./Ms. _____ authorized signatory of the Company/Close Corporation/Partnership (name) _____, acting in the capacity of lead partner, to sign all documents in connection with the tender offer and any contract resulting from it on our behalf.

(i) Name of firm (Lead partner)			
Address			
		Tel. No.	
Signature		Designation	

(ii) Name of firm			
Address			
		Tel. No.	
Signature		Designation	

(iii)Name of firm			
Address:			
		Tel. No.	
Signature		Designation	

(iv) Name of firm			
Address			
		Tel. No.	
Signature		Designation	

NOTE: A copy of the Joint Venture Agreement showing clearly the percentage contribution of each partner to the Joint Venture, shall be appended to this Schedule.

SCHEDULE 5 : SCHEDULE OF WORK EXPERIENCE

The tenderer shall insert in the spaces provided below a list of similar completed mechanical engineering contracts awarded to him comprising of construction of a wastewater treatment plant of which the scope includes the provision of new equipment for the build, upgrade or expansion of a treatment facility and those currently being undertaken. This information is deemed to be material to the award of the Contract.

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

COMPLETED CONTRACTS						
EMPLOYER (Name, Tel, Fax, Email)		Contact Person (Name, Tel, Fax, Email)		PROJECT NAME & NATURE OF WORK	VALUE OF WORK (INCL. VAT)	DATE COMPLETED
Name		Name				
Tel		Tel				
Fax		Fax				
Email		Email				
Name		Name				
Tel		Tel				
Fax		Fax				
Email		Email				
Name		Name				
Tel		Tel				
Fax		Fax				
Email		Email				
Name		Name				
Tel		Tel				
Fax		Fax				
Email		Email				
Name		Name				
Tel		Tel				
Fax		Fax				
Email		Email				

Attach additional pages if mores space is required.

Number of sheets appended by the tenderer to this schedule (If nil, enter NIL)	

SIGNATURE		NAME (PRINT)	
CAPACITY		DATE	
NAME OF FIRM			

SCHEDULE 6 : SCHEDULE OF CONSTRUCTION EQUIPMENT

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

DETAILS OF MAJOR EQUIPMENT THAT IS OWNED BY AND IMMEDIATELY AVAILABLE FOR THIS CONTRACT.			
QUANTITY	**DESCRIPTION**	**SIZE**	**CAPACITY**

Attach additional pages if mores space is required.

DETAIL OF MAJOR EQUIPMENT THAT WILL BE HIRED, ORE ACQUIRED FOR THIS CONTRACT IF MY / OUR TENDER IS ACCEPTED.			
QUANTITY	**DESCRIPTION,**	**SIZE**	**CAPACITY**

Attach additional pages if mores space is required.

Number of sheets appended by the tenderer to this schedule *(If nil, enter **NIL**)*	

SIGNATURE		NAME (PRINT)	
CAPACITY		DATE	
NAME OF FIRM			

SCHEDULE 7 : SCHEDULE OF SUB-CONTRACTORS

I/we the tenderer, notify the Langeberg Municipality that it is our intention to employ the following Subcontractors for work in this contract.

SUBCONTRACTORS				
Category / Type	**Subcontractor Name; Address; Contact Person; Tel. No.**		**Items of work (pay items) to be undertaken by the Subcontractor**	**Estimated cost of Work (Rand)**
1.	Name of firm			
	Contact person			
	Tel No			
	Address			
2.	Name of firm			
	Contact person			
	Tel No			
	Address			
3.	Name of firm			
	Contact person			
	Tel No			
	Address			
4.	Name of firm			
	Contact person			
	Tel No			
	Address			
5.	Name of firm			
	Contact person			
	Tel No			
	Address			
Number of sheets appended by the tenderer to this schedule *(If nil, enter **NIL**)*				

Acceptance of this tender shall not be construed as approval of all or any of the listed subcontractors. Should any of the subcontractors not be approved subsequent to acceptance of the tender, this shall in no way invalidate this tender, and the tendered unit rates for the various items of work shall remain final and binding, even in the event of a subcontractor not listed above being approved by the Engineer.

SIGNATURE		NAME (PRINT)	

SCHEDULE 8 : DETAILS OF CONTRACTS MANAGER AND CONSTRUCTION MANAGERS EXPERIENCE

Tenderers shall set out in the Schedule hereunder details of the Contract Manager and Construction Managers experience in work of a similar nature to that for which their Tender is submitted.

Failure to complete this Schedule may result in the Tender not being considered.

CONTRACT MANAGER (Mechanical Works)	**NAME**: …… **QUALIFICATION:** ……			
CONTRACT & CLIENT	**NATURE OF WORK**	**POSITION HELD**	**VALUE OF WORK**	**YEAR COMPLETED**

CONSTRUCTION MANAGER (Mechanical Works)	**NAME**: …… **QUALIFICATION:** ……			
CONTRACT & CLIENT	**NATURE OF WORK**	**POSITION HELD**	**VALUE OF WORK**	**YEAR COMPLETED**

CONSTRUCTION MANAGER (Civil Works)	NAME: …… QUALIFICATION: ……			
CONTRACT & CLIENT	**NATURE OF WORK**	**POSITION HELD**	**VALUE OF WORK**	**YEAR COMPLETED**

Number of sheets, appended by the tenderer to this Schedule ..... (If nil, enter NIL).

SIGNED ON BEHALF OF THE TENDERER: ……

SCHEDULE 9 : PRELIMINARY PROGRAMME

The tenderer shall attach a preliminary programme, reflecting the proposed sequence and tempo of execution of the various activities comprising the work for the Contract, to this page.

This programme shall be in the form of a bar chart (Gantt chart) or similar acceptable time/activity form reflecting the proposed sequence and tempo of the various activities and the quantities that will be carried out every week under each of the elements, comprising the work for this contract. The programme shall also indicate the point where the tenderer intends to commence work operations and the direction in which the work will proceed. The working hours shall be indicated.

The tenderer shall also consider the additional requirements stated in the Project Specifications when drawing up the programme.

Details of the preliminary programme shall be appended to this Schedule.

Number of sheets, appended by the tenderer to this Schedule ..... (If nil, enter NIL).

SIGNED ON BEHALF OF TENDERER: . . . . . .

SCHEDULE 10 : BARGAINING COUNCIL CERTIFICATE AND MINIMUM WAGE DECLARATION

A. BARGAINING COUNCIL CERTIFICATE OF COMPLIANCE

Tenderers must be registered with a relevant Bargaining Council (if such be in place) and provide the applicable Certificate of Compliance in terms of the relevant Government Gazette.

Where applicable, a Certificate of Compliance issued by the relevant Bargaining Council shall be attached to this schedule.

Each party to a Consortium/Joint Venture shall attach separate certificates in the above regard.

B. DECLARATION IN RESPECT OF MINIMUM WAGE

The tenderer, by signing this schedule, declares that not less than the statutory minimum wage shall be paid to employees, as applicable.

Number of sheets, appended by the tenderer to this Schedule ..... (If nil, enter NIL).

SIGNED ON BEHALF OF TENDERER: . . . . . .

SCHEDULE 11 : CONFIRMATION OF CONTRACTOR ENTERPRISE REGISTRATION

A. THE TENDERER ARE ENCOURAGED TO REGISTER AND SUBMIT THE FOLLOWING NATIONAL TREASURY CENTRAL SUPPLIER DATABASE (CSD) DETAILS WITH THIS TENDER.

Refer to Tender Data clauses C.2.1 and C.2.23:

Prospective suppliers should self-register on the CSD website www.csd.gov.za. Service providers with active accounts on Western Cape Supplier Database (WCSD) will be migrated to the Central Supplier Database and will have to activate their accounts on the self-service portal.

REGISTRATION WILL BE COMPULSORY IN ORDER TO CONDUCT BUSINESS WITH LANGEBERG MUNICIPALITY.

The database will be used to verify the accreditation of a supplier before an award can be made. For more information call: 012 315 5509 or Email: csd@treasury.gov.za.

We hereby confirm that I/we are registered and verified on the Central Supplier Database.

The database registration has nothing to do with the responsiveness of the expected tender offers. The tenderer will not be excluded from the tender process based on non-registration but will be required to register prior to the final award of the tender.

Document:

Tenderers should provide their **CSD Supplier Number and Unique registration reference number** of **registered Contractor** as well as JV Partner. CSD Registration Number of Tenderers and JV Partners needs to be filled in below:

NB: in case where a bidder intends to form a Joint Venture, the CSD Registration number/s Must be filled in below i.e the lead partner and Joint Venture partner/s.

Tenderer/Leading JV Partner

Name of Company: ……

CSD Supplier Number:……

Unique Registration

Supplier Number: ……

JV Partner

Name of Company: ……

CSD Supplier Number: ……

Unique Registration

Supplier Number: ……

JV Partner

Name of Company: ……

CSD Supplier Number:……

Unique Registration

Supplier Number: ……

SCHEDULE 12 : CERTIFICATE OF REGISTRATION WITH CIDB

CIDB Conractor Registration Certificate

A Certificate of Contractors Registration issued by the Construction Industry Development Board (CIDB) shall be attached to this schedule.

Where a tenderer satisfies CIDB Contractor Grading designation requirements through joint venture formation, such tenderers must submit the Certificates of Contractor Registration in respect of each partner.

Number of sheets appended by the tenderer to this schedule (If nil, enter NIL)	

SIGNATURE		NAME (PRINT)	
CAPACITY		DATE	
NAME OF FIRM			

SCHEDULE 13 : TENDERER'S BANKING DETAILS

Notes to tenderer:

1. The tenderer shall attach to this form a letter from the bank at which he declares he conducts his account. The contents of the bank's letter must state the credit rating that it, in addition to the information required below, accords to the tenderer for the business envisaged by this tender. Failure to provide the required letter with the tender submission may render the tenderer's offer unresponsive in terms of tender condition C.3.8.
2. The tenderer's banking details as they appear below shall be completed.
3. In the event that the tenderer is a joint venture enterprise, details of all the members of the joint venture shall be similarly provided and attached to this form.

The tenderer shall provide the following:

Name of Account Holder:

Account Number:

Bank name:

Branch Number:

Bank and branch contact details

Number of sheets, appended by the tenderer to this Schedule ..... (If nil, enter NIL).

SIGNED ON BEHALF OF TENDERER: . . . . . .

SCHEDULE 14 : PROPOSED AMENDMENTS AND QUALIFICATIONS BY THE TENDERER

The Tenderer should record any deviations or qualifications he may wish to make to the tender documents in this Returnable Schedule. Alternatively, a tenderer may state such deviations and qualifications in a covering letter attached to his tender and reference such letter in this schedule.

The Tenderer's attention is drawn to clause C.3.8 of the Standard Conditions of Tender referenced in the Tender Data regarding the Employer's handling of material deviation and qualifications.

If no deviations or modifications are desired, the schedule hereunder is to be marked **NIL** and signed by the Tenderer.

No alternative Tender will be considered unless a Tender free of qualifications and strictly on the basis of the Tender Documents is also submitted.

PAGE	CLAUSE / ITEM	PROPOSAL / DESCRIPTION

Number of sheets, appended by the tenderer to this Schedule ..... (If nil, enter NIL).

SIGNED ON BEHALF OF TENDERER: ……

SCHEDULE 15 : RECORD OF ADDENDA TO TENDER DOCUMENT

We confirm that the following communications / Addenda / Notice(s) to Tenderers received from the Employer before the submission of this tender offer, amending the tender documents, have been taken into account in this tender offer:

ADDENDUM No	DATE	SUBJECT MATTER OF ADDENDUM / NOTICE

Documentary evidence of Addenda / Notices issued to Tenderers indicating proof of receipt shall accompany this Schedule.

Number of sheets, appended by the tenderer to this Schedule ..... (If nil, enter NIL).

SIGNED ON BEHALF OF TENDERER: . . . . . .

SCHEDULE 16 : MBD 4 – DECLARATION OF INTEREST

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

3.1.	**Full Name of bidder or his or her representative**	
3.2.	**Identity Number**	
3.3.	**Position occupied in the Company (director, shareholder [2] etc.)**	
3.4.	**Company Registration Number**	
3.5.	**Tax Reference Number**	
3.6.	**VAT Registration Number**	

3.7.	**Are you presently in the service of the state?**	**YES**		**NO**	
3.7.1.	If so, furnish particulars:				
3.8.	**Have you been in the service of the state for the past twelve months?**	**YES**		**NO**	
3.8.1.	If so, furnish particulars:				

[1] *MSCM Regulations: "in the service of the state" means to be –*

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

[2] *"Shareholder" means a person who owns shares in the company and is actively involved in the management of the company or business and exercises control over the company.*

3.9.	**Do you have any relationship (family, friend, other) with persons in the service of the state and who may be involved with the evaluation and or adjudication of this bid?**	**YES**		**NO**	
3.9.1.	If so, furnish particulars:				
3.10.	**Are you aware of any relationship (family, friend, other) between a bidder and any persons in the service of the state who may be involved with the evaluation and or adjudication of this bid?**	**YES**		**NO**	
3.10.1.	If so, furnish particulars:				
3.11.	**Are any of the company's directors, managers, principal shareholders or stakeholders in the service of the state?**	**YES**		**NO**	
3.11.1.	If so, furnish particulars:				
3.12.	**Is any spouse, child or parent of the company's directors, managers, principal shareholders or stakeholders in the service of the state?**	**YES**		**NO**	
3.12.1.	If so, furnish particulars:				
3.13.	**Do you or any of the directors, trustees, managers, principal shareholders, or stakeholders of this company have any interest in any other related companies or business whether or not they are bidding for this contract?**	**YES**		**NO**	
3.13.1.	If so, furnish particulars:				

3.14.	Please provide the following information on ALL directors/shareholders/trustees/members below:		
Full Name and Surname	**Identity Number**	**Personal Income Tax Number**	**Provide State[3] Employee Number**

NB:

a) **PLEASE ATTACH CERTIFIED COPY(IES) OF ID DOCUMENT(S)**

b) **PLEASE PROVIDE PERSONAL INCOME TAX NUMBERS FOR ALL DIRECTORS / SHAREHOLDERS / TRUSTEES / MEMBERS, ETC.**

4. DECLARATION

I, the undersigned (name) _____, certify that the information furnished in paragraph 3 above is correct.

I accept that the state may act against me should this declaration prove to be false.

SIGNATURE		DATE	
NAME OF SIGNATORY			
POSITION			
NAME OF COMPANY			

[3] *MSCM Regulations: "in the service of the state" means to be –*

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

SCHEDULE 17 : MBD5 – DECLARATION FOR PROCUREMENT ABOVE R10 MILLION (VAT INCLUDED)

For all procurement expected to exceed R10 million (VAT included), bidders must complete the following questionnaire:

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

CERTIFICATION

I, the undersigned (name) _____, certify that the information furnished on this declaration form is correct.

I accept that the state may act against me should this declaration prove to be false.

SIGNATURE		DATE	
NAME (PRINT)			
CAPACITY			
NAME OF FIRM			

SCHEDULE 18 : MBD6.1 – PREFERENCE POINTS CLAIM FORM IN TERMS OF THE PREFERENTIAL PROCUREMENT REGULATIONS 2017 – PURCHASES/SERVICES 90/10

NB:
Before completing this form, bidders must study the general conditions, definitions and directives applicable in respect of B-BBEE, as prescribed in the Preferential Procurement Regulations, 2017.

1. GENERAL CONDITIONS

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

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

a) The value of this bid is estimated to exceed R50 million (all applicable taxes included) and therefore the **90/10** preference point system shall be applicable; or

1.2 Points for this bid shall be awarded for:

(a) Price; and

(b) B-BBEE Status Level of Contributor.

1.3 The maximum points for this bid are allocated as follows:

	POINTS
1.1.1. Price	90
1.1.2. B-BBEE status level of contribution	10
Total points for Price and B-BBEE must not exceed	**100**

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

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

2. DEFINITIONS

2.1 **"B-BBEE"** means broad-based black economic empowerment as defined in section 1 of the Broad-Based Black Economic Empowerment Act;

2.2 "**B-BBEE status level of contributor"** means the B-BBEE status of an entity in terms of a code of good practice on black economic empowerment, issued in terms of section 9(1) of the Broad-Based Black Economic Empowerment Act;

2.3 **"bid"** means a written offer in a prescribed or stipulated form in response to an invitation by an organ of state for the provision of goods or services, through price quotations, advertised competitive bidding processes or proposals;

2.4 **"Broad-Based Black Economic Empowerment Act"** means the Broad-Based Black Economic Empowerment Act, 2003 (Act No. 53 of 2003); as amended by Act No. 46 of 2013; (this was added by us)

2.5 **"EME"** means an Exempted Micro Enterprise in terms of a code of good practice on black economic empowerment issued in terms of section 9 (1) of the Broad-Based Black Economic Empowerment Act;

2.6 **"functionality"** means the ability of a tenderer to provide goods or services in accordance with specifications as set out in the tender documents.

2.7 **"prices"** includes all applicable taxes less all unconditional discounts;

2.8 **"proof of B-BBEE status level of contributor"** means:

2.8.1 B-BBEE Status level certificate issued by an authorized body or person;

2.8.2 A sworn affidavit as prescribed by the B-BBEE Codes of Good Practice;

2.8.3 Any other requirement prescribed in terms of the B-BBEE Act;

2.9 **"QSE"** means a qualifying small business enterprise in terms of a code of good practice on black economic empowerment issued in terms of section 9 (1) of the Broad-Based Black Economic Empowerment Act;

2.10 **"rand value"** means the total estimated value of a contract in Rand, calculated at the time of bid invitation, and includes all applicable taxes;

3. POINTS AWARDED FOR PRICE

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

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

80/20 **or** **90/10**

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

Where:

Ps = Points scored for price of bid under consideration

Pt = Price of bid under consideration

Pmin = Price of lowest acceptable bid

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

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

B-BBEE Status Level of Contributor	Number of points (90/10 system)	Number of points (80/20 system)
1	10	20
2	9	18
3	6	14
4	5	12
5	4	8
6	3	6
7	2	4
8	1	2
Non-compliant contributor	0	0

5. BID DECLARATION

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

6. **B -BBEE STATUS LEVEL OF CONTRIBUTION CLAIMED IN TERMS OF PARAGRAPHS 1.4 AND 4.1**

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

(Points claimed in respect of paragraph 7.1 must be in accordance with the table reflected in paragraph 4.1 and must be substantiated by means of a B-BBEE certificate issued by a Verification Agency accredited by SANAS or a sworn affidavit.

7. SUB-CONTRACTING

7.1	Will any portion of the contract be sub-contracted? *(Tick applicable box)*	**YES**		**NO**	
7.1.1	If yes, indicate:				
7.1.1.1	what percentage of the contract will be subcontracted?				**%**
7.1.1.2	the name of the sub-contractor?				
7.1.1.3	the B-BBEE status level of the sub-contractor?				
7.1.1.4	whether the sub-contractor is an EME or QSE? *(Tick applicable box)*	**YES**		**NO**	

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

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

8. DECLARATION WITH REGARD TO COMPANY/FIRM

8.1	**Name of Company/firm:**		
8.2	**VAT registration number**		
8.3	**Company registration number**		
8.4	**Type of Company/Firm:** ***(Tick applicable box)***	Partnership / Joint Venture / Consortium	
		One person business / sole proprietor	
		Close Corporation	
		Company	
		(Pty) Limited	
8.5	**Describe Principal Business Activities**		
8.6	**Company Classification (Tick applicable box)**	Manufacturer	
		Supplier	
		Professional service provider	
		Other service providers, e.g. transporter, etc.	
8.7	**Municipal Information**		
Municipality where business is situated:			
Registered Account Number:			
Stand Number:			
8.8	**Total Number of years the Company/Firm has been in business:**		

9. I / we, the undersigned, who is / are duly authorised to do so on behalf of the company/firm, certify that the points claimed, based on the B-BBE status level of contribution indicated in paragraph 1.4 and 6.1 of the foregoing certificate, qualifies the company/ firm for the preference(s) shown and I / we acknowledge that:

9.1 The information furnished is true and correct;

9.2 The preference points claimed are in accordance with the General Conditions as indicated in paragraph 1 of this form.

9.3 In the event of a contract being awarded as a result of points claimed as shown in paragraph 1.4 and 6.1, the contractor may be required to furnish documentary proof to the satisfaction of the purchaser that the claims are correct;

9.4 If the B-BBEE status level of contribution has been claimed or obtained on a fraudulent basis or any of the conditions of contract have not been fulfilled, the purchaser may, in addition to any other remedy it may have –

9.4.1 disqualify the person from the bidding process;

9.4.2 recover costs, losses or damages it has incurred or suffered as a result of that person's conduct;

9.4.3 cancel the contract and claim any damages which it has suffered as a result of having to make less favourable arrangements due to such cancellation;

9.4.4 restrict the bidder or contractor, its shareholders and directors, or only the shareholders and directors who acted on a fraudulent basis, from obtaining business from any organ of state for a period not exceeding 10 years, after the *audi alteram partem* (hear the other side) rule has been applied; and

9.4.5 forward the matter for criminal prosecution

SIGNATURE OF BIDDER(S):			
WITNESS 1:		WITNESS 2:	
DATE:			
ADDRESS:			

SCHEDULE 19A : MBD 6.2 – DECLARATION CERTIFICATE FOR LOCAL PRODUCTION AND CONTENT FOR DESIGNATED SECTORS

DECLARATION CERTIFICATE FOR LOCAL PRODUCTION AND CONTENT FOR DESIGNATED SECTORS

This Municipal Bidding Document (MBD) must form part of all bids invited. It contains general information and serves as a declaration form for local content (local production and local content are used interchangeably).

Before completing this declaration, bidders must study the General Conditions, Definitions, Directives applicable in respect of Local Content as prescribed in the Preferential Procurement Regulations, 2017, the South African Bureau of Standards (SABS) approved technical specification number SATS 1286:2011 (Edition 1) and the Guidance on the Calculation of Local Content together with the Local Content Declaration Templates [Annex C (Local Content Declaration: Summary Schedule), D (Imported Content Declaration: Supporting Schedule to Annex C) and E (Local Content Declaration: Supporting Schedule to Annex C)].

General Conditions

Preferential Procurement Regulations, 2017 (Regulation 8) make provision for the promotion of local production and content.

Regulation 8.(2) prescribes that in the case of designated sectors, organs of state must advertise such tenders with the specific bidding condition that only locally produced or manufactured goods, with a stipulated minimum threshold for local production and content will be considered.

Where necessary, for tenders referred to in paragraph 1.2 above, a two stage bidding process may be followed, where the first stage involves a minimum threshold for local production and content and the second stage price and B-BBEE.

A person awarded a contract in relation to a designated sector, may not sub-contract in such a manner that the local production and content of the overall value of the contract is reduced to below the stipulated minimum threshold.

The local content (LC) expressed as a percentage of the bid price must be calculated in accordance with the SABS approved technical specification number SATS 1286: 2011 as follows:

$$LC = [1 - x / y] * 100$$

Where

x is the imported content in Rand

y is the bid price in Rand excluding value added tax (VAT)

Prices referred to in the determination of x must be converted to Rand (ZAR) by using the exchange rate published by South African Reserve Bank (SARB) at 12:00 on the date of advertisement of the bid as indicated in paragraph 4.1 below.

The SABS approved technical specification number SATS 1286:2011 is accessible on http:/www.thedti.gov.za/industrial development/ip.jsp at no cost.

A bid may be disqualified if this Declaration Certificate and the Annex C (Local Content Declaration: Summary Schedule) are not submitted as part of the bid documentation;

The stipulated minimum threshold(s) for local production and content (refer to Annex A of SATS 1286:2011) for this bid is/are as follows:

#	Description of services, works or goods	Stipulated minimum threshold as a %
	Valves products and actuators	70%

Please submit also letters of exemption from dti if local content is not 100%.
Please ensure that you put all the items on Annexure A on which you make an offer.

3. Does any portion of the goods or services offered have any imported content?
(Tick applicable box)

YES		NO	

3.1 If yes, the rate(s) of exchange to be used in this bid to calculate the local content as prescribed in paragraph 1.5 of the general conditions must be the rate(s) published by SARB for the specific currency at 12:00 on the date of advertisement of the bid.

The relevant rates of exchange information is accessible on www.reservebank.co.za

Indicate the rate(s) of exchange against the appropriate currency in the table below (refer to Annex A of SATS 1286:2011):

Currency	Rates of exchange
US Dollar	
Pound Sterling	
Euro	
Yen	
Other	

NB: Bidders must submit proof of the SARB rate (s) of exchange used.

4. Where, after the award of a bid, challenges are experienced in meeting the stipulated minimum threshold for local content the dti must be informed accordingly in order for the dti to verify and in consultation with the AO/AA provide directives in this regard.

SIGNATURE OF BIDDER(S):			
WITNESS 1:		WITNESS 2:	
DATE:			
ADDRESS:			

LOCAL CONTENT DECLARATION
(REFER TO ANNEX B OF SATS 1286:2011)

LOCAL CONTENT DECLARATION BY CHIEF FINANCIAL OFFICER OR OTHER LEGALLY RESPONSIBLE PERSON NOMINATED IN WRITING BY THE CHIEF EXECUTIVE OR SENIOR MEMBER/PERSON WITH MANAGEMENT RESPONSIBILITY (CLOSE CORPORATION, PARTNERSHIP OR INDIVIDUAL)

IN RESPECT OF TENDER NO. : ....., ISSUED BY STELLENBOSCH MUNICIPALITY.
NB

The obligation to complete, duly sign and submit this declaration cannot be transferred to an external authorized representative, auditor or any other third party acting on behalf of the bidder.
Guidance on the Calculation of Local Content together with Local Content Declaration Templates (Annex C, D and E) is accessible on http://www.thdti.gov.za/industrial development/ip.jsp. Bidders should first complete Declaration D. After completing Declaration D, bidders should complete Declaration E and then consolidate the information on Declaration C. Declaration C should be submitted with the bid documentation at the closing date and time of the bid in order to substantiate the declaration made in paragraph (c) below. Declarations D and E should be kept by the bidders for verification purposes for a period of at least 5 years. The successful bidder is required to continuously update Declarations C, D and E with the actual values for the duration of the contract.

I, the undersigned, ……..... (full names),
do hereby declare, in my capacity as …… ……..
of .....(name of bidder entity), the following:

The facts contained herein are within my own personal knowledge.

I have satisfied myself that:
the goods/services/works to be delivered in terms of the above-specified bid comply with the minimum local content requirements as specified in the bid, and as measured in terms of SATS 1286:2011; and
The local content percentage (%) indicated below has been calculated using the formula given in clause 3 of SATS 1286:2011, the rates of exchange indicated in paragraph 4.1 above and the information contained in Declaration D and E which has been consolidated in Declaration C:

Bid price, excluding VAT (y)	R
Imported content (x), as calculated in terms of SATS 1286:2011	R
Stipulated minimum threshold for local content (paragraph 3 above)	
Local content %, as calculated in terms of SATS 1286:2011	

If the bid is for more than one product, the local content percentages for each product contained in Declaration C shall be used instead of the table above.
The local content percentages for each product has been calculated using the formula given in clause 3 of SATS 1286:2011, the rates of exchange indicated in paragraph 4.1 above and the information contained in Declaration D and E.

I accept that the Procurement Authority / Institution has the right to request that the local content be verified in terms of the requirements of SATS 1286:2011.
I understand that the awarding of the bid is dependent on the accuracy of the information furnished in this application. I also understand that the submission of incorrect data, or data that are not verifiable as described in SATS 1286:2011, may result in the Procurement Authority / Institution

imposing any or all of the remedies as provided for in Regulation 14 of the Preferential Procurement Regulations, 2017 promulgated under the Preferential Policy Framework Act (PPPFA), 2000 (Act No. 5 of 2000).

	SIGNATURE	DATE
TENDERER:		
WITNESS No. 1:		
WITNESS No. 2:		

Local Content Declaration – Summary Schedule

(C1) Tender No.	T41/2022			
(C2) Tender Description	REFURBISHMENT AND UPGRADE OF ROBERTSON WASTEWATER TREATMENT WORKS			
(C3) Designated product(s)	Valves products and actuators			
(C4) Tender Authority				
(C5) Name of Tendering Entity				
(C6) Tender Exchange Rate	Currency		Rate	
(C7) Specified local content %	70%			

NOTE: VAT to be excluded from all calculations

		Calculation of local content						Tender summary			
Tender Item No's	List of Items	Tender Price – each	Exempted imported value	Tender value net of exempted imported content	Imported value	Local value	Local content % (per item)	Tender Quantity	Total tender value	Total exempted imported content	Total imported content
(C8)	(C9)	(C10)	(C11)	(C12)	(C13)	(C14)	(C15)	(C16)	(C17)	(C18)	(C19)
C10.3.67	Supply, lay, joint, bed and test 200mm dia. PN 16 AVK anti-clockwise closing resilient seal gate valves with flanged ends, or equal approved							2			
C10.3.68	Supply, lay, joint, bed and test 250mm dia. PN 16 AVK anti-clockwise closing resilient seal gate valves with flanged ends, or equal approved							3			
C10.3.69	Supply, lay, joint, bed and test 355mm dia. PN 16 AVK anti-clockwise closing resilient seal gate valves with flanged							2			

	ends, or equal approved										
C10.3.70	Supply, lay, joint, bed and test 450mm dia. PN 16 AVK anti-clockwise closing resilient seal gate valves with flanged ends, or equal approved							3			
M1.17	Inlet works - Channel mounted (800x 1000)							2			
M1.18	Inlet works - Channel mounted (800x 1100)							2			
M1.19	Inlet works - Channel mounted (800x 1200)							2			
M1.20	Inlet works - Channel mounted (800x 1355)							2			
M1.21	Inlet Division Box-Walll mounted (750x 2200)							3			
M7.2	SST's Division Box-Walll mounted (600x 900) (Upward Closing)							3			
M7.3	Chlorine Contact Channel - Walll mounted (800x 1000)							1			
M7.4	Mixed Liquor Recycle Pumps chamber - Wall mounted (800x 1000)							2			

(C20) Total tender value	
(C21) Total Exempt imported content	
(C22) Total Tender value net of exempt imported content	
(C23) Total Imported content	
(C24) Total local content	
(C25) Average local content % of tender	

SIGNATURE OF TENDERER AS PER LOCAL CONTENT DECLARATION

DATE

Attach additional pages if mores space is required

SCHEDULE 19B : MBD 6.2 – DECLARATION CERTIFICATE FOR LOCAL PRODUCTION AND CONTENT FOR DESIGNATED SECTORS

DECLARATION CERTIFICATE FOR LOCAL PRODUCTION AND CONTENT FOR DESIGNATED SECTORS

This Municipal Bidding Document (MBD) must form part of all bids invited. It contains general information and serves as a declaration form for local content (local production and local content are used interchangeably).

Before completing this declaration, bidders must study the General Conditions, Definitions, Directives applicable in respect of Local Content as prescribed in the Preferential Procurement Regulations, 2017, the South African Bureau of Standards (SABS) approved technical specification number SATS 1286:2011 (Edition 1) and the Guidance on the Calculation of Local Content together with the Local Content Declaration Templates [Annex C (Local Content Declaration: Summary Schedule), D (Imported Content Declaration: Supporting Schedule to Annex C) and E (Local Content Declaration: Supporting Schedule to Annex C)].

General Conditions

Preferential Procurement Regulations, 2017 (Regulation 8) make provision for the promotion of local production and content.

Regulation 8.(2) prescribes that in the case of designated sectors, organs of state must advertise such tenders with the specific bidding condition that only locally produced or manufactured goods, with a stipulated minimum threshold for local production and content will be considered.

Where necessary, for tenders referred to in paragraph 1.2 above, a two stage bidding process may be followed, where the first stage involves a minimum threshold for local production and content and the second stage price and B-BBEE.

A person awarded a contract in relation to a designated sector, may not sub-contract in such a manner that the local production and content of the overall value of the contract is reduced to below the stipulated minimum threshold.

The local content (LC) expressed as a percentage of the bid price must be calculated in accordance with the SABS approved technical specification number SATS 1286: 2011 as follows:

$$LC = [1 - x / y] * 100$$

Where

x is the imported content in Rand

y is the bid price in Rand excluding value added tax (VAT)

Prices referred to in the determination of x must be converted to Rand (ZAR) by using the exchange rate published by South African Reserve Bank (SARB) at 12:00 on the date of advertisement of the bid as indicated in paragraph 4.1 below.

The SABS approved technical specification number SATS 1286:2011 is accessible on http:/www.thedti.gov.za/industrial development/ip.jsp at no cost.

A bid may be disqualified if this Declaration Certificate and the Annex C (Local Content Declaration: Summary Schedule) are not submitted as part of the bid documentation;

The stipulated minimum threshold(s) for local production and content (refer to Annex A of SATS 1286:2011) for this bid is/are as follows:

#	Description of services, works or goods	Stipulated minimum threshold as a %

	Electrical & Telecom Cables	90%

Please submit also letters of exemption from dti if local content is not 100%.
Please ensure that you put all the items on Annexure A on which you make an offer.

3. Does any portion of the goods or services offered have any imported content?
(Tick applicable box)

YES		NO	

3.1 If yes, the rate(s) of exchange to be used in this bid to calculate the local content as prescribed in paragraph 1.5 of the general conditions must be the rate(s) published by SARB for the specific currency at 12:00 on the date of advertisement of the bid.

The relevant rates of exchange information is accessible on www.reservebank.co.za

Indicate the rate(s) of exchange against the appropriate currency in the table below (refer to Annex A of SATS 1286:2011):

Currency	Rates of exchange
US Dollar	
Pound Sterling	
Euro	
Yen	
Other	

NB: Bidders must submit proof of the SARB rate (s) of exchange used.

4. Where, after the award of a bid, challenges are experienced in meeting the stipulated minimum threshold for local content the dti must be informed accordingly in order for the dti to verify and in consultation with the AO/AA provide directives in this regard.

SIGNATURE OF BIDDER(S):			
WITNESS 1:		WITNESS 2:	
DATE:			
ADDRESS:			

LOCAL CONTENT DECLARATION
(REFER TO ANNEX B OF SATS 1286:2011)

LOCAL CONTENT DECLARATION BY CHIEF FINANCIAL OFFICER OR OTHER LEGALLY RESPONSIBLE PERSON NOMINATED IN WRITING BY THE CHIEF EXECUTIVE OR SENIOR MEMBER/PERSON WITH MANAGEMENT RESPONSIBILITY (CLOSE CORPORATION, PARTNERSHIP OR INDIVIDUAL)

IN RESPECT OF TENDER NO. : ....., ISSUED BY STELLENBOSCH MUNICIPALITY.
NB

The obligation to complete, duly sign and submit this declaration cannot be transferred to an external authorized representative, auditor or any other third party acting on behalf of the bidder.
Guidance on the Calculation of Local Content together with Local Content Declaration Templates (Annex C, D and E) is accessible on http://www.thdti.gov.za/industrial development/ip.jsp. Bidders should first complete Declaration D. After completing Declaration D, bidders should complete Declaration E and then consolidate the information on Declaration C. Declaration C should be submitted with the bid documentation at the closing date and time of the bid in order to substantiate the declaration made in paragraph (c) below. Declarations D and E should be kept by the bidders for verification purposes for a period of at least 5 years. The successful bidder is required to continuously update Declarations C, D and E with the actual values for the duration of the contract.

I, the undersigned, ……..... (full names),
do hereby declare, in my capacity as …… ……..
of .....(name of bidder entity), the following:

The facts contained herein are within my own personal knowledge.

I have satisfied myself that:
the goods/services/works to be delivered in terms of the above-specified bid comply with the minimum local content requirements as specified in the bid, and as measured in terms of SATS 1286:2011; and
The local content percentage (%) indicated below has been calculated using the formula given in clause 3 of SATS 1286:2011, the rates of exchange indicated in paragraph 4.1 above and the information contained in Declaration D and E which has been consolidated in Declaration C:

Bid price, excluding VAT (y)	R
Imported content (x), as calculated in terms of SATS 1286:2011	R
Stipulated minimum threshold for local content (paragraph 3 above)	
Local content %, as calculated in terms of SATS 1286:2011	

If the bid is for more than one product, the local content percentages for each product contained in Declaration C shall be used instead of the table above.
The local content percentages for each product has been calculated using the formula given in clause 3 of SATS 1286:2011, the rates of exchange indicated in paragraph 4.1 above and the information contained in Declaration D and E.

I accept that the Procurement Authority / Institution has the right to request that the local content be verified in terms of the requirements of SATS 1286:2011.
I understand that the awarding of the bid is dependent on the accuracy of the information furnished in this application. I also understand that the submission of incorrect data, or data that are not verifiable as described in SATS 1286:2011, may result in the Procurement Authority / Institution imposing any or all of the remedies as provided for in Regulation 14 of the Preferential Procurement Regulations, 2017 promulgated under the Preferential Policy Framework Act (PPPFA), 2000 (Act

No. 5 of 2000).

	SIGNATURE	DATE
TENDERER:		
WITNESS No. 1:		
WITNESS No. 2:		

Local Content Declaration – Summary Schedule

(C1) Tender No.	T41/2022			
(C2) Tender Description	REFURBISHMENT AND UPGRADE OF ROBERTSON WASTEWATER TREATMENT WORKS			
(C3) Designated product(s)	Electrical & Telecom Cables			
(C4) Tender Authority				
(C5) Name of Tendering Entity				
(C6) Tender Exchange Rate	Currency		Rate	
(C7) Specified local content %	90%			

NOTE: VAT to be excluded from all calculations

		Calculation of local content					
Tender Item No's	List of Items	Tender Price – each	Exempted imported value	Tender value net of exempted imported content	Imported value	Local value	Local content % (per item)
(C8)	(C9)	(C10)	(C11)	(C12)	(C13)	(C14)	(C15)
E2.1.1	150 mm² x 4 Core PVC/SWA Supply and Deliver to site						
E2.1.5	120 mm² x 4 Core PVC/SWA Supply and Deliver to site						
E2.1.9	95 mm² x 4 Core PVC/SWA Supply and Deliver to site						
E2.1.13	70 mm² x 4 Core PVC/SWA Supply and Deliver to site						
E2.1.17	50 mm² x 4 Core PVC/SWA Supply and Deliver to site						
E2.1.21	35 mm² x 4 Core PVC/SWA Supply and Deliver to site						
E2.1.25	25 mm² x 4 Core PVC/SWA Supply						

Tender summary			
Tender Quantity	Total tender value	Total exempted imported content	Total imported content
(C16)	(C17)	(C18)	(C19)
240			
650			
100			
700			
260			
1			
115			

	and Deliver to site										
E2.1.29	16 mm² x 4 Core PVC/SWA Supply and Deliver to site							630			
E2.1.33	10 mm² x 4 Core PVC/SWA Supply and Deliver to site							60			
E2.1.37	6 mm² x 4 Core PVC/SWA Supply and Deliver to site							600			
E2.1.41	4 mm² x 4 Core PVC/SWA Supply and Deliver to site							305			
E2.1.45	2.5 mm² x 4 Core PVC/SWA Supply and Deliver to site							685			
E2.1.49	1.5 mm² x 4 Core PVC/SWA Supply and Deliver to site							1885			
E2.1.53	1.5 mm² x 3 Core PVC/SWA Supply and Deliver to site							1685			
E2.1.57	Signal cable: 1.5 mm² x 7 core Multicore PVC/SWA: Supply and Deliver to site							1160			
E2.1.61	Signal cable: 1.5 mm² x 11 core Multicore PVC/SWA: Supply and Deliver to site							195			
E2.1.65	DEKABON 0.5 mm² x 2 Pair twisted pair Shielded: Supply and Deliver to site							620			
E2.1.69	DEKABON 0.5 mm² x 4 Pair twisted pair Shielded: Supply and Deliver to site							60			
E2.1.73	Fibre-Optic cable: 12 core F-O Armoured PVC/SWA: Supply							380			

	and Deliver to site										
E2.1.1.1	Crow's foor Earth electrode, 4 x 1.2 m Earth spikes, connected with 2.0 m lenghts of 70 mm² BCE, all joints CADWELDed							3			
E2.1.1.2	Bare Copper earth conductor: 70 mm² x 4 Core PVC/SWA Supply and Deliver to site							990			

(C20) Total tender value	
(C21) Total Exempt imported content	
(C22) Total Tender value net of exempt imported content	
(C23) Total Imported content	
(C24) Total local content	
(C25) Average local content % of tender	

SIGNATURE OF TENDERER AS PER LOCAL CONTENT DECLARATION

DATE

Attach additional pages if mores space is required

SCHEDULE 19C : MBD 6.2 – DECLARATION CERTIFICATE FOR LOCAL PRODUCTION AND CONTENT FOR DESIGNATED SECTORS

DECLARATION CERTIFICATE FOR LOCAL PRODUCTION AND CONTENT FOR DESIGNATED SECTORS

This Municipal Bidding Document (MBD) must form part of all bids invited. It contains general information and serves as a declaration form for local content (local production and local content are used interchangeably).

Before completing this declaration, bidders must study the General Conditions, Definitions, Directives applicable in respect of Local Content as prescribed in the Preferential Procurement Regulations, 2017, the South African Bureau of Standards (SABS) approved technical specification number SATS 1286:2011 (Edition 1) and the Guidance on the Calculation of Local Content together with the Local Content Declaration Templates [Annex C (Local Content Declaration: Summary Schedule), D (Imported Content Declaration: Supporting Schedule to Annex C) and E (Local Content Declaration: Supporting Schedule to Annex C)].

General Conditions

Preferential Procurement Regulations, 2017 (Regulation 8) make provision for the promotion of local production and content.

Regulation 8.(2) prescribes that in the case of designated sectors, organs of state must advertise such tenders with the specific bidding condition that only locally produced or manufactured goods, with a stipulated minimum threshold for local production and content will be considered.

Where necessary, for tenders referred to in paragraph 1.2 above, a two stage bidding process may be followed, where the first stage involves a minimum threshold for local production and content and the second stage price and B-BBEE.

A person awarded a contract in relation to a designated sector, may not sub-contract in such a manner that the local production and content of the overall value of the contract is reduced to below the stipulated minimum threshold.

The local content (LC) expressed as a percentage of the bid price must be calculated in accordance with the SABS approved technical specification number SATS 1286: 2011 as follows:

$$LC = [1 - x / y] * 100$$

Where

x is the imported content in Rand

y is the bid price in Rand excluding value added tax (VAT)

Prices referred to in the determination of x must be converted to Rand (ZAR) by using the exchange rate published by South African Reserve Bank (SARB) at 12:00 on the date of advertisement of the bid as indicated in paragraph 4.1 below.

The SABS approved technical specification number SATS 1286:2011 is accessible on http:/www.thedti.gov.za/industrial development/ip.jsp at no cost.

A bid may be disqualified if this Declaration Certificate and the Annex C (Local Content Declaration: Summary Schedule) are not submitted as part of the bid documentation;

The stipulated minimum threshold(s) for local production and content (refer to Annex A of SATS 1286:2011) for this bid is/are as follows:

#	Description of services, works or goods	Stipulated minimum threshold as a %
	Conveyance Pipes	80% - 100%

Please submit also letters of exemption from dti if local content is not 100%.
Please ensure that you put all the items on Annexure A on which you make an offer.

3. Does any portion of the goods or services offered have any imported content?
(Tick applicable box)

YES		NO	

3.1 If yes, the rate(s) of exchange to be used in this bid to calculate the local content as prescribed in paragraph 1.5 of the general conditions must be the rate(s) published by SARB for the specific currency at 12:00 on the date of advertisement of the bid.

The relevant rates of exchange information is accessible on www.reservebank.co.za

Indicate the rate(s) of exchange against the appropriate currency in the table below (refer to Annex A of SATS 1286:2011):

Currency	Rates of exchange
US Dollar	
Pound Sterling	
Euro	
Yen	
Other	

NB: Bidders must submit proof of the SARB rate (s) of exchange used.

4. Where, after the award of a bid, challenges are experienced in meeting the stipulated minimum threshold for local content the dti must be informed accordingly in order for the dti to verify and in consultation with the AO/AA provide directives in this regard.

SIGNATURE OF BIDDER(S):			
WITNESS 1:		WITNESS 2:	
DATE:			
ADDRESS:			

LOCAL CONTENT DECLARATION
(REFER TO ANNEX B OF SATS 1286:2011)

LOCAL CONTENT DECLARATION BY CHIEF FINANCIAL OFFICER OR OTHER LEGALLY RESPONSIBLE PERSON NOMINATED IN WRITING BY THE CHIEF EXECUTIVE OR SENIOR MEMBER/PERSON WITH MANAGEMENT RESPONSIBILITY (CLOSE CORPORATION, PARTNERSHIP OR INDIVIDUAL)

IN RESPECT OF TENDER NO. : ....., ISSUED BY STELLENBOSCH MUNICIPALITY.
NB

The obligation to complete, duly sign and submit this declaration cannot be transferred to an external authorized representative, auditor or any other third party acting on behalf of the bidder.
Guidance on the Calculation of Local Content together with Local Content Declaration Templates (Annex C, D and E) is accessible on http://www.thdti.gov.za/industrial development/ip.jsp. Bidders should first complete Declaration D. After completing Declaration D, bidders should complete Declaration E and then consolidate the information on Declaration C. Declaration C should be submitted with the bid documentation at the closing date and time of the bid in order to substantiate the declaration made in paragraph (c) below. Declarations D and E should be kept by the bidders for verification purposes for a period of at least 5 years. The successful bidder is required to continuously update Declarations C, D and E with the actual values for the duration of the contract.

I, the undersigned, ……..... (full names),
do hereby declare, in my capacity as …… ……..
of .....(name of bidder entity), the following:

The facts contained herein are within my own personal knowledge.

I have satisfied myself that:
the goods/services/works to be delivered in terms of the above-specified bid comply with the minimum local content requirements as specified in the bid, and as measured in terms of SATS 1286:2011; and
The local content percentage (%) indicated below has been calculated using the formula given in clause 3 of SATS 1286:2011, the rates of exchange indicated in paragraph 4.1 above and the information contained in Declaration D and E which has been consolidated in Declaration C:

Bid price, excluding VAT (y)	R
Imported content (x), as calculated in terms of SATS 1286:2011	R
Stipulated minimum threshold for local content (paragraph 3 above)	
Local content %, as calculated in terms of SATS 1286:2011	

If the bid is for more than one product, the local content percentages for each product contained in Declaration C shall be used instead of the table above.
The local content percentages for each product has been calculated using the formula given in clause 3 of SATS 1286:2011, the rates of exchange indicated in paragraph 4.1 above and the information contained in Declaration D and E.

I accept that the Procurement Authority / Institution has the right to request that the local content be verified in terms of the requirements of SATS 1286:2011.
I understand that the awarding of the bid is dependent on the accuracy of the information furnished in this application. I also understand that the submission of incorrect data, or data that are not verifiable as described in SATS 1286:2011, may result in the Procurement Authority / Institution imposing any or all of the remedies as provided for in Regulation 14 of the Preferential Procurement Regulations, 2017 promulgated under the Preferential Policy Framework Act (PPPFA), 2000 (Act

No. 5 of 2000).

	SIGNATURE	DATE
TENDERER:		
WITNESS No. 1:		
WITNESS No. 2:		

Local Content Declaration – Summary Schedule

(C1) Tender No.	T41/2022			
(C2) Tender Description	REFURBISHMENT AND UPGRADE OF ROBERTSON WASTEWATER TREATMENT WORKS			
(C3) Designated product(s)	Conveyance Pipes			
(C4) Tender Authority				
(C5) Name of Tendering Entity				
(C6) Tender Exchange Rate	Currency		Rate	
(C7)Specified local content %	80% - 100%			

NOTE: VAT to be excluded from all calculations

		Calculation of local content					
Tender Item No's	List of Items	Tender Price – each	Exempted imported value	Tender value net of exempted imported content	Imported value	Local value	Local content % (per item)
(C8)	(C9)	(C10)	(C11)	(C12)	(C13)	(C14)	(C15)
C10.3.29	Puddle Flange with 200mm OD						
C10.3.30	Puddle Flange with 250mm OD						
C10.3.31	Puddle Flange with 315mm OD						
C10.3.32	Puddle Flange with 355mm OD						
C10.3.33	Puddle Flange with 450mm OD						
C10.3.34	Puddle Flange with 630mm OD						
C10.3.35	Puddle Flange to fit Flange Adaptor coupling with 200 mm OD						

Tender summary			
Tender Quantity	Total tender value	Total exempted imported content	Total imported content
(C16)	(C17)	(C18)	(C19)
2			
8			
1			
4			
3			
2			
2			

C10.3.36	Puddle Flange to fit Flange Adaptor coupling with 250 mm OD							3			
C10.3.37	Puddle Flange to fit Flange Adaptor coupling with 450 mm OD							3			
C10.3.49	355mm dia. HDG CC 4.5mm thick pipe with 550mm Bellmouth one end flanged (L = 1000mm)							2			
C10.3.50	355mm dia. HDG CC 4.5mm thick 90deg bend with duckfoot, medium radius bend with both ends flanged (R = 1065mm)							2			
C10.3.51	355mm dia. HDG CC 4.5mm thick 5.5deg lobster bend with both ends flanged (L = 295mm)							2			
C10.3.52	355mm dia. HDG CC Pipe 4.5mm thick both ends flanged (L =1800mm)							2			

C10.3.53	355mm dia. HDG CC Pipe 4.5mm thick both ends flanged (L = 2000mm)							2			
C10.3.54	355mm dia. HDG CC Pipe 4.5mm thick both ends flanged (L = 2200mm)							2			
C10.3.55	355mm dia. HDG CC Pipe 4.5mm thick both ends flanged (L = 3000mm)							2			
C10.3.56	250mm dia. HDG CC 4.5mm thick 90de medium radius bend with both ends flanged (R = 950mm)							4			
C10.3.57	250mm dia. HDG CC Puddle Pipe 4.5mm thick both ends flanged (L = 500mm)							2			
C10.3.58	250mm dia. HDG CC Puddle Pipe 4.5mm thick both ends flanged (L = 640mm)							2			
C10.3.59	250mm dia. HDG CC Pipe 4.5mm thick both ends flanged (L = 2200mm)							2			

C10.3.60	250mm dia. HDG CC Pipe 4.5mm thick both ends flanged (L = 2175mm)							4			
C10.3.61	250mm dia. HDG CC Puddle Pipe 4.5mm thick one end flanged (L =1650mm)							2			
C10.3.62	250mm dia. HDG CC 4.5mm thick 22.5eg lobster bend with both ends flanged (L = 465mm)							4			

(C20) Total tender value	
(C21) Total Exempt imported content	
(C22) Total Tender value net of exempt imported content	
(C23) Total Imported content	
(C24) Total local content	
(C25) Average local content % of tender	

SIGNATURE OF TENDERER AS PER LOCAL CONTENT DECLARATION

DATE

Attach additional pages if mores space is required

SCHEDULE 19D : MBD 6.2 – DECLARATION CERTIFICATE FOR LOCAL PRODUCTION AND CONTENT FOR DESIGNATED SECTORS

DECLARATION CERTIFICATE FOR LOCAL PRODUCTION AND CONTENT FOR DESIGNATED SECTORS

This Municipal Bidding Document (MBD) must form part of all bids invited. It contains general information and serves as a declaration form for local content (local production and local content are used interchangeably).

Before completing this declaration, bidders must study the General Conditions, Definitions, Directives applicable in respect of Local Content as prescribed in the Preferential Procurement Regulations, 2017, the South African Bureau of Standards (SABS) approved technical specification number SATS 1286:2011 (Edition 1) and the Guidance on the Calculation of Local Content together with the Local Content Declaration Templates [Annex C (Local Content Declaration: Summary Schedule), D (Imported Content Declaration: Supporting Schedule to Annex C) and E (Local Content Declaration: Supporting Schedule to Annex C)].

General Conditions

Preferential Procurement Regulations, 2017 (Regulation 8) make provision for the promotion of local production and content.

Regulation 8.(2) prescribes that in the case of designated sectors, organs of state must advertise such tenders with the specific bidding condition that only locally produced or manufactured goods, with a stipulated minimum threshold for local production and content will be considered.

Where necessary, for tenders referred to in paragraph 1.2 above, a two stage bidding process may be followed, where the first stage involves a minimum threshold for local production and content and the second stage price and B-BBEE.

A person awarded a contract in relation to a designated sector, may not sub-contract in such a manner that the local production and content of the overall value of the contract is reduced to below the stipulated minimum threshold.

The local content (LC) expressed as a percentage of the bid price must be calculated in accordance with the SABS approved technical specification number SATS 1286: 2011 as follows:

$$LC = [1 - x / y] * 100$$

Where

x is the imported content in Rand

y is the bid price in Rand excluding value added tax (VAT)

Prices referred to in the determination of x must be converted to Rand (ZAR) by using the exchange rate published by South African Reserve Bank (SARB) at 12:00 on the date of advertisement of the bid as indicated in paragraph 4.1 below.

The SABS approved technical specification number SATS 1286:2011 is accessible on http:/www.thedti.gov.za/industrial development/ip.jsp at no cost.

A bid may be disqualified if this Declaration Certificate and the Annex C (Local Content Declaration: Summary Schedule) are not submitted as part of the bid documentation;

The stipulated minimum threshold(s) for local production and content (refer to Annex A of SATS 1286:2011) for this bid is/are as follows:

#	Description of services, works or goods	Stipulated minimum threshold as a %
	Steel Products and Components for Construction	100%

Please submit also letters of exemption from dti if local content is not 100%.
Please ensure that you put all the items on Annexure A on which you make an offer.

3. Does any portion of the goods or services offered have any imported content?
(Tick applicable box)

YES		NO	

3.1 If yes, the rate(s) of exchange to be used in this bid to calculate the local content as prescribed in paragraph 1.5 of the general conditions must be the rate(s) published by SARB for the specific currency at 12:00 on the date of advertisement of the bid.

The relevant rates of exchange information is accessible on www.reservebank.co.za

Indicate the rate(s) of exchange against the appropriate currency in the table below (refer to Annex A of SATS 1286:2011):

Currency	Rates of exchange
US Dollar	
Pound Sterling	
Euro	
Yen	
Other	

NB: Bidders must submit proof of the SARB rate (s) of exchange used.

4. Where, after the award of a bid, challenges are experienced in meeting the stipulated minimum threshold for local content the dti must be informed accordingly in order for the dti to verify and in consultation with the AO/AA provide directives in this regard.

SIGNATURE OF BIDDER(S):			
WITNESS 1:		WITNESS 2:	
DATE:			
ADDRESS:			

LOCAL CONTENT DECLARATION
(REFER TO ANNEX B OF SATS 1286:2011)

LOCAL CONTENT DECLARATION BY CHIEF FINANCIAL OFFICER OR OTHER LEGALLY RESPONSIBLE PERSON NOMINATED IN WRITING BY THE CHIEF EXECUTIVE OR SENIOR MEMBER/PERSON WITH MANAGEMENT RESPONSIBILITY (CLOSE CORPORATION, PARTNERSHIP OR INDIVIDUAL)

IN RESPECT OF TENDER NO. : ....., ISSUED BY STELLENBOSCH MUNICIPALITY.
NB

The obligation to complete, duly sign and submit this declaration cannot be transferred to an external authorized representative, auditor or any other third party acting on behalf of the bidder.
Guidance on the Calculation of Local Content together with Local Content Declaration Templates (Annex C, D and E) is accessible on http://www.thdti.gov.za/industrial development/ip.jsp. Bidders should first complete Declaration D. After completing Declaration D, bidders should complete Declaration E and then consolidate the information on Declaration C. Declaration C should be submitted with the bid documentation at the closing date and time of the bid in order to substantiate the declaration made in paragraph (c) below. Declarations D and E should be kept by the bidders for verification purposes for a period of at least 5 years. The successful bidder is required to continuously update Declarations C, D and E with the actual values for the duration of the contract.

I, the undersigned, ……..... (full names),
do hereby declare, in my capacity as …… ……..
of .....(name of bidder entity), the following:

The facts contained herein are within my own personal knowledge.

I have satisfied myself that:
the goods/services/works to be delivered in terms of the above-specified bid comply with the minimum local content requirements as specified in the bid, and as measured in terms of SATS 1286:2011; and
The local content percentage (%) indicated below has been calculated using the formula given in clause 3 of SATS 1286:2011, the rates of exchange indicated in paragraph 4.1 above and the information contained in Declaration D and E which has been consolidated in Declaration C:

Bid price, excluding VAT (y)	R
Imported content (x), as calculated in terms of SATS 1286:2011	R
Stipulated minimum threshold for local content (paragraph 3 above)	
Local content %, as calculated in terms of SATS 1286:2011	

If the bid is for more than one product, the local content percentages for each product contained in Declaration C shall be used instead of the table above.
The local content percentages for each product has been calculated using the formula given in clause 3 of SATS 1286:2011, the rates of exchange indicated in paragraph 4.1 above and the information contained in Declaration D and E.

I accept that the Procurement Authority / Institution has the right to request that the local content be verified in terms of the requirements of SATS 1286:2011.
I understand that the awarding of the bid is dependent on the accuracy of the information furnished in this application. I also understand that the submission of incorrect data, or data that are not verifiable as described in SATS 1286:2011, may result in the Procurement Authority / Institution imposing any or all of the remedies as provided for in Regulation 14 of the Preferential Procurement Regulations, 2017 promulgated under the Preferential Policy Framework Act (PPPFA), 2000 (Act

No. 5 of 2000).

	SIGNATURE	DATE
TENDERER:		
WITNESS No. 1:		
WITNESS No. 2:		

Local Content Declaration – Summary Schedule

(C1) Tender No.	T41/2022			
(C2) Tender Description	REFURBISHMENT AND UPGRADE OF ROBERTSON WASTEWATER TREATMENT WORKS			
(C3) Designated product(s)	Steel Products and Components for Construction			
(C4) Tender Authority				
(C5) Name of Tendering Entity				
(C6) Tender Exchange Rate	Currency		Rate	
(C7)Specified local content %	100%			

NOTE: VAT to be excluded from all calculations

		Calculation of local content						Tender summary			
Tender Item No's	List of Items	Tender Price – each	Exempted imported value	Tender value net of exempted imported content	Imported value	Local value	Local content % (per item)	Tender Quantity	Total tender value	Total exempted imported content	Total imported content
(C8)	(C9)	(C10)	(C11)	(C12)	(C13)	(C14)	(C15)	(C16)	(C17)	(C18)	(C19)
C2.1.11	Mild steel bars of diameter: 10mm dia							1			
C2.1.12	High tensile steel bars of diameter: 20mm dia							10			
C2.1.13	High-Tensile Welded Mesh: Steel mesh in slab ref 193							150			
C2.5.1	1) Mentis or similar HDG MS Ball type, welded Inter-link handrails on horizontal surface complete as per detail.							45			
C2.5.2	2) Mentis or similar HDG MS Ball type, welded Inter-link handrails on inclined surface complete as per							10			

	detail.										
C2.5.3	22.5° bends							4			
C2.5.4	90° bends							20			
C2.5.5	180° bends							2			
C2.5.6	End pieces							8			
C2.8.1	Roof covering with pitch not exceeding 15 degrees							700			
C2.8.2	Apex flashing 400 mm girth							40			
C2.8.3	Apex flashing 400 mm girth							40			
C2.10.1	305x102x25 I-Column/Rafter Grade 350W							5			
C2.10.2	IPE200 Grade 350W Eaves Beam							1.5			
C2.10.3	254x146x31 I-GRAWLER BEAM Grade 350W							2.1			
C2.10.4	Fixing plates, connection plates, bolts etc.							2.0			
C2.11.1	125 x 75 x 20 x 3.0mm x 6.89kg/m purlins to trusses							7			
C2.11.2	70x70x8mm Angle Bracing							2.5			
C2.12.3	1) J-Bolts 500mm long M20							56			
C2.12.4	High tensile steel bars of diameter: 20mm dia							1			
C3.3.1	Mild steel bars of diameter: 10mm dia							5			
C3.3.2	High tensile steel bars of diameter: 20mm dia							145			
C3.6.1	1) Mentis or similar HDG MS Ball type, welded Inter-link handrails on							350			

	horizontal surface complete as per detail.										
C3.6.2	2) Mentis or similar HDG MS Ball type, welded Inter-link handrails on inclined surface complete as per detail.							12			
C3.6.3	45° Angle bend							5			
C3.6.4	90° Rail bend							50			
C3.6.5	Angle closure bend							5			
C3.6.6	Horizontal closure bend							15			
C4.3.1	Mild steel bars of diameter: 10mm dia							0.5			
C4.3.2	High tensile steel bars of diameter: 20mm dia							2.5			
C4.6.1	1) Mentis or similar HDG MS Ball type, welded Inter-link handrails on horizontal surface complete as per detail.							10			
C4.6.2	2) Mentis or similar HDG MS Ball type, welded Inter-link handrails on inclined surface complete as per detail.							5			
C4.6.3	45° Angle bend							2			
C4.6.4	90° Rail bend							8			
C4.6.5	Angle closure bend							2			
C4.6.6	Horizontal closure bend							8			
C5.3.1	Mild steel bars of diameter: 10mm dia							1.5			
C5.3.2	High tensile steel							17			

	bars of diameter: 20mm dia										
C6.3.1	Mild steel bars of diameter: 10mm dia							1			
C6.3.2	High tensile steel bars of diameter: 20mm dia							4			
C6.6.1	1) Mentis or similar HDG MS Ball type, welded Inter-link handrails on horizontal surface complete as per detail.							12			
C6.6.2	90° Rail bend							2			
C6.6.3	Horizaontal closure bend							6			
C7.3.1	Mild steel bars of diameter: 10mm dia							1			
C7.3.2	High tensile steel bars of diameter: 20mm dia							8			
C7.6.1	1) Mentis or similar HDG MS Ball type, welded Inter-link handrails on horizontal surface complete as per detail.							25			
C7.6.2	90° Rail bend							8			
C7.6.3	Horizaontal closure bend							6			
C8.5.1	High tensile steel bars of diameter: 20mm dia							8			
C8.5.2	High-Tensile Welded Mesh: Steel mesh in slab ref 193							550			
C8.5.3	High-Tensile Welded Mesh: Steel mesh in slab ref 617							64			

C8.14.1	305x102x29kg I Beam - Grade S355JR (Rafter)							1.8			
C8.14.2	254x146x37kg I Beam - Grade S355JR (Columns)							3.5			
C8.14.3	Fixing plates, connection plates, bolts etc.							0.70			
C8.15.1	60x60x5mm angle profile rails							2.0			
C8.15.2	70x70x6mm bracing							1.0			
C8.15.2	150x50x20x2.5mm purlins to rafters							1.2			
C8.15.2	125x75x20x2.5mm side purlins to columns							1.5			
C8.16.1	Roof covering with pitch not exceeding 20 degrees							300			
C8.16.2	Side cladding as per drawing							260			
C8.16.3	0.5 mm Vertical corner flashing (L-Shape 300 x 300 mm)							10			
C8.16.4	0.5 mm Gable trim 600 mm wide (L-Shape 300 x 300 mm)							30			
C8.16.5	0.5 mm Apex flashing 400 mm wide to mach roof angle (15º)							20			
C8.16.6	0.5 mm Flashing plate to cover penetration through side cladding							2			
C8.17.1	34mm Outside dia. Ball-Type Handrails, top mounted, hot dipped galvanized							20			
C8.17.2	90° short radius bend							4			

C8.17.3	45° stairway bend							2			
C8.17.4	45° closure							1			
C8.17.5	90° straight closure							5			
C8.17.6	Locking Chain: 2mm Krafft 4mm Electro Galvanised Chain and hook between handrails (All inclusive)							4			
C8.22.1	High tensile steel bars of diameter: 20mm dia							6.5			
C8.24.1	Mentis or similar HDG MS Ball type, welded Inter-link handrails on horizontal surface complete as per detail.							40			
C8.24.2	1) 90° bends							15			
C8.24.3	2) 180° bends							5			
C8.24.4	3) End pieces							8			
C9.4.1	High tensile steel bars of diameter: 20mm dia							2			
C9.9.1	High tensile steel bars of diameter: 20mm dia							0.35			
C9.14.1	High tensile steel bars of diameter: 20mm dia							0.25			
C13.4.1	High tensile steel bars of diameter: 20mm dia							6			
C13.4.2	I-Section, 203mm x 133 mm x 30kg/m							10			
C14.3	6m sliding Gate										
C14.4	2m sliding Gate										

(C20) Total tender value

(C21) Total Exempt imported content		
(C22) Total Tender value net of exempt imported content		
(C23) Total Imported content		
(C24) Total local content		
(C25) Average local content % of tender		

SIGNATURE OF TENDERER AS PER LOCAL CONTENT DECLARATION

DATE

Attach additional pages if mores space is required

SCHEDULE 19E : MBD 6.2 – DECLARATION CERTIFICATE FOR LOCAL PRODUCTION AND CONTENT FOR DESIGNATED SECTORS

DECLARATION CERTIFICATE FOR LOCAL PRODUCTION AND CONTENT FOR DESIGNATED SECTORS

This Municipal Bidding Document (MBD) must form part of all bids invited. It contains general information and serves as a declaration form for local content (local production and local content are used interchangeably).

Before completing this declaration, bidders must study the General Conditions, Definitions, Directives applicable in respect of Local Content as prescribed in the Preferential Procurement Regulations, 2017, the South African Bureau of Standards (SABS) approved technical specification number SATS 1286:2011 (Edition 1) and the Guidance on the Calculation of Local Content together with the Local Content Declaration Templates [Annex C (Local Content Declaration: Summary Schedule), D (Imported Content Declaration: Supporting Schedule to Annex C) and E (Local Content Declaration: Supporting Schedule to Annex C)].

General Conditions

Preferential Procurement Regulations, 2017 (Regulation 8) make provision for the promotion of local production and content.

Regulation 8.(2) prescribes that in the case of designated sectors, organs of state must advertise such tenders with the specific bidding condition that only locally produced or manufactured goods, with a stipulated minimum threshold for local production and content will be considered.

Where necessary, for tenders referred to in paragraph 1.2 above, a two stage bidding process may be followed, where the first stage involves a minimum threshold for local production and content and the second stage price and B-BBEE.

A person awarded a contract in relation to a designated sector, may not sub-contract in such a manner that the local production and content of the overall value of the contract is reduced to below the stipulated minimum threshold.

The local content (LC) expressed as a percentage of the bid price must be calculated in accordance with the SABS approved technical specification number SATS 1286: 2011 as follows:

$$LC = [1 - x / y] * 100$$

Where

x is the imported content in Rand

y is the bid price in Rand excluding value added tax (VAT)

Prices referred to in the determination of x must be converted to Rand (ZAR) by using the exchange rate published by South African Reserve Bank (SARB) at 12:00 on the date of advertisement of the bid as indicated in paragraph 4.1 below.

The SABS approved technical specification number SATS 1286:2011 is accessible on http:/www.thedti.gov.za/industrial development/ip.jsp at no cost.

A bid may be disqualified if this Declaration Certificate and the Annex C (Local Content Declaration: Summary Schedule) are not submitted as part of the bid documentation;

The stipulated minimum threshold(s) for local production and content (refer to Annex A of SATS 1286:2011) for this bid is/are as follows:

#	Description of services, works or goods	Stipulated minimum threshold as a %

	Pumps, Medium Voltage (MV) Motors and Associated Accessories	70%

Please submit also letters of exemption from dti if local content is not 100%.
Please ensure that you put all the items on Annexure A on which you make an offer.

3. Does any portion of the goods or services offered have any imported content?
(Tick applicable box)

YES		NO	

3.1 If yes, the rate(s) of exchange to be used in this bid to calculate the local content as prescribed in paragraph 1.5 of the general conditions must be the rate(s) published by SARB for the specific currency at 12:00 on the date of advertisement of the bid.

The relevant rates of exchange information is accessible on www.reservebank.co.za

Indicate the rate(s) of exchange against the appropriate currency in the table below (refer to Annex A of SATS 1286:2011):

Currency	Rates of exchange
US Dollar	
Pound Sterling	
Euro	
Yen	
Other	

NB: Bidders must submit proof of the SARB rate (s) of exchange used.

4. Where, after the award of a bid, challenges are experienced in meeting the stipulated minimum threshold for local content the dti must be informed accordingly in order for the dti to verify and in consultation with the AO/AA provide directives in this regard.

SIGNATURE OF BIDDER(S):			
WITNESS 1:		WITNESS 2:	
DATE:			
ADDRESS:			

LOCAL CONTENT DECLARATION
(REFER TO ANNEX B OF SATS 1286:2011)

LOCAL CONTENT DECLARATION BY CHIEF FINANCIAL OFFICER OR OTHER LEGALLY RESPONSIBLE PERSON NOMINATED IN WRITING BY THE CHIEF EXECUTIVE OR SENIOR MEMBER/PERSON WITH MANAGEMENT RESPONSIBILITY (CLOSE CORPORATION, PARTNERSHIP OR INDIVIDUAL)

IN RESPECT OF TENDER NO. : ....., ISSUED BY STELLENBOSCH MUNICIPALITY.
NB

The obligation to complete, duly sign and submit this declaration cannot be transferred to an external authorized representative, auditor or any other third party acting on behalf of the bidder.
Guidance on the Calculation of Local Content together with Local Content Declaration Templates (Annex C, D and E) is accessible on http://www.thdti.gov.za/industrial development/ip.jsp. Bidders should first complete Declaration D. After completing Declaration D, bidders should complete Declaration E and then consolidate the information on Declaration C. Declaration C should be submitted with the bid documentation at the closing date and time of the bid in order to substantiate the declaration made in paragraph (c) below. Declarations D and E should be kept by the bidders for verification purposes for a period of at least 5 years. The successful bidder is required to continuously update Declarations C, D and E with the actual values for the duration of the contract.

I, the undersigned, ……..... (full names),
do hereby declare, in my capacity as …… ……..
of .....(name of bidder entity), the following:

The facts contained herein are within my own personal knowledge.

I have satisfied myself that:
the goods/services/works to be delivered in terms of the above-specified bid comply with the minimum local content requirements as specified in the bid, and as measured in terms of SATS 1286:2011; and
The local content percentage (%) indicated below has been calculated using the formula given in clause 3 of SATS 1286:2011, the rates of exchange indicated in paragraph 4.1 above and the information contained in Declaration D and E which has been consolidated in Declaration C:

Bid price, excluding VAT (y)	R
Imported content (x), as calculated in terms of SATS 1286:2011	R
Stipulated minimum threshold for local content (paragraph 3 above)	
Local content %, as calculated in terms of SATS 1286:2011	

If the bid is for more than one product, the local content percentages for each product contained in Declaration C shall be used instead of the table above.
The local content percentages for each product has been calculated using the formula given in clause 3 of SATS 1286:2011, the rates of exchange indicated in paragraph 4.1 above and the information contained in Declaration D and E.

I accept that the Procurement Authority / Institution has the right to request that the local content be verified in terms of the requirements of SATS 1286:2011.
I understand that the awarding of the bid is dependent on the accuracy of the information furnished in this application. I also understand that the submission of incorrect data, or data that are not verifiable as described in SATS 1286:2011, may result in the Procurement Authority / Institution imposing any or all of the remedies as provided for in Regulation 14 of the Preferential Procurement Regulations, 2017 promulgated under the Preferential Policy Framework Act (PPPFA), 2000 (Act

No. 5 of 2000).

	SIGNATURE	DATE
TENDERER:		
WITNESS No. 1:		
WITNESS No. 2:		

Local Content Declaration – Summary Schedule

(C1) Tender No.	T41/2022			
(C2) Tender Description	REFURBISHMENT AND UPGRADE OF ROBERTSON WASTEWATER TREATMENT WORKS			
(C3) Designated product(s)	Pumps, Medium Voltage (MV) Motors and Associated Accessories			
(C4) Tender Authority				
(C5) Name of Tendering Entity				
(C6) Tender Exchange Rate	Currency		Rate	
(C7)Specified local content %	70%			

NOTE: VAT to be excluded from all calculations

		Calculation of local content						Tender summary			
Tender Item No's	List of Items	Tender Price – each	Exempted imported value	Tender value net of exempted imported content	Imported value	Local value	Local content % (per item)	Tender Quantity	Total tender value	Total exempted imported content	Total imported content
(C8)	(C9)	(C10)	(C11)	(C12)	(C13)	(C14)	(C15)	(C16)	(C17)	(C18)	(C19)
M1.6	Vortex grit removal equipment, including paddle system, drive assembly, chamber covers, complete set of all necessary piping for fluidising water, etc.							2			
M1.7	Grit removal self-priming pump set, complete on baseplate with motor, including all suction and delivery pipework, valves to convey grit from the vortex chamber to the grit classifier, for a fully functional operation										
M1.10	Skip dolly system, complete with trolley suitable for 2x 6m³ skips, rails, drive										

	assembly, etc.										
M1.13	Booster pump for all inlet works wash water requirments (duty/stanby)										
M2.1	Vertical shaft mixers, complete with fasteners and ancillary etc. All as specified for installation in the anoxic basins										
M2.3	Surface mechanical aerators, complete with fasteners and ancillary etc. All as specified for installation in the aeration basin. (45kW)										
M2.5	A-mixed liquor recycle (A-MLR) pumps, complete with fasteners and ancillary etc. All as specified for installation of the mixed liquor pumps.										
M2.8	Submersible WAS Pumps complete with fasteners and anchors, etc. as specified, including autocouplings, guiderails and Lifting chains										
M4.1	Submersible pump set, complete with motor, duckfoot-bend, guide rails, top brack and lifting chain										
M4.2	Submersible pump set, complete with motor, duckfoot-bend, guide rails, top brack and lifting chain										

M4.9	Sludge Holding Tank Feed 1 : Submersible pump set, complete with motor, duckfoot-bend, guide rails, top brack and lifting chain										
M5.16	Booster pump set, complete with control and instrumentation										
M5.19	Dosing pump sets, complete										
M5.23	Wash water pump sets, complete										

(C20) Total tender value	
(C21) Total Exempt imported content	
(C22) Total Tender value net of exempt imported content	
(C23) Total Imported content	
(C24) Total local content	
(C25) Average local content % of tender	

SIGNATURE OF TENDERER AS PER LOCAL CONTENT DECLARATION

DATE

Attach additional pages if mores space is required

SCHEDULE 19F : MBD 6.2 – DECLARATION CERTIFICATE FOR LOCAL PRODUCTION AND CONTENT FOR DESIGNATED SECTORS

DECLARATION CERTIFICATE FOR LOCAL PRODUCTION AND CONTENT FOR DESIGNATED SECTORS

This Municipal Bidding Document (MBD) must form part of all bids invited. It contains general information and serves as a declaration form for local content (local production and local content are used interchangeably).

Before completing this declaration, bidders must study the General Conditions, Definitions, Directives applicable in respect of Local Content as prescribed in the Preferential Procurement Regulations, 2017, the South African Bureau of Standards (SABS) approved technical specification number SATS 1286:2011 (Edition 1) and the Guidance on the Calculation of Local Content together with the Local Content Declaration Templates [Annex C (Local Content Declaration: Summary Schedule), D (Imported Content Declaration: Supporting Schedule to Annex C) and E (Local Content Declaration: Supporting Schedule to Annex C)].

General Conditions

Preferential Procurement Regulations, 2017 (Regulation 8) make provision for the promotion of local production and content.

Regulation 8.(2) prescribes that in the case of designated sectors, organs of state must advertise such tenders with the specific bidding condition that only locally produced or manufactured goods, with a stipulated minimum threshold for local production and content will be considered.

Where necessary, for tenders referred to in paragraph 1.2 above, a two stage bidding process may be followed, where the first stage involves a minimum threshold for local production and content and the second stage price and B-BBEE.

A person awarded a contract in relation to a designated sector, may not sub-contract in such a manner that the local production and content of the overall value of the contract is reduced to below the stipulated minimum threshold.

The local content (LC) expressed as a percentage of the bid price must be calculated in accordance with the SABS approved technical specification number SATS 1286: 2011 as follows:

$$LC = [1 - x / y] * 100$$

Where

x is the imported content in Rand

y is the bid price in Rand excluding value added tax (VAT)

Prices referred to in the determination of x must be converted to Rand (ZAR) by using the exchange rate published by South African Reserve Bank (SARB) at 12:00 on the date of advertisement of the bid as indicated in paragraph 4.1 below.

The SABS approved technical specification number SATS 1286:2011 is accessible on http:/www.thedti.gov.za/industrial development/ip.jsp at no cost.

A bid may be disqualified if this Declaration Certificate and the Annex C (Local Content Declaration: Summary Schedule) are not submitted as part of the bid documentation;

The stipulated minimum threshold(s) for local production and content (refer to Annex A of SATS 1286:2011) for this bid is/are as follows:

#	Description of services, works or goods	Stipulated minimum threshold as a %

	Plastic Pipes	100%

Please submit also letters of exemption from dti if local content is not 100%.
Please ensure that you put all the items on Annexure A on which you make an offer.

3. Does any portion of the goods or services offered have any imported content?
(Tick applicable box)

YES		NO	

3.1 If yes, the rate(s) of exchange to be used in this bid to calculate the local content as prescribed in paragraph 1.5 of the general conditions must be the rate(s) published by SARB for the specific currency at 12:00 on the date of advertisement of the bid.

The relevant rates of exchange information is accessible on www.reservebank.co.za

Indicate the rate(s) of exchange against the appropriate currency in the table below (refer to Annex A of SATS 1286:2011):

Currency	Rates of exchange
US Dollar	
Pound Sterling	
Euro	
Yen	
Other	

NB: Bidders must submit proof of the SARB rate (s) of exchange used.

4. Where, after the award of a bid, challenges are experienced in meeting the stipulated minimum threshold for local content the dti must be informed accordingly in order for the dti to verify and in consultation with the AO/AA provide directives in this regard.

SIGNATURE OF BIDDER(S):			
WITNESS 1:		WITNESS 2:	
DATE:			
ADDRESS:			

LOCAL CONTENT DECLARATION
(REFER TO ANNEX B OF SATS 1286:2011)

LOCAL CONTENT DECLARATION BY CHIEF FINANCIAL OFFICER OR OTHER LEGALLY RESPONSIBLE PERSON NOMINATED IN WRITING BY THE CHIEF EXECUTIVE OR SENIOR MEMBER/PERSON WITH MANAGEMENT RESPONSIBILITY (CLOSE CORPORATION, PARTNERSHIP OR INDIVIDUAL)

IN RESPECT OF TENDER NO. : ....., ISSUED BY STELLENBOSCH MUNICIPALITY.
NB

The obligation to complete, duly sign and submit this declaration cannot be transferred to an external authorized representative, auditor or any other third party acting on behalf of the bidder.
Guidance on the Calculation of Local Content together with Local Content Declaration Templates (Annex C, D and E) is accessible on http://www.thdti.gov.za/industrial development/ip.jsp. Bidders should first complete Declaration D. After completing Declaration D, bidders should complete Declaration E and then consolidate the information on Declaration C. Declaration C should be submitted with the bid documentation at the closing date and time of the bid in order to substantiate the declaration made in paragraph (c) below. Declarations D and E should be kept by the bidders for verification purposes for a period of at least 5 years. The successful bidder is required to continuously update Declarations C, D and E with the actual values for the duration of the contract.

I, the undersigned, ……..... (full names),
do hereby declare, in my capacity as …… ……..
of .....(name of bidder entity), the following:

The facts contained herein are within my own personal knowledge.

I have satisfied myself that:
the goods/services/works to be delivered in terms of the above-specified bid comply with the minimum local content requirements as specified in the bid, and as measured in terms of SATS 1286:2011; and
The local content percentage (%) indicated below has been calculated using the formula given in clause 3 of SATS 1286:2011, the rates of exchange indicated in paragraph 4.1 above and the information contained in Declaration D and E which has been consolidated in Declaration C:

Bid price, excluding VAT (y)	R
Imported content (x), as calculated in terms of SATS 1286:2011	R
Stipulated minimum threshold for local content (paragraph 3 above)	
Local content %, as calculated in terms of SATS 1286:2011	

If the bid is for more than one product, the local content percentages for each product contained in Declaration C shall be used instead of the table above.
The local content percentages for each product has been calculated using the formula given in clause 3 of SATS 1286:2011, the rates of exchange indicated in paragraph 4.1 above and the information contained in Declaration D and E.

I accept that the Procurement Authority / Institution has the right to request that the local content be verified in terms of the requirements of SATS 1286:2011.
I understand that the awarding of the bid is dependent on the accuracy of the information furnished in this application. I also understand that the submission of incorrect data, or data that are not verifiable as described in SATS 1286:2011, may result in the Procurement Authority / Institution imposing any or all of the remedies as provided for in Regulation 14 of the Preferential Procurement Regulations, 2017 promulgated under the Preferential Policy Framework Act (PPPFA), 2000 (Act

No. 5 of 2000).

	SIGNATURE	DATE
TENDERER:		
WITNESS No. 1:		
WITNESS No. 2:		

Local Content Declaration – Summary Schedule

(C1) Tender No.	T41/2022			
(C2) Tender Description	REFURBISHMENT AND UPGRADE OF ROBERTSON WASTEWATER TREATMENT WORKS			
(C3) Designated product(s)	Plastic Pipes			
(C4) Tender Authority				
(C5) Name of Tendering Entity				
(C6) Tender Exchange Rate	Currency		Rate	
(C7) Specified local content %	100%			

NOTE: VAT to be excluded from all calculations

		Calculation of local content					
Tender Item No's	List of Items	Tender Price – each	Exempted imported value	Tender value net of exempted imported content	Imported value	Local value	Local content % (per item)
(C8)	(C9)	(C10)	(C11)	(C12)	(C13)	(C14)	(C15)
C10.3.1	200 mm dia						
C10.3.2	250 mm dia						
C10.3.3	355 mm dia						
C10.3.4	450 mm dia						
C10.3.5	630 mm dia						
C10.3.6	200 mm dia						
C10.3.7	250 mm dia						
C10.3.8	355 mm dia						
C10.3.9	450 mm dia						
C10.3.10	630 mm dia						
C10.3.11	200 mm dia x 22.5º						
C10.3.12	200 mm dia x 45º						
C10.3.13	200 mm dia x 90º						
C10.3.14	200 mm dia T-Piece						
C10.3.15	250 mm dia x 45º						

Tender summary			
Tender Quantity	Total tender value	Total exempted imported content	Total imported content
(C16)	(C17)	(C18)	(C19)
50			
50			
50			
100			
400			
155			
630			
10			
100			
100			
2			
4			
8			
5			
5			

C10.3.16	250 mm dia x 90º							9			
C10.3.17	250 mm dia T-Piece							5			
C10.3.18	250 mm / 250 mm Y-Junction							1			
C10.3.19	355 mm dia x 45º							2			
C10.3.20	450 mm dia x 22.5º							2			
C10.3.21	450 mm dia x 45º							5			
C10.3.22	450 mm dia x 90º							8			
C10.3.23	630 mm dia x 22.5º							2			
C10.3.24	630 mm dia x 45º							5			
C10.3.25	630 mm dia x 90º							6			
C10.3.26	200 mm dia x 22.5º							2			
C10.3.27	200 mm dia x 90º							3			
C10.3.28	315 mm dia x 22.5º							4			
C3.5.7	Supply and install 110 mm dia PVC ducts, under walkway							250			
C3.5.8	Supply and install 160 mm dia PVC ducts, under walkway							250			

(C20) Total tender value	
(C21) Total Exempt imported content	
(C22) Total Tender value net of exempt imported content	
(C23) Total Imported content	
(C24) Total local content	
(C25) Average local content % of tender	

SIGNATURE OF TENDERER AS PER LOCAL CONTENT DECLARATION

DATE

Attach additional pages if mores space is required

SCHEDULE 19G : MBD 6.2 – DECLARATION CERTIFICATE FOR LOCAL PRODUCTION AND CONTENT FOR DESIGNATED SECTORS

DECLARATION CERTIFICATE FOR LOCAL PRODUCTION AND CONTENT FOR DESIGNATED SECTORS

This Municipal Bidding Document (MBD) must form part of all bids invited. It contains general information and serves as a declaration form for local content (local production and local content are used interchangeably).

Before completing this declaration, bidders must study the General Conditions, Definitions, Directives applicable in respect of Local Content as prescribed in the Preferential Procurement Regulations, 2017, the South African Bureau of Standards (SABS) approved technical specification number SATS 1286:2011 (Edition 1) and the Guidance on the Calculation of Local Content together with the Local Content Declaration Templates [Annex C (Local Content Declaration: Summary Schedule), D (Imported Content Declaration: Supporting Schedule to Annex C) and E (Local Content Declaration: Supporting Schedule to Annex C)].

General Conditions

Preferential Procurement Regulations, 2017 (Regulation 8) make provision for the promotion of local production and content.

Regulation 8.(2) prescribes that in the case of designated sectors, organs of state must advertise such tenders with the specific bidding condition that only locally produced or manufactured goods, with a stipulated minimum threshold for local production and content will be considered.

Where necessary, for tenders referred to in paragraph 1.2 above, a two stage bidding process may be followed, where the first stage involves a minimum threshold for local production and content and the second stage price and B-BBEE.

A person awarded a contract in relation to a designated sector, may not sub-contract in such a manner that the local production and content of the overall value of the contract is reduced to below the stipulated minimum threshold.

The local content (LC) expressed as a percentage of the bid price must be calculated in accordance with the SABS approved technical specification number SATS 1286: 2011 as follows:

$$LC = [1 - x / y] * 100$$

Where

x is the imported content in Rand

y is the bid price in Rand excluding value added tax (VAT)

Prices referred to in the determination of x must be converted to Rand (ZAR) by using the exchange rate published by South African Reserve Bank (SARB) at 12:00 on the date of advertisement of the bid as indicated in paragraph 4.1 below.

The SABS approved technical specification number SATS 1286:2011 is accessible on http:/www.thedti.gov.za/industrial development/ip.jsp at no cost.

A bid may be disqualified if this Declaration Certificate and the Annex C (Local Content Declaration: Summary Schedule) are not submitted as part of the bid documentation;

The stipulated minimum threshold(s) for local production and content (refer to Annex A of SATS 1286:2011) for this bid is/are as follows:

#	Description of services, works or goods	Stipulated minimum threshold as a %
	Cement	100%

Please submit also letters of exemption from dti if local content is not 100%.
Please ensure that you put all the items on Annexure A on which you make an offer.

3. Does any portion of the goods or services offered have any imported content?
(Tick applicable box)

YES		NO	

3.1 If yes, the rate(s) of exchange to be used in this bid to calculate the local content as prescribed in paragraph 1.5 of the general conditions must be the rate(s) published by SARB for the specific currency at 12:00 on the date of advertisement of the bid.

The relevant rates of exchange information is accessible on www.reservebank.co.za

Indicate the rate(s) of exchange against the appropriate currency in the table below (refer to Annex A of SATS 1286:2011):

Currency	Rates of exchange
US Dollar	
Pound Sterling	
Euro	
Yen	
Other	

NB: Bidders must submit proof of the SARB rate (s) of exchange used.

4. Where, after the award of a bid, challenges are experienced in meeting the stipulated minimum threshold for local content the dti must be informed accordingly in order for the dti to verify and in consultation with the AO/AA provide directives in this regard.

SIGNATURE OF BIDDER(S):			
WITNESS 1:		WITNESS 2:	
DATE:			
ADDRESS:			

LOCAL CONTENT DECLARATION
(REFER TO ANNEX B OF SATS 1286:2011)

LOCAL CONTENT DECLARATION BY CHIEF FINANCIAL OFFICER OR OTHER LEGALLY RESPONSIBLE PERSON NOMINATED IN WRITING BY THE CHIEF EXECUTIVE OR SENIOR MEMBER/PERSON WITH MANAGEMENT RESPONSIBILITY (CLOSE CORPORATION, PARTNERSHIP OR INDIVIDUAL)

IN RESPECT OF TENDER NO. : ....., ISSUED BY STELLENBOSCH MUNICIPALITY.
NB

The obligation to complete, duly sign and submit this declaration cannot be transferred to an external authorized representative, auditor or any other third party acting on behalf of the bidder.
Guidance on the Calculation of Local Content together with Local Content Declaration Templates (Annex C, D and E) is accessible on http://www.thdti.gov.za/industrial development/ip.jsp. Bidders should first complete Declaration D. After completing Declaration D, bidders should complete Declaration E and then consolidate the information on Declaration C. Declaration C should be submitted with the bid documentation at the closing date and time of the bid in order to substantiate the declaration made in paragraph (c) below. Declarations D and E should be kept by the bidders for verification purposes for a period of at least 5 years. The successful bidder is required to continuously update Declarations C, D and E with the actual values for the duration of the contract.

I, the undersigned, ……..... (full names),
do hereby declare, in my capacity as …… ……..
of .....(name of bidder entity), the following:

The facts contained herein are within my own personal knowledge.

I have satisfied myself that:
the goods/services/works to be delivered in terms of the above-specified bid comply with the minimum local content requirements as specified in the bid, and as measured in terms of SATS 1286:2011; and
The local content percentage (%) indicated below has been calculated using the formula given in clause 3 of SATS 1286:2011, the rates of exchange indicated in paragraph 4.1 above and the information contained in Declaration D and E which has been consolidated in Declaration C:

Bid price, excluding VAT (y)	R
Imported content (x), as calculated in terms of SATS 1286:2011	R
Stipulated minimum threshold for local content (paragraph 3 above)	
Local content %, as calculated in terms of SATS 1286:2011	

If the bid is for more than one product, the local content percentages for each product contained in Declaration C shall be used instead of the table above.
The local content percentages for each product has been calculated using the formula given in clause 3 of SATS 1286:2011, the rates of exchange indicated in paragraph 4.1 above and the information contained in Declaration D and E.

I accept that the Procurement Authority / Institution has the right to request that the local content be verified in terms of the requirements of SATS 1286:2011.
I understand that the awarding of the bid is dependent on the accuracy of the information furnished in this application. I also understand that the submission of incorrect data, or data that are not verifiable as described in SATS 1286:2011, may result in the Procurement Authority / Institution imposing any or all of the remedies as provided for in Regulation 14 of the Preferential Procurement Regulations, 2017 promulgated under the Preferential Policy Framework Act (PPPFA), 2000 (Act

No. 5 of 2000).

	SIGNATURE	DATE
TENDERER:		
WITNESS No. 1:		
WITNESS No. 2:		

ANNEXURE C	SATS 1286.2011
Local Content Declaration – Summary Schedule	

(C1) Tender No.	T41/2022			
(C2) Tender Description	REFURBISHMENT AND UPGRADE OF ROBERTSON WASTEWATER TREATMENT WORKS			
(C3) Designated product(s)	Cement			
(C4) Tender Authority				
(C5) Name of Tendering Entity				
(C6) Tender Exchange Rate	Currency		Rate	
(C7) Specified local content %	100%			

NOTE: VAT to be excluded from all calculations

		Calculation of local content					
Tender Item No's	List of Items	Tender Price – each	Exempted imported value	Tender value net of exempted imported content	Imported value	Local value	Local content % (per item)
(C8)	(C9)	(C10)	(C11)	(C12)	(C13)	(C14)	(C15)
C2.2.7	Supply of Cement for items C.2.2.4, C.2.2.5 and C.2.2.6 above						
C3.4.16	Supply of Cement for items C3.4.6, C3.4.7, C3.4.8, C3.4.9, C3.4.10, C3.4.11, C3.4.12, C3.4.13 and C3.4.14 above						
C4.4.7	Supply of Cement for items C4.4.3, C4.4.4 and C4.4.5 above						

Tender summary			
Tender Quantity	Total tender value	Total exempted imported content	Total imported content
(C16)	(C17)	(C18)	(C19)
78			
890			
25			

C5.4.14	Supply of Cement for items C5.4.18, C5.4.19, C5.4.10, C5.4.11, C5.4.12 and C5.4.13 above							200			
C6.4.7	Supply of Cement for items C6.4.3, C6.4.4 and C6.4.5 above							18			
C7.4.7	Supply of Cement for items C7.4.3, C7.4.4. and C7.4.5 above							18			
C8.2.7	Supply of Cement for items C8.2.2, C8.2.3, C8.2.4, C8.2.5, C8.2.5 and C8.2.6 above							66.50			
C9.5.5	Supply of Cement for items C9.5.3 and C9.5.4 above							3			
C9.10.5	Supply of Cement for items C9.10.3 and C9.10.4 above							2			
C9.15.2	Supply of Cement for items C9.15.1 above							1.5			

(C20) Total tender value	
(C21) Total Exempt imported content	
(C22) Total Tender value net of exempt imported content	
(C23) Total Imported content	
(C24) Total local content	
(C25) Average local content % of tender	

SIGNATURE OF TENDERER AS PER LOCAL CONTENT DECLARATION

DATE

Attach additional pages if mores space is required

SCHEDULE 20 : MBD 8 – DECLARATION OF BIDDER'S PAST SUPPLY CHAIN MANAGEMENT PRACTICES

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

4.1	Is the bidder or any of its directors listed on the National Treasury's database as a company or person prohibited from doing business with the public sector? *(Companies or persons who are listed on this database were informed in writing of this restriction by the National Treasury after the audi alteram partem rule was applied).*	**Yes**	**No**
4.1.1	If so, furnish particulars:		
4.2	Is the bidder or any of its directors listed on the Register for Tender Defaulters in terms of section 29 of the Prevention and Combating of Corrupt Activities Act (No 12 of 2004)? *(To access this Register enter the National Treasury's website, www.treasury.gov.za, click on the icon "Register for Tender Defaulters" or submit your written request for a hard copy of the Register to facsimile number (012) 3265445).*	**Yes**	**No**
4.2.1	If so, furnish particulars:		
4.3	Was the bidder or any of its directors convicted by a court of law (including a court of law outside the Republic of South Africa) for fraud or corruption during the past five years?	**Yes**	**No**

4.3.1	If so, furnish particulars:		
4.4	Does the bidder or any of its directors owe any municipal rates and taxes or municipal charges to the municipality / municipal entity, or to any other municipality / municipal entity, that is in arrears for more than three months?	**Yes**	**No**
4.4.1	If so, furnish particulars:		
4.5	Was any contract between the bidder and the municipality / municipal entity or any other organ of state terminated during the past five years on account of failure to perform on or comply with the contract?	**Yes**	**No**
4.5.1	If so, furnish particulars:		

5. CERTIFICATION

I, the undersigned (full name), _____ ,

certify that the information furnished on this declaration form true and correct.

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

SIGNATURE:		NAME (PRINT):	
CAPACITY:		DATE:	
NAME OF FIRM:			

SCHEDULE 21 : MBD 9 – CERTIFICATE OF INDEPENDENT BID DETERMINATION

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

CERTIFICATE OF INDEPENDENT BID DETERMINATION:

In response to the invitation for the bid made by:

LANGEBERG MUNICIPALITY

I, the undersigned, in submitting the accompanying bid, hereby make the following statements that I certify to be true and complete in every respect:

1. I have read and I understand the contents of this Certificate;
2. I understand that the accompanying bid will be disqualified if this Certificate is found not to be true and complete in every respect;
3. I am authorized by the bidder to sign this Certificate, and to submit the accompanying bid, on behalf of the bidder;
4. Each person whose signature appears on the accompanying bid has been authorized by the bidder to determine the terms of, and to sign, the bid, on behalf of the bidder;
5. For the purposes of this Certificate and the accompanying bid, I understand that the word "competitor" shall include any individual or organization, other than the bidder, whether or not affiliated with the bidder, who:
   5.1. has been requested to submit a bid in response to this bid invitation;
   5.2. could potentially submit a bid in response to this bid invitation, based on their qualifications, abilities or experience; and

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

5.3. provides the same goods and services as the bidder and/or is in the same line of business as the bidder

6. The bidder has arrived at the accompanying bid independently from, and without consultation, communication, agreement or arrangement with any competitor. However communication between partners in a joint venture or consortium[5] will not be construed as collusive bidding.

7. In particular, without limiting the generality of paragraphs 6 above, there has been no consultation, communication, agreement or arrangement with any competitor regarding:

   7.1. prices;

   7.2. geographical area where product or service will be rendered (market allocation)

   7.3. methods, factors or formulas used to calculate prices;

   7.4. the intention or decision to submit or not to submit, a bid;

   7.5. the submission of a bid which does not meet the specifications and conditions of the bid; or

   7.6. bidding with the intention not to win the bid.

8. In addition, there have been no consultations, communications, agreements or arrangements with any competitor regarding the quality, quantity, specifications and conditions or delivery particulars of the products or services to which this bid invitation relates.

9. The terms of the accompanying bid have not been, and will not be, disclosed by the bidder, directly or indirectly, to any competitor, prior to the date and time of the official bid opening or of the awarding of the contract.

10. I am aware that, in addition and without prejudice to any other remedy provided to combat any restrictive practices related to bids and contracts, bids that are suspicious will be reported to the Competition Commission for investigation and possible imposition of administrative penalties in terms of section 59 of the Competition Act No. 89 of 1998 and or may be reported to the National Prosecuting Authority (NPA) for criminal investigation and or may be restricted from conducting business with the public sector for a period not exceeding ten (10) years in terms of the Prevention and Combating of Corrupt Activities Act No. 12 of 2004 or any other applicable legislation.

SIGNATURE:		NAME (PRINT):	
CAPACITY:		DATE:	
NAME OF FIRM:			

[5] Joint venture or Consortium means an association of persons for the purpose of combining their expertise, property, capital, efforts, skill and knowledge in an activity for the execution of a contract.

SCHEDULE 22 : MBD 10 – CERTIFICATE FOR PAYMENT OF MUNICIPAL SERVICES

DECLARATION IN TERMS OF CLAUSE 112(1) OF THE MUNICIPAL FINANCE MANAGEMENT ACT (NO.56 OF 2003)

I, _____, _____ (full name and ID no.), hereby acknowledge that according to SCM Regulation 38(1)(d)(i), the Municipality may reject the tender of the tenderer if any municipal rates and taxes or municipal service charges owed by the Tenderer or any of its directors/members/partners to the LANGEBERG Municipality, or to any other municipality or municipal entity, are in arrears for more than 3 (three) months.

I declare that I am duly authorised to act on behalf of _____ (name of the firm) and hereby declare, that to the best of my personal knowledge, neither the firm nor any director/member/partner of said firm is in arrears on any of its municipal accounts with any municipality in the Republic of South Africa, for a period longer than 3 (three) months.

I further hereby certify that the information set out in this schedule and/or attachment(s) hereto is true and correct. The Tenderer acknowledges that failure to properly and truthfully complete this schedule may result in the tender being disqualified, and/or in the event that the tenderer is successful, the cancellation of the contract.

PHYSICAL BUSINESS ADDRESS(ES) OF THE TENDERER	MUNICIPAL ACCOUNT NUMBER

FURTHER DETAILS OF THE BIDDER'S Director / Shareholder / Partners, etc.:

Director / Shareholder / partner	Physical address of the Business	Municipal Account number(s)	Physical residential address of the Director / shareholder / partner	Municipal Account number(s)

NB: Please attach certified copy (ies) of ID document(s) and Municipal Accounts

If the entity or any of its Directors/Shareholders/Partners, etc. rents/leases premises, a copy of the rental/lease agreement must be submitted with this tender.

Signature	**Position**	**Date**

SCHEDULE 23 : COMPENSATION FOR OCCUPATIONAL INJURIES AND DISEASES ACT, 1993 (ACT 130 OF 1993)

COMPENSATION FOR OCCUPATIONAL INJURIES AND DISEASES ACT, 1993 (ACT 130 OF 1993)	
Langeberg Municipality has legal duty in terms of Section 89 of the said Act to ensure that all contractors with whom agreements are entered into for the execution of work are registered as employers in accordance with the provisions of this Act and that all the necessary assessments have been paid by the contractor. In order to enter into this agreement, the following information is needed regarding the above-mentioned:	
Contractor's registration number with the office of the Compensation Commissioner:	
NOTE: **A copy of the latest receipt together with a copy of the relevant assessment OR a copy of a valid Letter of Good Standing must be handed in, in this regard.**	

PRINT NAME:			
CAPACITY:		NAME OF FIRM	
SIGNATURE:		DATE:	

SCHEDULE 24 : FORM OF INDEMNITY

INDEMNITY

Given by (Name of Company) _____ of (registered address of Company) __

_____a company incorporated with limited liability according to the Company Laws of the Republic of South Africa (hereinafter called the Contractor), represented herein by (Name of Representative) _____in his capacity as (Designation) _____ of the Contractor, is duly authorised hereto by a resolution dated _____ /20___, to sign on behalf of the Contractor.

WHEREAS the Contractor has entered into a Contract dated _____ / 20_____, with the Municipality who require this indemnity from the Contractor.

NOW THEREFORE THIS DEED WITNESSES that the Contractor does hereby indemnify and hold harmless the Municipality in respect of all loss or damage that may be incurred or sustained by the Municipality by reason of or in any way arising out of or caused by operations that may be carried out by the Contractor in connection with the aforementioned contract; and also in respect of all claims that may be made against the Municipality in consequence of such operations, by reason of or in any way arising out of any accidents or damage to life or property or any other cause whatsoever; and also in respect of all legal or other expenses that may be incurred by the Municipality in examining, resisting or settling any such claims; for the due performance of which the Contractor binds itself according to law.

SIGNATURE OF CONTRACTOR:	
DATE:	
SIGNATURE OF WITNESS 1:	
DATE:	
SIGNATURE OF WITNESS 2:	
DATE:	

SCHEDULE 25 : SCHEDULE OF PRE-QUALIFICATION CRITERIA SUB-CONTRACTORS

The tenderer shall provide information for the evaluation of their compliance with any sub-contracting pre-qualification criteria set in the tender conditions.

Sub-contractor Name	Nature of sub-contracting	QSE, EME or Co-operative	Black ownership % of QSE, EME or Co-operative	Designated group (youth, women, disabled, rural or township, military veteran)	Value of sub-contracting (including VAT)
					R
					R
					R
					R
					R
					R
					R
					R
					R
					R
					R
					R
					R
					R
					R
					R
					R
					R
					R
					R
					R
					R
					R
					R
					R
					R
					R
Total value of sub-contracting (B)					**R**

A	Price of tender under consideration (Pt) including VAT	R
B	Total value of sub-contracting including VAT	R
	Total sub-contracting percentage – (B/A)*100	**%**
	MINIMUM SUB-CONTRACTING TARGET AS CONTAINED IN CLAUSE C.2.1.4.6	

SIGNED ON BEHALF OF TENDERER: ……

SCHEDULE 26 : SCHEDULE OF MECHANICAL AND ELECTRICAL DATA SHEETS

The Mechanical and Electrical Data Sheets form part of the Returnable Documents. Tenderers may be disqualified if the Schedule of Mechanical and Electrical data sheets in Annex 7 are not submitted as part of the bid documentation.

SIGNED ON BEHALF OF TENDERER: ……

Part C1 : AGREEMENTS AND CONTRACT DATA

C1.1 FORM OF OFFER AND ACCEPTANCE

NOTE:

1. **This form must be completed in duplicate by both the successful bidder (Part 1) and the purchaser (Part 2). Both forms must be signed in the original so that the successful bidder and the purchaser will be in possession of originally signed contracts for their respective records.**
2. **NO correction fluid/tape may be used.**
   a. **In the event of a mistake having been made, it shall be crossed out in ink and be accompanied by an initial at each and every alteration.**
3. **The Bidder MUST indicate whether he/she/the entity is a registered VAT Vendor or not.**
   a. **In the case of the Bidder not being a registered VAT Vendor, both columns (amount/rate excluding AND including VAT) must reflect the same amount.**

	INDICATE WITH AN 'X'									
Are you/is the firm a registered VAT Vendor	**YES**					**NO**				
If "YES", please provide VAT number										

1. OFFER

1.1. The Employer, identified in the Acceptance signature block, has solicited offers to enter into a contract in respect of the following works: **T41/2022**

1.2. The tenderer, identified in the Offer signature block, has examined the draft contract as listed in the Acceptance section and agreed to provide this Offer.

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

THE OFFERED TOTAL OF THE PRICES INCLUSIVE OF VAT IS:	
In figures:	**R**
In words:	

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

Signature(s)			
Name(s)			
Capacity			
Name of tenderer:			
Name of witness:	*(Insert name and address of organisation)*	Date	
Signature of witness:			

2. ACCEPTANCE

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

2.2. Deviations from and amendments to the documents listed in the Tender Data and any addenda thereto listed in the Returnable Schedules as well as any changes to the terms of the Offer agreed by the tenderer and the Employer during this process of offer and acceptance, are contained in the Schedule of Deviations attached to and forming part of this Form of Offer and Acceptance. No amendments to or deviations from said documents are valid unless contained in this Schedule.

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

Signature(s):			
Name(s):			
Capacity:			
For the employer:	**Langeberg Municipality, , Main Street 28, Ashton**		
Name of witness:		Date:	
Signature of witness:			

Contract Data provided by the Employer

GENERAL CONDITIONS OF CONTRACT

The following standardized 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 from 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's Agent.

The Pro-formas bound with the General Conditions of Contract 2015, on pages 96 to 116 shall not apply to this Contract and shall be replaced with the documentation bound into this Contract Document.

The General Conditions of Contract 2015 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, Second Edition, 2015, are applicable to this Contract:

Clause 1.1.1.13:
The Defects Liability Period is **12** months.

Clause 1.1.1.14:

The time for achieving Practical Completion is **Not Later than June 2025**, inclusive of the 14-day period referred to in Clause 5.3.2 below, and inclusive of non-working days referred to in Clause 5.8.1 below, but exclusive of special non-working days (Clause 5.8.1).

Clause 1.1.1.15:

The **Employer** is the LANGEBERG MUNICIPALITY, represented by the Director: Infrastructure Services and/or such other person or persons duly authorised thereto by the Employer in writing.

The name of the **Employer** is: **Langeberg Municipality**

Clause 1.2.1.2:

The address of the Employer is:

Physical address: Main Street 28
Ashton
Postal address: Private Bag X2
Ashton
6715

E-mail address: mjohnson@langeberg.gov.za

Clause 1.1.1.16:

The **Employer's Agent**, referred to in the documents, is the firm of WEC-Consult (Pty)Ltd, acting through a director, an associate or an official authorised thereto in writing.

The name of the **Employer's Agent** is: **WEC-Consult (Pty) Ltd**

Clause 1.2.1.2:

The address of the **Employer's Agent** is:

Physical address: Unit 24, Oewerpark
Rokewood Road
Stellenbosch
7600

Postal address: Private Bag X2
Ashton
6715

E-mail address: harris@wec-consult.co.za

Clause 1.1.1.26:

The Pricing Strategy is a Re-measurement Contract.

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 "**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 the successful tenderer's Offer and no rights shall accrue.

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:

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 5.11.2 Suspension of the Works
e) Clause 5.12.4 Acceleration instead of extension of time
f) Clause 6.3.1 Ordering of any variation that causes the contract price to exceed the contract sum
g) Clause 6.10.10 Advance payment, for items not listed in the Advance Payment Schedule.

Clause 4.3:

Add the following clause after Clause 4.3.2.:

4.3.3 The Employer and the Contractor shall enter into an agreement to complete the work required for the construction of the works in terms of the provisions of Section 37(2) of the Occupational Health and Safety Act (Act 85 of 1993) and the Construction Regulations promulgated thereunder.

An agreement is included in the Contract Document (C1.2 of Contract Data) and shall be completed and submitted to the Employer together with a letter of good standing from the Compensation Commissioner (if not insured with a Licenced Compensation Insurer) within fourteen (14) days after the Commencement Date. The Contractor shall ensure that any letter of good standing shall be timeously renewed in order that it remains in full force for the duration of the Contract.

Clause 5.3.1:

The documentation required before commencement with Works execution is permitted:

a) Approved Health and Safety Plan (Refer to applicable clause in the Health and Safety Specification in Part C3.5 in the Scope Work)
b) Initial programme (Refer to Clause 5.6)
c) Security (Refer to Clause 6.2)
d) Evidence of Insurance (Refer to Clause 8.6)
e) Occupational Health and Safety Agreement (Part C1.4 in Agreements and Contract Data)
f) Letter of good standing from the Compensation Commissioner, or a licensed compensation insurer (Refer to Clause 4.3)
g) Protection of the Environment Declaration (Part C1.5 in Agreements and Contract Data)
h) Proof of Registration / Letter of Good Standing with the Bargaining Council for the Civil Engineering Industry (BCCEI)

Add the following to Clause 5.3.1:

Such instruction shall, where the Contract Sum exceeds sixty million Rand (R60 000 000.00),, also be subject to the issuing, by the Provincial Director of the Department of Labour, of a construction work permit to perform the intended construction work in terms of Clause 5.3.4 below.

Clause 5.3.2:

The time to submit the documentation required before commencement with Works execution is 14 days.

Clause 5.3.3:

Add the following to Clause 5.3.3:

Notwithstanding the above, where the Contract Sum exceeds sixty million Rand (R60 000 000.00), and a construction work permit from the Provincial Director of the Department of Labour is required, commencement of the Works shall not be deemed to take place until such construction work permit has been issued by the Provincial Director.

Clause 5.3.4:

Add the following Clause after Clause 5.3.3:

5.3.4 Application for Construction Work Permit

Where the Contract Sum exceeds sixty million Rand (R60 000 000.00), the Employer shall, in compliance with Regulation 3 of the Construction Regulations, read together with the exemptions published in Government Notice dated 7 July 2015, apply to the Provincial Director of the Department of Labour for a construction work permit to perform the intended construction work. The employer will apply for the construction work permit as soon as possible after its Bid Adjudication Committee has awarded the contract, and the period that the Department of labour requires to issue the permit will run concurrently with the appeal period.

Should the issuing of a construction work permit delay the Employer's Agent's instruction to commence executing the Works and this in turn causes a delay to Practical Completion, 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 a 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 5.4.2:

5.4.3 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 5.8.1:

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 5.12.2.2:

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 **work on the critical path** of the approved construction programme.

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 5.13.1:

The penalty for failing to complete the Works is **R20 000** per calendar day.

Clause 5.14.1:

The requirements for achieving Practical Completion are:

a) **Dewatering installation -** Full mechanical/electrical installation and 28-day trail and operation period completed, wet and dry commissioning completed by the Contractor and witnessed and approved by the Employer's Agent's Representative.
b) **Raw sewer pump station** – Full mechanical/electrical installation and 28-day trail and operation period completed, wet and dry commissioning completed by the Contractor and witnessed and approved by the Employer's Agent's Representative.
c) **New Biological Reactor** – Full mechanical/electrical installation and 28-day trail and operation period completed, wet and dry commissioning completed by the Contractor and witnessed and approved by the Employer's Agent's Representative.
d) **SST's Division box** – Full mechanical installation and 28-day trail and operation period completed, wet and dry commissioning completed by the Contractor and witnessed and approved by the Employer's Agent's Representative.
e) **RAS Pump Station** – Full mechanical/electrical installation and 28-day trail and operation period completed, wet and dry commissioning completed by the Contractor and witnessed and approved by the Employer's Agent's Representative.
f) **Secondary Settling Tank (SST's)** – Full mechanical/electrical installation and 28-day trail and operation period completed, wet and dry commissioning completed by the Contractor and

witnessed and approved by the Employer's Agent's Representative.

g) **Mechanical coarse screen (Inlet Works)** – Full mechanical/electrical installation and 28-day trail and operation period completed, wet and dry commissioning completed by the Contractor and witnessed and approved by the Employer's Agent's Representative.
h) **Electronic Control Room and Generator Room** – Full mechanical/electrical installation and 28-day trail and operation period completed, wet and dry commissioning completed by the Contractor and witnessed and approved by the Employer's Agent's Representative.
i) **Chlorination building** – Full mechanical/electrical installation and 28-day trail and operation period completed, wet and dry commissioning completed by the Contractor and witnessed and approved by the Employer's Agent's Representative.
j) **Demolishing of the existing Various small concrete structures** completed
k) **Various small structures** - concrete work completed and grating and handrails installed.
l) **All interconnecting pipework** installed.
m) **Roadworks, Walkways and Stormwater** completed
n) **Water testing** of all water retaining structures completed.

Clause 5.16.3:

The latent defects period is **10** years

Clause 6.2.1:

The security to be provided by the Contractor shall be a performance guarantee of **10%** of the Contract Sum. The 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 6.5.1.2.3:

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 **not** be subject to any contract price adjustment during the first twelve months after the Commencement Date and the rates and prices tendered in the bill of quantities shall be final and binding throughout the period of the Contract. Thereafter contract price adjustment will apply. Notwithstanding the above, 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.

No Contract price adjustment claims will be accepted which are submitted later than 60 days after the date of the Completion Certificate.

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:

a) Civil Works

The value of "x" is 0,15.

The values of the coefficients are:
a = 0,25 b = 0,15 c = 0,55 d = 0,05

The base month is the sixth month after the month in which the tender closed.

In addition, 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 – roads, general **(excluding 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.

The amount "Ac" shall be sub-divided into Ac_1 and Ac_2, as appropriate, and each of these shall be multiplied by its Contract Price Adjustment Factor (CPAF), with the resultant amounts added together to produce the adjustment as envisaged in the CPA Schedule:

where

Ac_1 is the proportion of Ac applicable to "Concrete works", and
Ac_2 is the proportion of Ac applicable to "Roads and earthworks"

and where

$Ac_1 = T_1 – S_1 – D_1 – E_1 – G_1 – Ap_1$, and
$Ac_2 = T_2 – S_2 – D_2 – E_2 – G_2 – Ap_2$

in which formulae the values associated with the symbols T_1 and T_2…. Ap_1 and Ap_2 shall be applicable to the proportions of T …. Ap in "Bulk Earthworks" and "Township Roads and Services", respectively.

Furthermore, the value of the General Items shall be proportional to the value of work done and materials on Site in T_1 and T_2 respectively.

b) Supply of Mechanical Plant and Equipment
The amount of Contract Price Adjustment (CPA) will be as follows:

$$= PT(1-x)\left[a\frac{(L1-L0)}{L0} + b\frac{(M1-M0)}{M0} + c\frac{(S1-S0)}{S0}\right]$$ where:

PT = Contract sum for the supply of plant and equipment subject to escalation which sum shall exclude VAT
x = Portion of the original contract sum to be taken as fixed and therefore not subjected to escalation

a = Percentage of contract sum to be taken as that portion that consist of Actual Labour cost

L0 = SEIFSA index of Actual Labour cost (all hourly paid employees) (Table C3) for the month during which tender enquiry closes

L1 = SEIFSA index of Actual Labour cost (all hourly paid employees) (Table C3 for the month during which delivery takes place as specified

b = Percentage of contract sum to be taken as that portion that consist of Mechanical Engineering materials

M0 = SEIFSA Index for Mechanical Engineering materials (Table G) for the month during which tender enquiry closes

M1 = SEIFSA Index for Mechanical Engineering materials (Table G) for the months during which delivery as specified takes place

c = Percentage of contract sum to be taken as that portion that consists

of **Steel materials**

S0 = SEIFSA Index for Steel materials (Table E) for the month during which tender enquiry closes

S1 = SEIFSA Index for Steel materials (Table E) for the month during which delivery as specified takes place

and **Stainless-Steel materials**

S_0 = SEIFSA Index for Stainless Steel materials (Table Q-(A)) for the month during which tender enquiry closes

S_1 = SEIFSA Index for Stainless Steel materials (Table Q-(A)) for the month during which delivery as specified takes place

The following values for x, a, b and c shall apply:
x = 0.15%; a = 0.45%; b = 0.35%; C= 0.20

c) Supply for Electrical Plant and Equipment

The amount of Contract Price Adjustment (CPA) will be as follows:

$$= PT(1-x)\left[a\frac{(L1-L0)}{L0} + b\frac{(M1-M0)}{M0} + c\frac{(S1-S0)}{S0}\right]$$ where:

PT = Contract sum for the supply of plant and equipment subject to escalation which sum shall exclude Value Added Tax

x = Portion of the original contract sum to be taken as fixed and therefore not subjected to escalation

a = Percentage of contract sum to be taken as that portion that consist of Actual Labour cost

L0 = SEIFSA Index of Actual Labour cost (all hourly paid employees) (Table C3) for the month during which tender enquiry closes

L1 = SEIFSA Index of Actual Labour cost (all hourly paid employees) (Table C3 for the month during which delivery takes place as specified

b = Percentage of contract sum to be taken as that portion that consist of Electrical Engineering materials

M0 = SEIFSA Index for Electrical Engineering materials (Table G) for the month during which tender enquiry closes

M1 = SEIFSA Index for Electrical Engineering materials (Table G) for the months during which delivery as specified takes place

c = Percentage of contract sum to be taken as that portion that consists of Copper Cabling

S0 = SEIFSA Index for Copper per Metric Ton (Table F) for the month during which tender enquiry closes

S1 = SEIFSA Index for Copper per Metric Ton (Table Q-F) for the month during which delivery as specified takes place

The following values for x, a, b and c shall apply:
x = 0.15%; a = 0.45%; b = 0.35%; c= 0.20

d) Erection and Commissioning of all Plant and Equipment

The amount of Contract Price Adjustment (CPA) will be as follows:

$$= PT(1 - x)\left[\frac{(L_1 - L_0)}{L_0}\right]$$ where:

PT = Contract sum for the erection and commissioning of all plant and equipment subject to escalation which sum shall exclude Value Added Tax

x = Portion of the original contract sum to be taken as fixed and therefore not subjected to escalation

L_0 = SEIFSA Index of Actual Labour cost (all hourly paid employees) (Table C3) for the month during which tender enquiry closes

L_1 = SEIFSA Index of Actual Labour cost (all hourly paid employees) (Table C3) for the month in which the work is completed as specified

The following value for x shall apply:
x = 0.15

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 at the end of this Part 1: Contract Data provided by the Employer.

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 28 days before the closing date for tenders, no costs other than those that can be claimed under Clause 5.12.3 shall be added to the contract price.

Add the following Clause after Clause 6.8.4:
Clause 6.8.5 Price basis for imported equipment:

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 Equipment"**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 Equipment"** (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 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 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 **Employer's** main banker rate referred to above, then the **Employer's** main banker 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 Equipment"**.

(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 Equipment"** 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 Equipment"**, 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 Equipment"** 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.

(c) The Tenderer shall state the Customs Duty Tariff Reference ap plicable 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:

The percentage advance on materials not yet built into the Permanent Works is **80%**.
The percentage advance on Plant not yet supplied to site is **90%**.

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 Contractors shall be subject to a retention by the Employer of an amount of **10%** of the said amounts due to the Contractor, with no limit. A guarantee in lieu of retention is not permitted.

Clause 6.10.4:

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.

Clause 6.10.10:

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 a 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 No. 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 8.6.6:

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 worded precisely as given in part C1.6 Insurance Broker's Warranty.

Clause 9.2.1:

Add the following Clauses after Clause 9.2.1.3.8:

9.2.1.3.9 The Contractor committed a corrupt or fraudulent act during the procurement process or the execution of the contract.

9.2.1.3.10 An official or other role player committed any corrupt or fraudulent act during the procurement process or in the execution of the contract that benefited the Contractor.

Clause 10.5.3:

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

Clause 10.7:

Add the following Clauses after Clause 10.7.3:

10.7.4 The Arbitrator must be a legal practitioner with more than 10 years legal experience. Must have a good knowledge of the Municipal Finance Management Act and other relevant Municipal Legislation, and may in addition be qualified in respect of the main nature of the Contract (Engineer, Quantity Surveyor, Accountant, etc.).

ADDITIONAL CONDITIONS OF CONTRACT

Add the following clause 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.

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 :	……..….		

Clause 6.8.3: Variation in the cost of special material
Refer to special materials schedule on the next page.

SPECIAL MATERIALS

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 rates and prices for the special materials (current at the time of tender) shall be as stated in the schedule below, or where required, shall furnished by the tenderer. Rates or prices furnished by the tenderer shall not include VAT but shall include all other obligatory taxes and levies). Only those materials listed by the Employer below shall be considered as special materials.

Special Material	**Unit**	**State source (refinery)**	**Current Rate or Price**
Reinforcing steel	Ton		
Stainless-Steel materials	kg		
Steel Products	Ton		
Electrical & Telecom Cables	kg		

Notes:

1. When called upon to do so, the tenderer/contractor shall substantiate rates or prices furnished at the time of tender, or during the execution of the contract, with acceptable documentary evidence.

2. In the case of bituminous products, the tenderer shall state, in the schedule above, the source of the bitumen upon which the tendered rates are based.

3. Extra over rates to cover the cost of transporting bitumen from beyond the borders of the Western Cape Province have been measured separately in the Bills of Quantities.

SIGNED ON BEHALF OF TENDERER: . . . . . .

Note: Tenderers should not add any Special Materials to this list. They may qualify their tenders should they believe any material which will be used in the Contract constitutes a Special material. Their tender will be adjudicated with qualifications when compared to the other tenders

C1.3 FORM OF GUARANTEE

PERFORMANCE GUARANTEE

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

GUARANTOR DETAILS AND DEFINITIONS

"Guarantor" means:

"Physical address:

"Employer" means: **Langeberg Municipality**

"Contractor" means:

"Employer's Agent" means: **WEC-Consult (Pty) Ltd**

"Works" means: **CONTRACT NO: T41/2022- REFURBISHMENT AND UPGRADE OF ROBERTSON WASTEWATER TREATMENT WORKS**

"Site" means: The site as defined in Clause 1.1.1.29 of the General Conditions of Contract

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

"Contract Sum" means: The accepted amount inclusive of tax of R

Amount in words:

"Guaranteed Sum" means: The maximum aggregate amount of R

Amount in words:

"Expiry Date" means: The date of issue by the Employer's Agent of the Certificate of Completion of the Works

CONTRACT DETAILS

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

PERFORMANCE GUARANTEE

1. The Guarantor's liability shall be limited to the amount of the Guaranteed Sum.

2. The Guarantor's period of liability shall be from and including the date of issue of this Performance Guarantee and up to and including the Expiry Date or the date of issue by the Employer's Agent of the Certificate of Completion of the Works or the date of payment in full of the Guaranteed Sum, whichever occurs first. The Employer's Agent and/or the Employer shall advise the Guarantor in writing of the date on which the Certificate of Completion of the Works has been issued.

3. The Guarantor hereby acknowledges that:

3.1 any reference in this Performance Guarantee to the Contract is made for the purpose of convenience and shall not be construed as any intention whatsoever to create an accessory obligation or any intention whatsoever to create 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. Payment by the Guarantor in terms of 5 will only be made against the return of the original Performance Guarantee by the Employer.

10. The Employer shall have the absolute right to arrange his affairs with the Contractor in any manner which the Employer may deem fit and the Guarantor shall not have the right to claim his release from this Performance Guarantee on account of any conduct alleged to be prejudicial to the Guarantor.

11. The Guarantor chooses the physical address as stated above for the service of all notices for all purposes in connection herewith.

12. This Performance Guarantee is neither negotiable nor transferable and shall expire in terms of 2, where after no claims will be considered by the Guarantor. The original of this Guarantee shall be returned to the Guarantor after it has expired.

13. This Performance Guarantee, with the required demand notices in terms of 4 or 5, shall be regarded as a liquid document for the purposes of obtaining a court order.

14. Where this Performance Guarantee is issued in the Republic of South Africa the Guarantor hereby consents in terms of Section 45 of the Magistrate's Courts Act No 32 of 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 t he 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 18 October 2016) approved for issue of contract guarantees to the Municipality:

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:
ABSA Insurance
Coface s.a.
Compass Insurance Co.
Constantia Insurance Co.
Credit Guarantee Insurance Co.
Guardrisk Insurance Co.
Hollard Insurance Company Ltd.
Home Loan Guarantee Co.
Infiniti Insurance Limited
Lombard Insurance
Mutual & Federal Insurance Co.
New National Assurance Co.
Regent Insurance Co.
Renasa Insurance Company Ltd.
Santam Limited
Zurich Insurance Co.

C1.4 OCCUPATIONAL HEALTH AND SAFETY AGREEMENT

AGREEMENT MADE AND ENTERED INTO BETWEEN THE LANGEBERG MUNICIPALITY (HEREINAFTER CALLED THE "EMPLOYER") AND

……..……..…… ,
(Contractor/Mandatary/Company/CC Name)

IN TERMS OF SECTION 37(2) OF THE OCCUPATIONAL HEALTH AND SAFETY ACT, ACT No. 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 appended Occupational Health and Safety Conditions and undertake to comply therewith at all times.

I hereby also undertake to comply with the Occupational Health and Safety Specification and Plan.

Signed at .....on the.....day of.....20….

_____ _____
Witness **Mandatary**

Signed at ..... on the.....day of.....20 ....

_____ _____
Witness for and on behalf of
LANGEBERG MUNICIPALITY

OCCUPATIONAL HEALTH AND SAFETY CONDITIONS

1. The Chief Executive Officer of the Contractor shall assume the responsibility in terms of Section 16(1) of the Occupational Health and Safety Act (as amended). Should the Contractor assign any duty in terms of Section 16(2), a copy of such assignment shall immediately be provided to the representative of the Employer as defined in the Contract.

2. All work performed on the Employer's premises shall be performed under the supervision of the construction supervisor who understand the hazards associated with any work that the Contractor performs on the site in terms of Construction Regulations 2014.

3. The Contractor shall appoint a Competent Person who shall be trained on any occupational health and safety aspect pertaining to them or to the work that is to be performed.

4. The Contractor shall ensure that he familiarises himself with the requirements of the Occupational Health and Safety Act and that he, his employees, and any sub-contractors, comply with them.

5. Discipline in the interests of occupational health and safety shall be strictly enforced.

6. Personal protective equipment shall be issued by the Contractor as required and shall be worn at all times where necessary.

7. Written safe work procedures and appropriate precautionary measures shall be available and enforced, and all employees shall be made conversant with the contents of these practices.

8. No substandard equipment/machinery/articles or substances shall be used on the site.

9. All incidents referred to in terms of Section 24 of the Occupational Health and Safety Act shall be reported by the Contractor to the Department of Labour and the Employer.

10 The Employer hereby obtains an interest in the issue of any formal inquiry conducted in terms of Section 32 of the Occupational Health and Safety Act and into any incident involving a Contractor and/or his employees and/or his sub-contractor/s.

11. No use shall be made of any of the Employer's machinery / plant / equipment / substance / personal protective equipment or any other article without prior arrangement and written approval.

12. No alcohol or any other intoxicating substance shall be allowed on the site. Any person suspected of being under the influence of alcohol or any other intoxicating substance shall not be permitted access to, or allowed to remain on the site.

13. Prior to commencement of any work, verified copies of all documents mentioned in the agreement, must be presented to the Employer

C1.5 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.: T41/2022

CONTRACT TITLE: UPGRADING OF THE ROBERTSON WASTEWATER TREATMENT WORKS

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 Bills of Quantities 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

C1.6 INSURANCE BROKER'S WARRANTY

Pro Forma

Logo

Letterhead of Contractor's Insurance Broker

Date

LANGEBERG MUNICIPALITY

Municipal Manager
28 Main Street,
Ashton
6715

Dear Sir

CONTRACT NO.: **T41/2022**

CONTRACT TITLE: **UPGRADING OF THE ROBERTSON WASTEWATER TREATMENT WORKS:**

NAME OF CONTRACTOR:

I, the undersigned, do hereby confirm and warrant that all the insurances required in terms of the abovementioned contract have been issued and/or in the case of blanket/umbrella policies, have been endorsed to reflect the interests of the LANGEBERG MUNICIPALITY with regard to the abovementioned 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: _____

C1.7 DECLARATION BY TENDERER

I / We acknowledge that I / we am / are fully acquainted with the contents of the conditions of tender of this tender document and that I / we accept the conditions in all respects.

I / We agree that the laws of the Republic of South Africa shall be applicable to the contract resulting from the acceptance of *my / our tender and that I / we elect *domicillium citandi et executandi* (physical address at which legal proceedings may be instituted) in the Republic at:

_____

_____

_____

I / We accept full responsibility for the proper execution and fulfillment of all obligations and conditions devolving in me / us under this agreement as the principal liable for the due fulfillment of this contract.

I / We furthermore confirm I / we satisfied myself / ourselves as to the corrections and validity of my / our tender; that the price quoted cover all the work / items specified in the tender documents and that the price(s) cover all my / our obligations under a resulting contract and that I / we accept that any mistake(s) regarding price and calculations will be at my / our risk.

I / We furthermore confirm that my / our offer remains binding upon me / us and open for acceptance by the Purchases / Employer during the validity period indicated and calculated from the closing date of the bid.

SIGNATURE		NAME (PRINT)	
CAPACITY		DATE	
NAME OF FIRM			
WITNESS 1		WITNESS 2	

C1.8 CONTRACT OF TEMPORARY EMPLOYMENT AS COMMUNITY LIAISON OFFICER

Construction Contract No: T41/2022

PROJECT: REFURBISHMENT AND UPGRADE OF ROBERTSON WASTEWATER TREATMENT WORKS

AGREEMENT made between the CONTRACTOR and the Community Liaison Office……., hereafter referred to as the CLO, for the appointment and employment of a CLO for the duration of the work in respect of the above named construction contract.

1. **THE PARTIES HAVE AGREED THAT**

The CLO will be employed by the CONTRACTOR on a temporary basis for the duration of the work from the date of signing this agreement to the date of practical completion as defined in the Contract, subject to all the conditions set out below.

2. **THE DUTIES OF THE COMMUNITY LIAISON OFFICER SHALL BE:**

1. to keep the community informed on the progress of the project;
2. to keep the Contractor informed on relevant Community affairs and possible grievances;
3. to manage the recruitment of workers from the Sub-Council Job-Seekers Database;
4. to assist the Contractor's supervisory staff in the management of the workers.

3. **THE FOLLOWING CONDITIONS OF EMPLOYMENT SHALL APPLY:**

The Conditions of Temporary Employment as applicable on this Contract for the workers recruited from the Community shall apply equally to the CLO, except that the rate of remuneration shall be R365.00 per working day. These conditions that apply are listed below as they appear in the Contract of Temporary Employment:

3.1 If required to work on a statutory public holiday or Sunday the payment will be double the amount stated in the previous paragraph.

3.2 Maximum hours of work:

(i) 9¼ hours per day
(ii) 45 hours per week;
(iii) 5 days per week;
(iv) 5 hours without an interval, whereupon there shall be an interval of at least 30 minutes;
(v) A spread-over period of 12 hours.

3.3 The CLO shall be entitled to payment where he is prevented from working by reasons which are within the control of the Contractor.

3.4 On days when it is raining the Contractor may, before 9 a.m., decide not to open the site and there will be no pay.

If the Contractor closes the site between 9 a.m. and 1 p.m., the CLO will be paid half the daily wage.

If the site works later than 1 p.m., the CLO will be paid the full daily wage.

3.5 Workers and the CLO will not be permitted to work under conditions of:
(i) undisciplined or unruly behaviour;

(ii) insubordination to Team Leader, Supervisors or Management;
(iii) abuse of intoxicating substances;
(iv) criminal actions by the employee;
(v) strike action or political stayaways.

3.6 Workers, including the CLO, may be dismissed after two official written warnings for the following behaviour:

(i) undisciplined or unruly behavior;
(ii) insubordination to Team Leader, Supervisors or Management;
(iii) abuse of intoxicating substances;
(iv) willful or negligent damage to or loss of machines or equipment.

The Contractor shall ensure that he has statements from at least two witnesses concerning any of the above situations.

The Contractor shall inform the CLO within 24 hours of any warning issued to workers employed from the Job-Seekers Database.

3.7 The CLO will be paid on a Friday afternoon every two weeks, one week in arrears.

3.8 The CLO shall be given a statement with each payment on which is recorded:

(i) the name of the Contractor;
(ii) the CLO's name;
(iii) the number of days worked by the CLO;
(iv) the rate per day;
(v) the details of any deductions made;
(vi) the actual amount paid to the CLO.

3.9 No deduction shall be made from the remuneration except where the CLO consents in writing or unless the Contractor is permitted or required to do so by law or the order of any competent court.

3.10 The CLO shall be supplied free of charge with all health and safety equipment required by the Occupation Health and Safety Act. The equipment shall remain the property of the Contractor.

3.11 The Contractor must give the CLO at least one week's notice of the termination of the Contract of Temporary Employment. If this is not done, the CLO must be paid earnings for five days. This condition does not apply if the CLO is dismissed.

3.12 At the end of the period of temporary employment, the Contractor shall provide a Certificate of Service recording the Contractor's name, the CLO's name and address, the period of service, the type of work on which the CLO was engaged and the rate of remuneration on termination.

4. TERMINATION OF AGREEMENT

4.1 If the CLO can no longer perform and execute his/her duties as detailed in this agreement, this agreement will be terminated without prejudice to any rights under this agreement.

5. THE CONDITIONS OF THIS AGREEMENT

5.1 The parties expressly declare that this agreement contains all the conditions negotiated between them, and no condition or stipulation not contained herein shall be binding upon the parties.

6. **THUS AGREED AND SIGNED BY THE PARTIES**:

Contractor: …….....

Community Liaison officer:

Date:

.....

PART C2 : Pricing Data

CONTENTS **PAGE NUMBER**

C2.1 PRICING INSTRUCTIONS **169**
C2.2 : PRICING SCHEDULE DECLARATION **171**
C2.3 BILL OF QUANTITIES **172**

C2.1 PRICING INSTRUCTIONS

1. Measurement and payment shall be in accordance with the relevant provisions of the COLTO Standard Specification for Road and Bridge Works for State Authorities (1998 edition) as amended in the Scope of Works.

2. The units of measurement described in the Bill of Quantities are metric units. Abbreviations used in the Bill of Quantities are as follows:

%	=	percent
h	=	hour
ha	=	hectare
kg	=	kilogram
kl	=	kilolitre
km	=	kilometer
km-pass	=	kilometre-pass
kPa	=	kilopascal
kW	=	kilowatt
l	=	litre
m	=	meter
mm	=	millimeter
m^2	=	square meter
m^2-pass	=	square meter-pass
m^3	=	cubic meter
m^3-km	=	cubic meter-kilometer
MN	=	meganewton
MN.m	=	meganewton-meter
MPa	=	mega Pascal
No.	=	number
Prov sum	=	Provisional sum
PC sum	=	Prime Cost sum
R/only	=	Rate only
sum	=	lump sum
t	=	ton (1000 kg)
W/day	=	Work day

3. For the purpose of the Bill of Quantities, the following words shall have the meanings hereby assigned to them:

Unit:	The unit of measurement for each item of work as defined in the COLTO Standard Specification for Road and Bridge Works for State Authorities (1998 edition).
Quantity:	The number of units of work for each item.
Rate:	The agreed payment per unit of measurement.
Amount:	The product of the quantity and the agreed rate for an item.
Lump sum:	An agreed amount for an item, the extent of which is described in the Bill of Quantities but the quantity of work of which is not measured in any units.

4. Unless otherwise stated, items are measured net in accordance with the drawings, and no allowance is made for waste.

5. It will be assumed that prices included in the bills of quantities are 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)

6. The prices and rates in the Bill of Quantities are to be fully inclusive prices for the work described under the several items. Such prices and rates cover all costs and expenses that may

be required in and for the execution of the work described in accordance with the provisions of the Scope of Work, and shall cover
the cost of all general risks, liabilities, and obligations set forth or implied in the Contract Data, as well as overhead charges and profit. Reasonable prices 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.

7. Where the Scope of Work requires detailed drawings and designs or other information to be provided, all costs associated therewith are deemed to have been provided for and included in the unit rates and sum amount tendered such items.

8. The short descriptions of the items of payment given in the Bill of Quantities are only for the purposes of identifying the items. More details regarding the extent of the work entailed under each item appear in the Scope of Work.

9. The item numbers appearing in the Bill of Quantities refer to the corresponding item numbers in the
Standardised Specification for Civil engineering Construction SABS 1200, or the COLTO Standard Specification for Road and Bridge Works for State Authorities (1998 edition), if applicable**.**

10. **A price or rate shall be entered against each item in the Bill / Schedule of Quantities.** Should the Tenderer not wish to make any charge in respect of an item, a rate of zero "R0.00" or "Nil" shall be entered. The Tenderer may not group a number of items together and tender one lump sum for such group of items.

    The tendered rates shall be valid irrespective of any change in the quantities during the execution of the works projects under the contract.

    No unauthorized amendment shall be made to the Schedule of Rates / Bill of Quantities or any part of the Pricing Data. If such amendment is made or if the Schedule of Rates / Bill of Quantities is not properly completed, the tender will be rejected.

11. The quantities set out in the Bill of Quantities are approximate and do not necessarily represent the actual amount of work to be done. The quantities of work accepted and certified for payment will be used for determining payments due and not the quantities given in the Bill of Quantities.

12. Reasonable compensation will be received where no pay item appears in the Bill of Quantities in respect of work required in terms of the Contract and which is not covered in any other pay item.

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

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

C2.2 : PRICING SCHEDULE DECLARATION

NOTE:

1. **Only firm prices will be accepted. Non-firm prices will not be considered.**
2. **All delivery costs MUST be included in the bid price, for delivery at the prescribed destination.**
3. **Document MUST be completed in non-erasable black ink.**
4. **NO correction fluid/tape may be used.**
   a. **In the event of a mistake having been made, it shall be crossed out in ink and be accompanied by an initial at each and every alteration.**
5. **The Bidder MUST indicate whether he/she/the entity is a registered VAT Vendor or not.**
   a. **In the case of the Bidder not being a registered VAT Vendor, both columns (amount/rate excluding AND including VAT) must reflect the same amount.**

I / We _ (full name of Bidder) the undersigned in my capacity as _____ of the firm ___ hereby offer to LANGEBERG Municipality to render the services as described, in accordance with the specification and conditions of contract to the entire satisfaction of the LANGEBERG Municipality and subject to the conditions of tender, for the amounts indicated hereunder:

	INDICATE WITH AN 'X'									
Are you/is the firm a registered VAT Vendor	**YES**						**NO**			
If "YES", please provide VAT number										

Please note the following:

1. Langeberg Municipality reserves the right to downward adjust the scope of work/ quantity required to stay within its budget.
2. Only firm prices will be accepted and non-firm prices will not be considered.

PRICING SCHEDULE:

SIGNATURE		NAME (PRINT)	
CAPACITY		DATE	
NAME OF FIRM			

C2.3 BILL OF QUANTITIES

CONTENTS

A: PRELIMINARY AND GENERAL
SECTION PG1: PRELIMINARY AND GENERAL

B: CIVIL
SECTION C1: SITE CLEARANCE AND EARTH WORKS
SECTION C2: INLET WORKS
SECTION C3: BIOLOGICAL REACTOR
SECTION C4: SST'S DIVISION BOX
SECTION C5: CLARIFIER
SECTION C6: ACTIVATED SLUDGE RECYCLE PUMP STATION (RAS)
SECTION C7: CHLORINATION CONTACT CHANNEL
SECTION C8: SLUDGE DEWATERING
SECTION C9: VARIOUS SMALL STRUCTURES
SECTION C10: INTERCONNECTING PIPE WORK
SECTION C11: ROADWORKS AND STORMWATER DRAINAGE
SECTION C12: CABLE DUCTS
SECTION C13: MCC AND GENERATOR BUILDING
SECTION C14: FENCING AND SECURITY

C: MECHANICAL
SECTION M1: INLET WORKS
SECTION M2: BIOLOGICAL REACTOR
SECTION M3: SECONDARY SETTLING TANK AND DIVISION BOX
SECTION M4: PUMP STATIONS
SECTION M5: MECHANICAL DEWATERING
SECTION M6: CHLORINATION EQUIPMENT
SECTION M7: DIVISION BOXES, CHLORINE CONTACT CHANNEL, SPLITTER AND OVERFLOW BOX

D: ELECTRICAL
SECTION E1: LOW VOLTAGE INSTALLATION
SECTION E2: CABLING
SECTION E3: CABLE SUPPORT SYSTEMS
SECTION E4: BUILDING SERVICES ELECTRICAL
SECTION E6: GENERATOR

SUMMARY OF SCHEDULE(S) OF QUANTITIES

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
P	SANS 1200 A	PRELIMINARY AND GENERAL					
P.1	8.3	SCHEDULED FIXED-CHARGE AND VALUE-RELATED ITEMS					
P.1.1	8.3.1	Contractual Requirements	Sum	1.00			
P.1.2	PSA 8.4.6	Contractors obligations in respect of Health and Safety	Sum	1.00			
P.1.3	PSA 8.4.7	Contractors obligations in respect of the Enviromental Management Programme	Sum	1.00			
		Establishment of Facilities on the Site					
	8.3.2.1	Facilities for Engineer					
P.1.4	PSAB	a) Furnished offices	Sum	1.00			
P.1.5		c) Nameboard	Sum	1.00			
	8.3.2.2	Facilities for Contractor					
P.1.6		a) Offices and storage sheds	Sum	1.00			
P.1.7		b) Workshops	Sum	1.00			
P.1.8		d) Living accommodation	Sum	1.00			
P.1.9		e) Ablution and latrine facilities	Sum	1.00			
P.1.10		f) Tools and equipment	Sum	1.00			
P.1.11		g) Water supplies, electrical power and communication	Sum	1.00			
P.1.12		h) Dealing with water	Sum	1.00			
P.1.13		i) Access	Sum	1.00			
P.1.14	8.3.3	Other fixed charge obligations	Sum	1.00			
P.1.15	8.3.4	Removal of Site Establishment	Sum	1.00			
P.2	8.4	SCHEDULED TIME-RELATED ITEMS					
P.2.1	8.4.1	Contractual Requirements	Sum	1.00			
	8.4.2	Operate and maintain facilities on the Site:					
	8.4.2.1	Facilities for Engineer					
P.2.2		a) Furnished offices	Sum	1.00			
P.2.3		c) Nameboard	Sum	1.00			
P.2.4		d) Survey assistants and materials	Sum	1.00			
	8.4.2.2	Facilities for Contractor					
P.2.5		a) Offices and storage sheds	Sum	1.00			
P.2.6		b) Workshops	Sum	1.00			
Total Carried Forward							

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
Brought Forward							
P.2.7		d) Living accomodation	Sum	1.00			
P.2.8		e) Ablution and latrine facilities	Sum	1.00			
P.2.9		f) Tools and equipment	Sum	1.00			
P.2.10		g) Water supplies, electric power and communications	Sum	1.00			
P.2.11		h) Dealing with water	Sum	1.00			
P.2.12		i) Access	Sum	1.00			
P.2.13	8.4.3	Supervision for Duration of Construction	Sum	1.00			
P.2.14	8.4.4	Company and Head office Overhead Costs for the Duration of the Contract	Sum	1.00			
P.2.15	8.4.5	Other time-related obligations (Specify).....	Sum	1.00			
P.2.16	PSA 8.4.6	Contractors obligations in respect of Health and Safety	Sum	1.00			
P.2.17	PSA 8.4.7	Contractors obligations in respect of the Environmental Management Programme	Prov Sum	1.00	50,000.00	50,000	00
		Standing time costs					
P.2.18	PSA 8.4.8	a) Plant	day	10.00			
P.2.19	PSA 8.4.8	b) Labour	day	10.00			
P.2.20	PSA 8.4.8	c) Other resources (to be specified by the contractor	day	10.00			
P.3	8.5	SUMS STATED PROVISIONALLY BY ENGINEER					
P.3.1	PSA 8.5	c) For work to be executed by the Contractor (lowering and moving of existing services)	Prov Sum	1.00	100,000.00	100,000	00
P.3.2	PSA 8.5	d) Handling costs and profit in respect of subitem above	%	100,000.00			
P.3.3	PSA 8.5	e) Cost of calls in connection with contract administration by the Engineers's Representative	Prov Sum	1.00	24,000.00	24,000	00
P.3.4	PSA 8.5	f) Handling costs and profit in respect of subitem above	%	24,000.00			
P.3.5	PSA 8.5	g) Material testing by commercial laboratories if required by the Engineer	Prov Sum	1.00	60,000.00	60,000	00
P.3.6	PSA 8.5	h) Handling costs and profit in respect of subitem above	%	60,000.00			
P.3.7	PSA 8.5	i) Monthly remuneration of Community Liason Officer	Prov Sum	1.00	150,000.00	150,000	00
Total Carried Forward							

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
Brought Forward							
P.3.8	PSA 8.5	j) Handling costs and profit in respect of subitem above	%	150,000.00			
P.4	8.7	DAYWORKS					
P.5		LABOUR					
P.5.1	PSA 8.7	a) Unskilled labour	hr	250.00			
P.5.2	PSA 8.7	b) Semi skilled labour	hr	250.00			
P.5.3	PSA 8.7	c) Skilled labour	hr	250.00			
P.6		PLANT					
P.6.1	PSA 8.7	d) Excavators	hr	40.00			
P.6.2	PSA 8.7	f) Front-end loaders	hr	40.00			
P.6.3	PSA 8.7	g) Roller	hr	20.00			
P.6.4	PSA 8.7	h) Trucks (5m^3)	hr	20.00			
P.6.5	PSA 8.7	i) Water Truck	hr	20.00			
P.6.6	PSA 8.7	j) Plate Compactor	hr	40.00			
P.6.7	PSA 8.7	k) Pump (18mm dia. pipe, maximum flow 600l/min, maximum head 30m)	hr	100.00			
P.6.8	PSA 8.7	l) Pump (150mm dia. pipe, maximum flow 1000l/min, maximum head 30m)	hr	100.00			
P.7	8.8	TEMPORARY WORKS					
		Existing services					
P.7.1	8.8.4	c) Excavate by hand in soft material to expose existing services	m^3	200.00			
P.7.2	8.8.4	d) Temporary protection of existing services	Sum	1.00			
		Cost of survey in Terms of the Land Survey Act					
P.7.3	8.8.5	a) Trigonometrical survey and plot boundary pegs - locate and record	Sum	1.00			
Total Carried Forward							

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
Brought Forward							
P.7.4		Diversion of line and pumping for switch-over/tie-ins	Prov Sum	1.00	150,000.00	150,000	00
P.8		**MECHANICAL & ELECTRICAL**					
	Sect. 1	Engineering Responsibilities					
		Allow for all costs and expenses with regards to the following Preliminary & General, Contractual and Health & Safety and Project Management requirements					
		Providing the required guarantee:					
P.8.1		Materials Guarantee	Sum	1.00			
P.8.2		Liaison and coordination with other on-site Contractors/Operations Staff	Sum	1.00			
		Meetings:					
P.8.3		Initial project initiation meeting	Sum	5.00			
P.8.4		Site meetings (monthly)	Sum	24.00			
P.8.5		Ad-hoc technical meetings (site)	Sum	12.00			
		Site inspection, surveys, equipment design and workshop drawings:					
P.8.6		i) Mechanical Component	Sum	1.00			
P.8.7		ii) Electrical Component	Sum	1.00			
P.8.8		iii) Generator Component	Sum	1.00			
P.8.9		iv) Telemetry & SCADA Component	Sum	1.00			
		As-built Drawings and O&M Manuals:					
P.8.10		i) Mechanical Component	Sum	1.00			
P.8.11		ii) Electrical Component	Sum	1.00			
P.8.12		iii) Generator Component	Sum	1.00			
P.8.13		iv) Telemetry & SCADA Component	Sum	1.00			
		Training (training program by a Engineer, accompanied by specialist equipment suppliers):					
P.8.14		i) Mechanical Component	Sum	1.00			
P.8.15		ii) Electrical Component	Sum	1.00			
P.8.16		iii) Generator Componet	Sum	1.00			
P.8.17		iv) Telemetry & SCADA Component	Sum	1.00			
P.8.18		Commissioning, Testing, Monitoring and Optimisation of Complete System	Sum	1.00			
Total Carried Forward							

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
Brought Forward							
P.8.19		Taking-over tests with the Client and Engineer (all disciplines)	Sum	1.00			
P.8.20		28-day Trial and Operational Period	Sum	1.00			
P.8.21		Any other expenses deemed to be incurred in complying with the full requirements of the Scope of Works	Sum	1.00			
Total Carried Forward To Summary							

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
C1		SITE CLEARANCE AND EARTH WORKS					
C1.1	SANS1200 C	SITE CLEARANCE					
C1.1.1	8.2.1	Clear and grub site including trees and stumps up to 1m grith	ha	2.00			
	8.2.2	Remove and grub large trees and tree stumps of girth Over and up to					
C1.1.2		1 m to 2 m	No.	4.0			
C1.1.3		2 m to 3 m	No.	2.0			
C1.1.4		3 m upwards in 1 m steps	No.	1.0			
C1.1.5	8.2.4	Reclear surfaces (provisional) (where ordered by Engineer)	ha	2.0			
C1.1.6	8.2.5	Take down existing fences	km	1,000.0			
C1.1.7	8.2.7	Dismantle and remove pipelines (not encased in concrete), electricity transmission lines, cables, etc.	m	100.0			
C1.1.8	8.2.7	Dismantle and remove pipelines encased in concrete	m	50.0			
		Demolishing of Old Structures:					
C1.1.9	8.2.8	Demolish and remove structures/buildings and dismantle steelwork, ect.	Prov Sum	1.00			
C1.1.10		Demolish and remove reinforced concrete structure walls/top slap up to 0.5m form the top of structure.	m^3	25.00			
C1.1.11	8.2.9	Transport materials and debris to unspecified sites and dump (Provisional)	$m^3.km$	25.00			
C1.1.12		Import from stockpile material for backfill or for fill material inside structure.	m^3	12.00			
		Grouting/Brickwork					
C1.1.13		Existing incoming/outgoing pipe to be closed with brickwork to prevent backfilling/water entering existing pipework (all inclusive)	No	2.00			
		Old Buildings at Inletworks					
	8.2.8	Demolish and remove structures/buildings and dismantle steelwork, ect.					
C1.1.14		Demolish and remove structure	m^3	30.00			
C1.1.15	8.2.9	Transport materials and debris to unspecified sites and dump (Provisional)	$m^3.km$	30.00			
C1.1.16		Import from stockpile material for backfill or for fill material inside structure.	m^3	10.00			
Total Carried Forward							

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
Brought Forward							
C1.1.17		Dismantle and remove existing handrails and store on site at a location approved by the Engineer	m	60.00			
C1.2	SANS 1200 D	EARTHWORKS					
	8.3.2	Structures:					
		a) Excavate in all material and stockpile for backfill around structures or dispose, as orderd:					
C1.2.1		Biological Reactor	m³	10,000.00			
C1.2.2		Clarifiers	m³	3,000.00			
C1.2.3		SST Division Box	m³	30.00			
C1.2.4		Inletworks	m³	120.00			
C1.2.5		RAS Pump Station	m³	60.00			
C1.2.6		Various small concrete structures	m³	120.00			
		b) Extra-over for:					
C1.2.7		1) intermediate excavation	m³	100.00			
C1.2.8		2) hard rock excavation	m³	100.00			
C1.2.9		3) boulders excavation, Class A	m³	50.00			
C1.2.10		4) boulders excavation, Class B	m³	50.00			
	8.3.3	Restricted excavation:					
		a) Excavate for restricted foundations, footings and pipe trenches in all materials and use for backfill or embankment or dispose:					
C1.2.11		Biological Reactor	m³	150.00			
C1.2.12		Clarifier	m³	50.00			
C1.2.13		SST Division Box	m³	10.00			
C1.2.14		Inletworks	m³	20.00			
C1.2.15		RAS Pump Station	m³	20.00			
C1.2.16		Various small concrete structures	m³	20.00			
		b) Extra-over for:					
C1.2.17		1) intermediate excavation	m³	25.00			
C1.2.18		2) hard rock excavation	m³	25.00			
C1.2.19		3) boulders excavation, Class A	m³	5.00			
C1.2.20		4) boulders excavation, Class B	m³	5.00			
Total Carried Forward							

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
Brought Forward							
C1.2.21	8.3.9	Extra-over for Importing from stockpile for backfill or for fill material againts structure.	m^3	3,400.00			
C1.2.22	8.3.9	Extra-over for approved cohesionless gravel backfill against structures, G9 material.	m^3	300.00			
C1.2.23		Backfilling to over-excavation and compact to 95% MOD AASTHO	m^3	600.00			
		Finishing					
C1.2.24		Fill by importing of G7 material from commercial sources and compact to 98% MOD AASTHO.	m^3	100.00			
C1.2.25		Fill by importing of G5 material from commercial sources and compact to 98% MOD AASTHO.	m^3	250.00			
C1.2.26		Extra over item 1C.1.26 for stabilisation (2.5%) of imported material with Portland cement (Stabilising agent)	t	2.50			
C1.3		TERRAFORCE:					
C1.3.1		Excavation for foundation	m^3	7.00			
C1.3.2		Supply and Construct 25/19Mpa Concrete Foundation (Excluding Cement)	m^3	7.00			
C1.3.3		Supply of Cement for item 1C.3.2 above	t	2.00		Rate Only	
C1.3.4		Supply and construct L12 smooth terraforce retaining block wall (Maximum height of 2.5m)	m^2	50.00			
C1.3.5		Supply and place clean filling sand as drainage behind terraforce blocks in layers of 300mm and compact	m^3	25.00			
C1.3.6		Construct sub soil drains complete including excavation, 19 mm stone fill, geofabric blanket and 110 mm dia perforated flexible drainage pipe as per detail.	m	35.00			
Total Carried Forward To Summary							

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
C2		INLET WORKS					
C2.1	SANS 1200 G	CONCRETE (STRUCTURAL)					
	8.2	Formwork					
	8.2.1	Rough:					
C2.1.1		Narrow sections to footings, 200 to 400 mm high	m	90.00			
	8.2.2	Smooth:					
C2.1.2		Plane vertical to walls	m²	200.00			
C2.1.3		Curved vertical to circular grit unit walls	m²	130.00			
C2.1.4		Curved inclined to circular grit unit walls	m²	10.00			
C2.1.5		Narrow sections to ends of walls 200 mm to 400 mm wide	m²	10.00			
C2.1.6		Narrow widths to floor/deck slab up to300 mm wide	m	120.00			
		Plain horizontal to slab soffits with prop height of:					
		Over and Up to					
C2.1.7		1 m 3,0 m	m²	25.00			
	8.2.6	Box out holes/Form voids:					
		Box out holes and forming grooves in walls and slabs:					
C2.1.8		c) Large, circular, of diameter over 0.35m up to and including 0.7m	No	4.00			
C2.1.9		Large other than circular of area over 0,5 m² up to and including 1,0 m²	No	4.00			
C2.1.10		Form slots for Sluice Gates as per drawing no: 21-LBM-039/ST601	No	25.00			
	8.3	Reinforcement					
	8.3.1	Mild steel bars:					
C2.1.11		Up to 10 mm dia	t	1.00			
	8.3.1	High-tensile steel bars:					
C2.1.12		up to 20 mm dia	t	10.00			
	8.3.2	High-Tensile Welded Mesh:					
C2.1.13		Mesh Ref 193	m²	150.00			
C2.2	8.4	SCHEDULED CONCRETE ITEMS					
	8.4.2	Strength concrete: 15 MPa/19 mm to:					
C2.2.1		Blinding layer 75 mm minimum thickness	m²	150.00			
Total Carried Forward							

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
Brought Forward							
C2.2.2		Benching	m³	6.00			
C2.2.3		Pipe encasement	m³	5.00			
	8.4.3	Strength concrete: 30 MPa/19 mm to:					
C2.2.4		Walls up to 300 mm thick	m³	60.00			
C2.2.5		Floor slabs and footings	m³	50.00			
C2.2.6		Walkway slabs up to 200 mm thick	m³	10.00			
C2.2.7		Supply of Cement for items C.2.2.4, C.2.2.5 and C.2.2.6 above	t	78.00			
	8.4.4	Unformed surface finishes					
		a) Wood-floated finish:					
C2.2.8		Walkways and floor slabs	m²	200.00			
C2.2.9		Narrow horizontal surfaces up to 350 mm wide	m²	10.00			
		b) Steel-floated finish:					
C2.2.10		Floor/deck slabs	m²	30.00			
C2.2.11		Narrow to channels up to 350 mm wide	m²	10.00			
		Bond breakers:					
C2.2.12		Polyethylene sheeting between floors and blinding	m²	60.00			
	8.5	Joints as per drawing no. 21-LBM-039/ST601/00					
C2.2.13		Construction Joint H1	m	15.00			
C2.2.14		Construction Joint H2	m	100.00			
C2.2.15		Construction Joint V1	m	20.00			
	8.7	Grouting					
		Grout-in of items supplied by others					
C2.2.16		Under baseplates	m³	2.00			
C2.2.17		Extra over Items for non-shrink cementitous grout	m³	2.00			
C2.3	1200LC	CABLE DUCTS					
C2.4		KABELFLEX DN 75	m	50.00			
C2.5	1200 HA	STRUCTURAL STEELWORK (SUNDRY ITEMS)					
		Supply and install:					
C2.5.1	8.3.2	1) Mentis or similar HDG MS Ball type, welded Inter-link handrails on horizontal surface complete as per detail.	m	45.00			
Total Carried Forward							

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
Brought Forward							
C2.5.2	8.3.2	2) Mentis or similar HDG MS Ball type, welded Inter-link handrails on inclined surface complete as per detail.	m	10.00			
		3) Bends, end closures and accessories:					
C2.5.3		22.5° bends	No	4.00			
C2.5.4		90° bends	No	20.00			
C2.5.5		180° bends	No	2.00			
C2.5.6		End pieces	No	8.00			
		Banded Grating floors:					
C2.5.7		Mentis RS40 Rectagrid or similar HDG MS open grating and cast in frame complete including installation as per Detail A on drawing no. SBM943/ST601/00	m²	40.00			
		Precast/ Prefabricated items					
C2.5.8		Install partial flume as per drawing no. 21-LBM-039/G703/00	No	1.00			
		Watertightness testing					
C2.5.9		Testing Inlet Works for watertightness	Sum	1.00			
C2.6		PORTAL FRAME					
C2.7	SABS 1200H	STRUCTURAL STEELWORK (SUNDRY ITEMS)					
C2.7.1		NOTE: Tenderes are advised to study the Model preambles for Trades before pricing this bill					
C2.8		**PROFILED METAL SHEETING AND ACCESSORIES**					
		BROWNBUILT - •ZINCALUME AZ150 COATED STEEL G550 0.53MM (HEAVY INDUSTRIAL), CONCEALED FIX ROOFING OR SIMILAR APPROVED @ ROOF SHEETING - 12 (PAINTED) including fixing accessories, fixing to steel purlins or rails at approximately 1 200 mm centres including all necessary flashings as per manufacturers instructions complete.					
C2.8.1		Roof covering with pitch not exceeding 15 degrees	m²			Rate Only	
C2.8.2		Gable trim 600 mm girth	m			Rate Only	
C2.8.3		Apex flashing 400 mm girth	m			Rate Only	
C2.9		**SUPPLEMENTARY PREAMBLES**					
		Descriptions					
Total Carried Forward							

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
Brought Forward							
		Descriptions of bolts shall be deemed to include nuts and washers.					
		Descriptions of L-shaped and U-shaped anchor bolts shall be deemed to include bending, threading, nuts and washers and embedding in concrete.					
		Description of expansion anchors and bolts an chemical anchors and bolts shall be deemed to include nuts, washers and mortices in brickwork or concrete.					
		Where anchor bolts are described as embedded in sides or soffits of concrete it shall be deemed to include holes through formwork.					
		General					
C2.9.1		All dimensions are to be checked with architects drawings and any discrepancies brought to the architects attention before any construction work commences.					
		Supply and install 110 mm diameter downpipe					
		Products different to those specified may be used with the engineers prior approval.					
C2.9.2		Supply and install Ask if in doubt. Structural Steelwork					
		All Structural steelwork shall be fabricated and erected in accordance with the latest edition of SABS 1200H					
		All dimensions shall be checked on site before shop drawings commence. Any descrepancies shall be brought to the attention of the engineer.					
		A complete set of shop drawing shall be submitted to the engineer for approval before fabrication commences. The contractor shall allow 1 week for checking and approval by the engineer, and shall also allow for any possible chances to shop drawings.					
		The contractor shall design all welds and, where necessary, gussets of sufficient strength shall be approved to obtain the required weld strength.					
		Setting out points (S.O.Ps) at member centroids shall conform to those shown on general arrangement drawings.					
		No eccentricities, except those shown on the engineers drawings, shall be allowed.					
		All structural steelwork shall be grade 350 W or Higher					
Total Carried Forward							

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
Brought Forward							
		A certificate from the steel manufacturer in which the grade of the structural steel is verified shall be handed to the engineer for approval.					
		Anchor bolts and structural bolts for fixing the purlins shall be grade 4.6 galvanised and all offer shall be grade 8.8 galvanised.					
		Minimum weld size to be 6 mm continues fillet welds all around, unless shown otherwise. All butt welds shall be full penetration wells and be of full strength.					
		Welders: All welds on the project on the project shall be executed by coded welders. Proof of the relevant certificates shall be submitted to the engineer prior to fabrication of any structural steelwork.					
		The sequence of erection of the structure is the responsibility of the contractor. The contractor shall ensure stability of the structure during erection. Where temporary bracing and propping is necessary, the contractor shall be responsible for design, erection, maintenance and removal (where necessary) of such supports. No stacking of roof sheets or other point loads shall be allowed on the structure during the construction process.					
		All cold formed sections (purlins, etc) shall be hot dipped galvanised					
		Where applicable, non shrink grout (SIKA GROUT 212) shall be provided under base plates befor any preliminary					
C2.10		**STEEL COLUMNS AND BEAMS TO BE HOT DIPPED GALVANIZED**					
		Welded columns in single lengths with flat section base, top, bearer and connection plates bolted to concrete bases					
C2.10.1		305x102x25 I-Column/Rafter Grade 350W	t			Rate Only	
C2.10.2		IPE200 Grade 350W Eaves Beam	t			Rate Only	
C2.10.3		254x146x31 I-GRAWLER BEAM Grade 350W	t			Rate Only	
		Fixing of steel members etc.					
C2.10.4		Fixing plates, connection plates, bolts etc.	t			Rate Only	
C2.11		PURLINS, GIRTS, BRACING, ETC					
		Purlins and girts bolted to steel					
C2.11.1		125 x 75 x 20 x 3.0mm x 6.89kg/m purlins to trusses	t			Rate Only	
C2.11.2		70x70x8mm Angle Bracing	t			Rate Only	
Total Carried Forward							

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
Brought Forward							
C2.12	SANS1200 G	CONCRETE (STRUCTURAL)					
		Formwork					
	8.2.1	Rough:					
C2.12.1		1) Narrow sections to footings, 200 to 400 mm high	m			Rate Only	
	8.2.2	Smooth:					
C2.12.2		1) Plane vertical to columns (575x435mm)	m²			Rate Only	
	8.3.1	Reinforcement					
C2.12.3		1) J-Bolts 500mm long M20	No			Rate Only	
		High-tensile steel bars:					
C2.12.4		2) up to 20 mm dia	t			Rate Only	
		Concrete					
	8.4.2	Strength concrete: 15 MPa/19 mm to:					
C2.12.5		1) Blinding layer 50 mm minimum thickness	m²			Rate Only	
	8.4.3	Strength concrete: 30 MPa/19 mm to:					
C2.12.6		Foundation columns	m³			Rate Only	
Total Carried Forward To Summary							

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
C3		BIOLOGICAL REACTOR					
C3.1	SANS 1200 G	CONCRETE (STRUCTURE)					
C3.2	8.2	SCHEDULED FORMWORK ITEMS					
	8.2.1	Rough formwork:					
C3.2.1		Vertical to walls of reactor up to 2m below final ground level (outside walls)	m²	250.00			
	8.2.2	Smooth formwork:					
		Plane vertical to:					
C3.2.2		Vertical to walls of reactor	m²	2,600.00			
C3.2.3		Vertical to walls of channels	m²	60.00			
C3.2.4		Vertical to wall of A-Cycle Chamber	m²	80.00			
C3.2.5		Vertical to baffles	m²	30.00			
C3.2.6		Stairs	m²	20.00			
		Curved vertical to:					
C3.2.7		Columns	m²	45.00			
	8.2.2	Plain horizontal to slab soffits with prop height of:					
		Over and Up to					
C3.2.8		0 m 2.5 m	m²	10.00			
C3.2.9		2.5 m 4.5 m	m²	20.00			
C3.2.10		4.5 m 6.5 m	m²	270.00			
	8.2.5	Narrow Widths:					
C3.2.11		Narrow sections to channel base up to 200mm in width (Smooth)	m	180.00			
C3.2.12		Narrow section to walkways up to 300mm in width (Smooth)	m	400.00			
C3.2.13		Narrow to footing up to 300mm in width (Rough)	m	280.00			
	8.2.6	Box out holes/From voids:					
		d) Large, other than circular, of area over 0.1m² and up to and including 6m²:					
C3.2.14		1) Rectangular, 0.45m x 0.45m, up to 0.30m deep	No.	2.00			
C3.2.15		1) Rectangular, 0.55m x 0.55m, up to 0.40m deep	No.	2.00			
C3.2.16		1) Rectangular, 0.75m x 0.75m, up to 0.40m deep	No.	2.00			
		Core Drill					
C3.2.17		0.20m dia up to 0.25m deep	No	2.00			
Total Carried Forward							

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
Brought Forward							
C3.2.18		0.45m dia up to 0.25m deep	No	2.00			
C3.2.19		0.6m dia up to 0.40m deep	No	2.00			
		Grouting: (Excluding Cement)					
C3.2.20		Grouting in of pipes or fittings through box outs, of area over 0.1m² and up to and including 0.60m², in 250 mm thick concrete wall (all inclusive)	No	10.00			
C3.3	8.3	SCHEDULED REINFORCEMENT ITEMS					
	8.3.1	Mild steel bars of diameter:					
C3.3.1		Up to 10 mm dia.	t	5.00			
	8.3.1	High tensile steel bars of diameter:					
C3.3.2		Up to 20 mm dia.	t	145.00			
C3.4	8.4	SCHEDULED CONCRETE ITEMS					
	8.4.2	Strength concrete: Grade 15 MPa/19 mm: (Excluding Cement)					
C3.4.1		100 mm thick Blinding Layer under footing	m²	525.00			
C3.4.2		Encasement for pipes 200 mm and 500 mm dia.	m³	5.00			
C3.4.3		Benching	m³	10.00			
C3.4.4		No fines concrete (100mm thick) under structure and including 20 mm thick mortar skim and PVC layer on top	m²	1,900.00			
C3.4.5		200 mm thick hard rock drainage layer	m²	500.00			
	8.4.3	Strength concrete: Grade 35 MPa/19 mm: (Excluding Cement)					
C3.4.6		Footings of Walls up to 300 mm thick	m³	290.00			
C3.4.7		Floor slabs up to 300 mm thick	m³	320.00			
C3.4.8		Channel Walls and slab up to 250 mm thick	m³	40.00			
C3.4.9		Walls up to 400 mm thick	m³	525.00			
C3.4.10		Walkway suspended slabs up to 300 mm thick	m³	110.00			
C3.4.11		A-Cycle Chamber	m³	25.00			
C3.4.12		Columns	m³	25.00			
C3.4.13		Stairs	m³	8.00			
C3.4.14		Plinth and Baffles	m³	10.00			
		Concrete Screed:					
C3.4.15		25mm Slipfree Grand screed on stairs	m²	10.00			
Total Carried Forward							

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
Brought Forward							
C3.4.16		Supply of Cement for items C3.4.6, C3.4.7, C3.4.8, C3.4.9, C3.4.10, C3.4.11, C3.4.12, C3.4.13 and C3.4.14 above	t			Rate Only	
	8.4.4	Unformed surface finishes					
		a) Wood floated finish to:					
C3.4.17		Narrow horizontal surfaces up to 350 mm wide	m	150.00			
C3.4.18		Walkway	m²	350.00			
C3.4.19		Channels	m²	150.00			
C3.4.20		Slabs/Floor	m²	1,740.00			
C3.4.21		Staircase	m²	15.00			
C3.4.22		Plinth and Baffles	m²	60.00			
		b) Steel floated finish to:					
C3.4.23		Benching	m²	100.00			
C3.5	8.5	JOINTS:					
		Joints as per drawing no. 21-LBM-039/ST602					
C3.5.1		Construction Joint H1	m	340.00			
C3.5.2		Construction Joint H2	m	290.00			
C3.5.3		Construction Joint H3	m	20.00			
C3.5.4		Construction Joint V1	m	50.00			
C3.5.5		Supply and install 110 mm dia PVC ducts, under walkway	m	250.00			
C3.5.6		Supply and install 160 mm dia PVC ducts, under walkway	m	250.00			
		Underdrainage system:					
C3.5.7		Construct sub soil drains complete including excavation, 19 mm stone fill, geofabric blanket and 110 mm dia perforated flexible drainage pipe as per detail.	m	350.00			
C3.5.8		Supply and install 110 mm dia groundwater release valves (GWRV) as supplied by Gereg sewage and water equipment or equal approved	No	20.00			
		Watertightness Testing:					
C3.5.9		Carry out watertightness test	No	1.00			
C3.6	SANS 1200 HA	STRUCTURAL STEELWORK (SUNDRY ITEMS)					
		Supply and install:					
Total Carried Forward							

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
Brought Forward							
C3.6.1	8.3.2	1) Mentis or similar HDG MS Ball type, welded Inter-link handrails on horizontal surface complete as per detail.	m	350.00			
C3.6.2	8.3.2	2) Mentis or similar HDG MS Ball type, welded Inter-link handrails on inclined surface complete as per detail.	m	12.00			
		3) Bends, end closures and accessories:					
C3.6.3		45° Angle bend	No	5.00			
C3.6.4		90° Rail bend	No	50.00			
C3.6.5		Angle closure bend	No	5.00			
C3.6.6		Horizontal closure bend	No	15.00			
	8.3.4	Banded Grating floors:					
C3.6.7		a) Open grating Polyester grid, cast in frame complete including installation as per Detail A on drawing no. 21-LBM-039/ST602	m^2	30.00			
Total Carried Forward To Summary							

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
C4		SST's DIVISION BOX					
C4.1	SABS 1200 G	CONCRETE (STRUCTURAL)					
C4.2	8.2	SCHEDULED FORMWORK ITEMS					
	8.2.1	Rough formwork:					
C4.2.1		Vertical to walls up to 1m (outside walls)	m²	20.00			
	8.22	Smooth formwork:					
C4.2.2		Vertical to walls	m²	80.00			
C4.2.3		Stairs	m²	15.00			
	8.2.5	Narrow Widths:					
C4.2.4		Narrow to Footing up to 250mm in width	m	15.00			
	8.2.6	Box out holes/From voids:					
		d) Large, other than circular, of area over 0.1m² and up to and including 0.5m²:					
C4.2.5		1) Rectangular, 0.70m x 0.70m, up to 0.25m deep	No.	2.00			
C4.2.6		1) Rectangular, 0.55m x 0.55m, up to 0.25m deep	No.	3.00			
		Grouting: (Excluding Cement)					
C4.2.7		Grouting in of pipes or fittings through box outs, of area over 0.1m² and up to and including 0.5m², in 250 mm thick concrete wall (all inclusive)	No	3.00			
C4.3	8.3	SCHEDULED REINFORCEMENT ITEMS					
	8.3.1	Mild steel bars of diameter:					
C4.3.1		Up to 10 mm dia.	t	0.50			
	8.3.1	High tensile steel bars of diameter:					
C4.3.2		Up to 20 mm dia.	t	2.50			
C4.4	8.4	SCHEDULED CONCRETE ITEMS					
	8.4.2	Strength concrete: Grade 15 MPa/19 mm: (Excluding Cement)					
C4.4.1		50 mm thick Blinding layer	m²	15.00			
C4.4.2		Concrete benching as per detail (all inclusive)	m³	1.00			
	8.4.3	Strength concrete: Grade 35 MPa/19 mm: (Excluding Cement)					
C4.4.3		Floor slab	m³	5.00			
C4.4.4		Walls	m³	20.00			
C4.4.5		Stairs	m³	10.00			
Total Carried Forward							

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
Brought Forward							
		Concrete Screed:					
C4.4.6		25mm Slipfree Grand screed on stairs	m²	3.00			
C4.4.7		Supply of Cement for items C4.4.3, C4.4.4 and C4.4.5 above	t			Rate Only	
	8.4.4	Unformed surface finishes					
		a) Wood floated finish					
C4.4.8		Top of Floor/Base	m²	20.00			
C4.4.9		Top of Walls	m²	10.00			
C4.5	8.5	JOINTS:					
		Joints as per detail shown on drawing no. 21-LBM-039/ST604					
C4.5.1		Construction Joint H2	m	25.00			
		Watertightness Testing:					
C4.5.2		Testing divistion box for watertightness (filling of divistion box included)	No	1.00			
C4.6	SANS 1200 HA	STRUCTURAL STEELWORK (SUNDRY ITEMS)					
		Supply and install:					
C4.6.1	8.3.2	1) Mentis or similar HDG MS Ball type, welded Inter-link handrails on horizontal surface complete as per detail.	m	10.00			
C4.6.2	8.3.2	2) Mentis or similar HDG MS Ball type, welded Inter-link handrails on inclined surface complete as per detail.	m	5.00			
		3) Bends, end closures and accessories:					
C4.6.3		45° Angle bend	No	2.00			
C4.6.4		90° Rail bend	No	8.00			
C4.6.5		Angle closure bend	No	2.00			
C4.6.6		Horizantal closure bend	No	8.00			
	8.3.4	Banded Grating floors:					
C4.6.7		a) Open grating Polyester grid, cast in frame complete including installation as per Detail A on drawing no. ST1077/ST603	m²	4.00			
Total Carried Forward To Summary							

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
C5		CLARIFIER					
C5.1	SANS1200 G	CONCRETE (STRUCTURAL)					
C5.2	8.2	SCHEDULED FORMWORK ITEMS					
	8.2.1	Rough formwork:					
C5.2.1		Curved vertical to internal walls of hopper	m²	35.00			
C5.2.2		Curved vertical to exterior walls up to 2m below top of SST (outside walls)	m²	50.00			
	8.2.2	Smooth formwork:					
C5.2.3		Inside walls of Effluent, Sludge and Scum collection box	m²	20.00			
C5.2.4		External walls of Effluent, Sludge and Scum collection box	m²	25.00			
	8.2.2	Curved vertical to:					
C5.2.5		Hopper centre column	m²	17.00			
C5.2.6		Tank walls	m²	300.00			
C5.2.7		Launder walls	m²	100.00			
	8.2.2	Curved horizontal to soffit of launder with prop height of:					
		Over and Up to					
C5.2.8		2.5 m 4.5 m	m²	60.00			
	8.2.2	Horizontal to soffit of collection boxes with prop height of:					
		Over and Up to					
C5.2.9		2.5 m 4.5 m	m²	10.00			
	8.2.5	Narrow Widths:					
C5.2.10		Curved vertical up to 450 mm width to wall footings (Rough formwork)	m	260.00			
C5.2.11		Narrow to surface bed joints upto 250 mm width (Rough formwork)	m	50.00			
C5.2.12		Narrow sections 450 mm width to launder invert slab (Smooth formwork)	m	80.00			
	8.2.6	Box out holes/form voids:					
		d) Large, other than circular, of area over 0.1m² and up to and including 0.5m²:					
C5.2.13		1) Rectangular, 1.00m x 0.45m up to 0.25m deep in tank wall at effluent water collection box	No	2.00			
C5.2.14		1) Rectangular, 0.50m x 0.20m, up to 0.30m deep in hopper center column	No.	6.00			
Total Carried Forward							

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
Brought Forward							
C5.2.15		1) Rectangular, 0.55m x 0.55m, up to 0.30m deep	No.	5.00			
C5.2.16		1) Rectangular, 0.65m x 0.65m, up to 0.35m deep	No	3.00			
C5.2.17		1) Rectangular, 0.75m x 0.75m, up to 0.25m deep	No	1.00			
		Grouting: (Excluding Cement)					
C5.2.18		Grouting in of pipes or fittings through box outs, of area over 0.1m² and up to and including 0.60m², in 350 mm thick concrete wall (all inclusive)	No	17.00			
C5.3	8.3	SCHEDULED REINFORCEMENT ITEMS					
	8.3.1	Mild steel bars of diameter:					
C5.3.1		Up to 10 mm dia.	t	1.50			
	8.3.1	High tensile bars of diameter:					
C5.3.2		Up to 20 mm dia.	t	17.00			
C5.4	8.4	SCHEDULED CONCRETE ITEMS					
	8.4.2	Strength concrete: Grade 15 MPa/19 mm: (Excluding Cement)					
C5.4.1		50mm - 100 mm thick Blinding Layer under footing and floor	m²	160.00			
C5.4.2		Encasement for pipes up to 355mm dia.	m³	35.00			
C5.4.3	PS 8.14	Granolithic screed to benching of launder and hopper	m³	15.00			
C5.4.4	PS 8.14	50 mm granolithic screed to floor of tank	m²	450.00			
		Filter bed					
C5.4.5		No-fines concrete (150 mm thick) to sloping surfaces and including 20 mm thick mortar skim and Bondbreaker 250 micro DCP on top	m²	450.00			
C5.4.6		200 mm thick hard rock drainage layer	m²	200.00			
C5.4.7		Sika product on top of Wall	m²	25.00			
	8.4.3	Strength concrete: Grade 35 MPa/19 mm: (Excluding Cement)					
C5.4.8		Footings and floor slabs	m³	140.00			
C5.4.9		Centre column	m³	4.00			
C5.4.10		Walls: 300 mm to 450 mm thick	m³	90.00			
C5.4.11		Launder floor base	m³	15.00			
C5.4.12		Launder walls 150 mm thick	m³	5.00			
C5.4.13		Effluent, Sludge and Scum collection box	m³	6.00			
Total Carried Forward							

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
Brought Forward							
C5.4.14		Supply of Cement for items C5.4.18, C5.4.19, C5.4.10, C5.4.11, C5.4.12 and C5.4.13 above	t	200.00			
	8.4.4	Unformed surface finishes					
		a) Wood floated finish					
C5.4.15		Top of floors	m²	475.00			
C5.4.16		Top of effluent launder wall	m²	65.00			
C5.4.17		Top of walls	m²	20.00			
C5.5	8.5	JOINT:					
		Joints as per drawing no. 21-LBM-039/ST603					
C5.5.1		Movement Joint H1	m	80.00			
C5.5.2		Construction Joint H2	m	90.00			
C5.5.3		Construction Joint H3	m	50.00			
C5.5.4		Construction Joint V1	m	15.00			
		Underdrainage system:					
C5.5.5		Construct sub soil drains complete including excavation, 19 mm stone fill, geofabric blanket and 110 mm dia perforated flexible drainage pipe as per detail.	m	100.00			
C5.5.6		Supply and install 110 mm dia groundwater release valves (GWRV) as supplied by Gereg sewage and water equipment or equal approved	No	12.00			
C5.5.7		Supply and install 100mm DHDPE cable duct in Hopper centre column	m	25.00			
		Watertightness testing:					
C5.5.8		Carry out watertightness test of clarifier including chambers and launder (filling of clarifier/box included)	Sum	1.00			
C5.6	SANS 1200 HA	STRUCTURAL STEELWORK (SUNDRY ITEMS)					
		Supply and install:					
	8.3.4	Banded Grating floors:					
C5.6.1		a) Open grating Polyester grid, cast in frame complete including installation as per Detail A on drawing no. A1004/ST602	m²	8.00			
Total Carried Forward To Summary							

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
C6		ACTIVATED SLUDGE RECYCLE PUMP STATION (RAS)					
C6.1	SABS 1200 G	CONCRETE (STRUCTURAL)					
C6.2	8.2	SCHEDULED FORMWORK ITEMS					
	8.2.1	Rough formwork:					
C6.2.1		Vertical to walls up to 2.3m (outside walls)	m²	38.00			
	8.2.2	Smooth formwork:					
C6.2.2		Vertical to walls	m²	75.00			
C6.2.3		Stairs	m²	3.50			
	8.2.5	Narrow Widths:					
C6.2.4		Narrow to Footing up to 200mm in width (Rough formwork)	m	10.00			
C6.2.5		Narrow to Footing up to 250mm in width (Rough formwork)	m	15.00			
	8.2.6	Box out holes/From voids:					
		d) Large, other than circular, of area over 0.1m² and up to and including 0.5m²:					
C6.2.6		1) Rectangular, 0.45m x 0.45m, up to 0.25m deep	No.	2.00			
C6.2.7		1) Rectangular, 0.50m x 0.50m, up to 0.25m deep	No.	3.00			
		Grouting: (Excluding Cement)					
C6.2.8		Grouting in of pipes or fittings through box outs, of area over 0.1m² and up to and including 0.5m², in 250 mm thick concrete wall (all inclusive)	No	5.00			
C6.3	8.3	SCHEDULED REINFORCEMENT ITEMS					
	8.3.1	Mild steel bars of diameter:					
C6.3.1		Up to 10 mm dia.	t	1.00			
	8.3.1	High tensile steel bars of diameter:					
C6.3.2		Up to 20 mm dia.	t	4.00			
C6.4	8.4	SCHEDULED CONCRETE ITEMS					
	8.4.2	Strength concrete: Grade 15 MPa/19 mm: (Excluding Cement)					
C6.4.1		50 mm thick Blinding layer	m²	23.00			
C6.4.2		Concrete benching as per detail (all inclusive)	m³	2.50			
	8.4.3	Strength concrete: Grade 35 MPa/19 mm: (Excluding Cement)					
C6.4.3		Floor slab	m³	7.00			
Total Carried Forward							

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
Brought Forward							
C6.4.4		Walls	m³	16.00			
C6.4.5		Stairs	m³	2.50			
		Concrete Screed:					
C6.4.6		25 mm Slipfree Grand screed on stairs	m²	3.00			
C6.4.7		Supply of Cement for items C6.4.3, C6.4.4 and C6.4.5 above	t	18.00			
	8.4.4	Unformed surface finishes					
		a) Wood floated finish					
C6.4.8		Top of Floor/Base	m²	20.00			
C6.4.9		Top of Walls	m²	5.00			
C6.5	8.5	JOINT:					
		Joints as per detail shown on drawing no.21-LBM-039/ST605					
C6.5.1		Construction Joint H2	m	14.50			
		Watertightness Testing:					
C6.5.2		Testing RAS box for watertightness (filling of RAS box included)	No	1.00			
C6.6	SANS 1200 HA	STRUCTURAL STEELWORK (SUNDRY ITEMS)					
		Supply and install:					
C6.6.1	8.3.2	1) Mentis or similar HDG MS Ball type, welded Inter-link handrails on horizontal surface complete as per detail.	m	12.00			
		3) Bends, end closures and accessories:					
C6.6.2		90° Rail bend	No	2.00			
C6.6.3		Horizaontal closure bend	No	6.00			
	8.3.4	Banded Grating floors:					
C6.6.4		a) Open grating Polyester grid, cast in frame and support frame complete including installation as per Detail A, B and C on drawing no. 21-LBM-039/ST605	m²	10.00			
C6.6.5		Polypropylene step irons, staggered at 300mm C/C	No	5.00			
Total Carried Forward To Summary							

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
C7		CHLORINATION CONTACT CHANNEL					
C7.1	SABS 1200 G	CONCRETE (STRUCTURAL)					
C7.2	8.2	SCHEDULED FORMWORK ITEMS					
	8.2.1	Rough formwork:					
C7.2.1		Vertical to walls	m²	10.00			
	8.2.2	Smooth formwork:					
C7.2.2		Vertical to walls	m²	750.00			
C7.2.3		Stairs	m²	3.50			
	8.2.5	Narrow Widths:					
C7.2.4		Narrow to Footing up to 200mm in width (Rough formwork)	m	60.00			
C7.2.5		Narrow to Footing up to 250mm in width (Rough formwork)	m	15.00			
	8.2.6	Box out holes/From voids:					
		d) Large, other than circular, of area over 0.1m² and up to and including 0.5m²:					
C7.2.6		1) Rectangular, 0.45m x 0.45m, up to 0.25m deep	No.	2.00			
C7.2.7		1) Rectangular, 0.50m x 0.50m, up to 0.25m deep	No.	3.00			
		Grouting: (Excluding Cement)					
C7.2.8		Grouting in of pipes or fittings through box outs, of area over 0.1m² and up to and including 0.5m², in 250 mm thick concrete wall (all inclusive)	No	5.00			
C7.3	8.3	SCHEDULED REINFORCEMENT ITEMS					
	8.3.1	Mild steel bars of diameter:					
C7.3.1		Up to 10 mm dia.	t	1.00			
	8.3.1	High tensile steel bars of diameter:					
C7.3.2		Up to 20 mm dia.	t	8.00			
C7.4	8.4	SCHEDULED CONCRETE ITEMS					
	8.4.2	Strength concrete: Grade 15 MPa/19 mm: (Excluding Cement)					
C7.4.1		50 mm thick Blinding layer	m²	200.00			
C7.4.2		Concrete benching as per detail (all inclusive)	m³	2.50			
	8.4.3	Strength concrete: Grade 35 MPa/19 mm: (Excluding Cement)					
C7.4.3		Floor slab	m³	40.00			
Total Carried Forward							

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
Brought Forward							
C7.4.4		Walls	m³	75.00			
C7.4.5		Stairs	m³	2.50			
		Concrete Screed:					
C7.4.6		25 mm Slipfree Grand screed on stairs	m²	3.00			
C7.4.7		Supply of Cement for items C7.4.3, C7.4.4. and C7.4.5 above	t	18.00			
	8.4.4	Unformed surface finishes					
		a) Wood floated finish					
C7.4.8		Top of Floor/Base	m²	20.00			
C7.4.9		Top of Walls	m²	5.00			
C7.5	8.5	JOINT:					
		Joints as per detail shown on drawing no. ST1077/ST603					
C7.5.1		Construction Joint H2	m	200.00			
		Watertightness Testing:					
C7.5.2		Testing box for watertightness (filling of box included)	No	1.00			
C7.6	SANS 1200 HA	STRUCTURAL STEELWORK (SUNDRY ITEMS)					
		Supply and install:					
C7.6.1	8.3.2	1) Mentis or similar HDG MS Ball type, welded Inter-link handrails on horizontal surface complete as per detail.	m	25.00			
		3) Bends, end closures and accessories:					
C7.6.2		90° Rail bend	No	8.00			
C7.6.3		Horizaontal closure bend	No	6.00			
	8.3.4	Banded Grating floors:					
C7.6.4		a) Open grating Polyester grid, cast in frame and support frame complete including installation as per Detail A, B and C on drawing no. A1004/ST604 & ST608	m²	10.00			
C7.6.5		Polypropylene step irons, staggered at 300mm C/C	No	5.00			
Total Carried Forward To Summary							

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
C8		SLUDGE DEWATERING					
C8.1		BELT PRESS BUIDLING					
		NOTE: Tenderers are advised to study the Model Preambles for Trades before pricing this bill.					
		Supplementary Preambles:					
		Trade Names					
		Items, materials or methods to be used specified by trade names or catalogue numbers are only an indication of the quality required. Items, materials or methods of similar quality may be used with prior written approval from the Project Manager.					
C8.2	SANS 1200 G	CONCRETE (STRUCTURAL)					
		Includes the necessary anchor and supports bolts and fastening components as specified in the drawings.					
	8.4.2	Blinding layer in 15 MPa/19 mm concrete					
C8.2.1		50 mm minimum thickness	m²	180.00			
	8.4.3	Strength concrete: Grade 20 MPa/19 mm					
C8.2.2		Strip foundations for walls	m³	30.00			
	8.4.3	Strength concrete: Grade 30 MPa/19 mm					
C8.2.3		Footings for columns	m³	25.00			
C8.2.4		Stub Columns	m³	8.00			
C8.2.5		Mezzanine slab	m³	20.00			
C8.2.6		Surface bed slab	m³	50.00			
C8.2.7		Supply of Cement for items C8.2.2, C8.2.3, C8.2.4, C8.2.5, C8.2.5 and C8.2.6 above	t	66.50			
C8.3	8.2	SCHEDULED FORMWORK ITEMS					
	8.2.1	Rough formwork:					
C8.3.1		Column bases	m²	40.00			
C8.3.2		Foundation	m²	60.00			
	8.2.2	Smooth formwork:					
C8.3.3		Stub Columns	m²	30.00			
C8.3.4		Narrow to slab up to 300 mm in width	m	50.00			
		Plain horizontal to slab soffits with prop height of:					
		Over and Up to					
Total Carried Forward							

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
Brought Forward							
C8.3.5		1 m 3,0 m	m²	80.00			
C8.4	8.4.4	UNFORMED SURFACE FINISHING					
C8.4.1		Power float finishing:					
C8.4.2	PSG 8.4.4	Surface bed slab/Mezzanine slab	m²	345.00			
	8.2.6	Box out holes/From voids:					
		d) Large, other than circular, of area over 0.1 m² and up to and including 0.5 m²:					
C8.4.3		1) Rectangular, 0.40 m x 0.40 m, up to 0.30 m deep	No.	3.00			
C8.4.4		2) Rectangular, 0.60 m x 0.60 m, up to 0.30 m deep	No	2.00			
		Grouting/Brickwork					
C8.4.5		1) Grouting in of pipes or fittings through box outs, of area over 0.1 m² and up to and including 0.5 m² , in 300 mm thick concrete (all inclusive)	No	5.00			
C8.5	8.1.2	REINFORCMENT					
	8.3.1	High tensile steel bars of diameter:					
C8.5.1		up to 20 mm	t	8.00			
	8.3.2	High-Tensile Welded Mesh:					
C8.5.2		Mesh Ref 193	m²	550.00			
C8.5.3		Mesh Ref 617	m²	64.00			
C8.6	8.5	JOINTS					
		Joints as per detail shown on drawing no. SM943/ST603					
C8.6.1		Saw Cut Joint detail (J1)	m	65.00			
C8.6.2		Joint between Brickwork and Steel Columns detail (J2)	m	185.00			
C8.6.3		Joint between surface bed and vertical brickwork (J3)	m	90.00			
C8.7		BUILDING WORK					
		Masonry					
		Brickwork (Face brick):					
C8.7.1		Brick structures complete according to details specified in the drawings. In the event of discrepancies between the BOQ and the drawings , details in the drawings will govern.					
Total Carried Forward							

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
Brought Forward							
C8.7.2		All brickwork shall be imperial clay bricks (222x 106 x73mm) with compresive strength of 14MPa and must comply with the requirements. Tie wires shall be butterfly type and comply with the requirements of SANS 28, shall be of required size to suit cavity wall dims. and shall be installed not less than 7no. per square meter wall area. Brick force to be every 4th layer. Precast lintels shall be installed directly above openings. Mortal Class 2 in accordance with SANS 0164 shall be used throughout in all brickwork.					
C8.7.3		280mm Foundation Cavity Wall (on top of strip foundation to height as per the drawings; filled with 20MPa/13mm concrete to surface bed level)	m²	70.00			
C8.7.4		280mm Cavity Wall (from top of surface bed level to height as per the drawings)	m²	220.00			
C8.7.5		230mm Foundation Brick (from top of strip foundation to under surface bed level)	m²	100.00			
C8.7.6		230mm Wall (from top of surface bed level to height as per the drawings)	m²	150.00			
C8.8		DAMPPROOFING OF WALLS AND FLOORS					
		One layer 250 micron black polyethylene waterproof sheeting (SANS 952-1985 type C) sealed at laps with PVC self-adhesive tape.					
C8.8.1		Under surface bed slabs	m²	300.00			
C8.8.2		2 layers Cemflex waterproofing slurry on cable trench walls (or similar approved)	m²	60.00			
C8.9		JOINERY					
C8.9.1		Doors:					
C8.9.2		Supply and install doors, gates complete with frames and all fittings as per specifications:					
C8.9.3		Supply and HDG Steel door (door frame to be 1900mm high x 2500mm wide standard heavy duty steel double door with Louvres, rebate for 280mm wall) Item to include all associated ironmongery (hinges, bolts, catches, cabin hooks, handles etc) and rubber door stops:	No	2.00			
C8.9.4		Manually operated roller shutter door 4m high by 3m wide (all inclusive)	No	1.00			
		Supply and Solid Meranti Wooden door (rebate for 280mm wall) Item to include all associated ironmongery (hinges, bolts, catches, cabin hooks, handles etc) and rubber door stops:					
C8.9.5		Door 1500 x 2400 mm high	No	2.00			
C8.9.6		Door 900 x 2100 mm high	No	4.00			
Total Carried Forward							

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
Brought Forward							
C8.10		METAL WORKS					
		Aluminium Windows					
		Power coated aluminium windows (colour as per client's specifications), consisting of extruded aluminium sections in accordance with AAAMSA standards and BS1474 including 6mm laminated safety glass, complying with SANS0400 with name of the manufacturer permanently marked on each sheet visible after glazing and ironmongery, complete plugged to brickwork/concrete/steel beams including polyurethane elastomeric UV reistant flexible joint sealant, aluminium/rubber gaskets, all in accordance with specifications.					
C8.10.1		Window Size 1800 x 900 mm high	No.	4.00			
C8.10.2		Glass block windows 1400 mm wide x 600 mm high with 200 x 200 mm gass blocks (21 glass blocks per window) installation and water proofing all inclusive.	No	126.00			
C8.10.3		Whirlybird roof Vents (installation and water proofing all inclusive)	No	4.00			
C8.11		FIRE PREVENTION EQUIPMENT					
C8.11.1		Supply and install fire hose reels and fire extinguishers (including all connection brackets and fittings):					
C8.11.2		9 kg DCP fire extinguishers	No	4.00			
C8.11.3		30 m fire hose reel	No	2.00			
		Photoluminescent Fire Signage:					
C8.11.4		Arrow sign	No	2.00			
C8.11.5		Fire hose reel sign	No	2.00			
C8.11.6		Fire extinguishers sign	No	4.00			
		Photoluminescent Directional Signage:					
C8.11.7		Exit sign	No	2.00			
C8.12	SANS 1200 HA	STRUCTURAL STEELWORK (SUNDRY ITEMS)					
C8.13		SUPPLEMENTARY PREAMBLES					
		Descriptions:					
		Descriptions of bolts shall be deemed to include nuts and washers.					
		Descriptions of L-shaped and U-shaped anchor bolts shall be deemed to include bending, threading, nuts and washers and embedding in concrete.					
Total Carried Forward							

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
Brought Forward							
		Description of expansion anchors and bolts and chemical anchors and bolts shall be deemed to include nuts, washers and mortices in brickwork or concrete. Where anchor bolts are described as embedded in sides or soffits of concrete it shall be deemed to include holes through formwork. General: Products different to those specified may be used with the engineers prior written approval. All Structural steelwork shall be fabricated and erected in accordance with the latest edition of SABS 1200H All dimensions shall be checked on site before shop drawings commence. Any descrepancies shall be brought to the attention of the engineer. A complete set of shop drawing shall be submitted to the engineer for approval before fabrication commences. The contractor shall allow 1 week for checking and approval by the engineer, and shall also allow for any possible changes to shop drawings. The contractor shall design all welds and, where necessary, gussets of sufficient strength shall be approved to obtain the required weld strength. Setting out points (S.O.Ps) at member centroids shall conform to those shown on general arrangement drawings. No eccentricities, except those shown on the engineers drawings, shall be allowed. All structural steelwork shall be grade S355JR or higher. A certificate from the steel manufacturer in which the grade of the structural steel is verified shall be handed to the engineer for approval. Anchor bolts, structural bolts for fixing the purlins and all other shall be grade 8.8 galvanised or electro plated. Minimum weld size to be 6 mm continues fillet welds all around, unless shown otherwise. All butt welds shall be full penetration welds of full strength. Welders: All welds on the project shall be executed by coded welders. Proof of the relevant certificates shall be submitted to the engineer prior to fabrication of any structural steelwork.					
Total Carried Forward							

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
Brought Forward							
		The sequence of erection of the structure is the responsibility of the contractor. The contractor shall ensure stability of the structure during erection. Where temporary bracing and propping is necessary, the contractor shall be responsible for design, erection, maintenance and removal (where necessary) of such supports. No stacking of roof sheets or other point loads shall be allowed on the structure during the construction process.					
		All structural steel members to be hot-dip galvanized.					
		Where applicable, non shrink grout (SIKA GROUT 212 or similar approved) shal be provided between baseblates and stub columns as specified on the drawings.					
		Pricing to include fabrication, transport and erection of the steel members.					
C8.14		STEEL COLUMNS AND BEAMS					
		Welded columns in single lengths with flat section base, top, bearer and connection plates bolted to concrete bases.					
C8.14.1		305x102x29kg I Beam - Grade S355JR (Rafter)	t	1.80			
C8.14.2		254x146x37kg I Beam - Grade S355JR (Columns)	t	3.50			
		Fixing of steel members:					
C8.14.3		Fixing plates, connection plates, bolts etc.	t	0.70			
C8.15		PURLINS, GIRTS, BRACING, ETC					
C8.15.1		60x60x5mm angle profile rails	t	2.00			
C8.15.2		70x70x6mm bracing	t	1.00			
C8.15.3		150x50x20x2.5mm purlins to rafters	t	1.20			
C8.15.4		125x75x20x2.5mm side purlins to columns	t	1.50			
C8.16	SANS 1200 HB	PROFILED METAL SHEETING AND ACCESSORIES					
		Supply and install 0.5mm conceled klip on type roof sheeting (Safintra saflok 410 or similar approved (charcoal) including fixing accessories, fixing to steel purlins or rails at approximately 1500mm centres.					
C8.16.1	8.2.2	Roof covering with pitch not exceeding 20 degrees	m²	300.00			
C8.16.2		Side cladding as per drawing	m²	260.00			
C8.16.3		0.5 mm Vertical corner flashing (L-Shape 300 x 300 mm)	m	10.00			
Total Carried Forward							

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
Brought Forward							
C8.16.4		0.5 mm Gable trim 600 mm wide (L-Shape 300 x 300 mm)	m	30.00			
C8.16.5	8.2.3	0.5 mm Apex flashing 400 mm wide to mach roof angle (15º)	m	20.00			
C8.16.6		0.5 mm Flashing plate to cover penetration through side cladding	m²	2.00			
C8.17	8.3.7	HAND RAILS					
C8.17.1		34mm Outside dia. Ball-Type Handrails, top mounted, hot dipped galvanized	m	20.00			
		3) Bends, end closures and accessories:					
C8.17.2		90° short radius bend	No.	4.00			
C8.17.3		45° stairway bend	No.	2.00			
C8.17.4		45° closure	No.	1.00			
C8.17.5		90° straight closure	No.	5.00			
C8.17.6		Locking Chain: 2mm Krafft 4mm Electro Galvanised Chain and hook between handrails (All inclusive)	m	4.00			
		Banded Grating floors:					
C8.17.7		Closed grating flooring - GRP, cast in frame complete including installation as per Detail.	m²	25.00			
C8.17.8		Staircase as per drawing no. SM943/ST604	No	1.00			
C8.18	SABS 1200 G	SLUDGE CHUTE					
C8.19	SABS 1200 G	CONCRETE (STRUCTURAL)					
C8.20	8.4	SCHEDULED CONCRETE ITEMS					
	8.4.2	Blinding layer in 15 MPa/19 mm concrete					
C8.20.1		50 mm minimum thickness	m²			Rate Only	
C8.20.2		Benching	m³			Rate Only	
	8.4.3	Strength concrete: 35 MPa/19 mm					
C8.20.3		1) Footings	m³			Rate Only	
C8.20.4		2) Walls	m³			Rate Only	
C8.20.5		3) Floor slabs	m³			Rate Only	
C8.20.6		4) Columns	m³			Rate Only	
C8.21	8.2	SCHEDULED FORMWORK ITEMS					
	8.2.1	Rough:					
Total Carried Forward							

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
Brought Forward							
C8.21.1		1) Narrow sections to footings, 200 to 400 mm high	m			Rate Only	
	8.2.2	Smooth:					
C8.21.2		1) Plane vertical to walls	m²			Rate Only	
C8.21.3		2) Plain vertical to columns	m²			Rate Only	
C8.21.4		3) Narrow sections to ends of walls 200 mm to 400 mm wide	m²			Rate Only	
		Plain horizontal to slab soffits with prop height of:					
		Over and Up to					
C8.21.5		1 m 3,0 m	m²			Rate Only	
C8.21.6		3.0 m 4.5 m	m²			Rate Only	
	8.2.6	Box out holes:					
C8.21.7		d) Large rectangular up to 4.5 m² in area and up to 350 mm deep	No			Rate Only	
C8.22	8.3	SCHEDULED REINFORCEMENT ITEMS					
	8.3.1	High tensile steel bars of diameter					
C8.22.1		20 mm	t			Rate Only	
C8.23	8.4.	SCHEDULED CONCRETE ITEMS					
C8.23.1		Wood floated finish to top of walls, wall sides, floors, benching and stairs	m²			Rate Only	
C8.24	1200 HA	STRUCTURAL STEELWORK (SUNDRY ITEMS)					
		Supply and install:					
C8.24.1	8.3.2	Mentis or similar HDG MS Ball type, welded Inter-link handrails on horizontal surface complete as per detail.	m			Rate Only	
		Extra over Item C.35 for:					
C8.24.2		1) 90° bends	No			Rate Only	
C8.24.3		2) 180° bends	No			Rate Only	
C8.24.4		3) End pieces	No			Rate Only	
Total Carried Forward To Summary							

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
C9		VARIOUS SMALL STRUCTURES					
C9.1		OVERFLOW BOX (2X)					
C9.2	SANS 1200 G	CONCRETE WORKS					
C9.3	8.2	SCHEDULED FORMWORK ITEMS					
	8.2.1	Rough formwork:					
C9.3.1		Vertical to walls (outside walls)	m²	20.00			
	8.2.2	Smooth formwork:					
C9.3.2		Vertical to walls (inside walls)	m²	20.00			
	8.2.5	Narrow Widths:					
C9.3.3		Narrow to Plinth up to 250mm in width (Rough)	m	12.00			
	8.2.6	Box out holes/From voids:					
		d) Large, other than circular, of area over 0.1m² and up to and including 0.5m²:					
C9.3.4		1) Rectangular, 0.45m x 0.45m, up to 0.25m deep	No.	2.00			
		Grouting: (Excluding Cement)					
C9.3.5		Grouting in of pipes ot fittings through box outs, of area over 0.1m² and up to and including 0.5m², in 250 mm thick concrete wall (all inclusive)	No	2.00			
C9.4	8.3	SCHEDULED REINFORCEMENT ITEMS					
	8.3.1	High tensile steel bars of diameter:					
C9.4.1		up to 20 mm	t	2.00			
C9.5	8.4	SCHEDULED CONCRETE ITEMS					
	8.4.2	Strength concrete: Grade 15 MPa/19 mm: (Excluding Cement)					
C9.5.1		50 mm thick Blinding layer	m²	4.00			
C9.5.2		Benching as per drawing	m³	0.50			
	8.4.3	Strength concrete: Grade 25 MPa/19 mm: (Excluding Cement)					
C9.5.3		Floor slabs up to 250 mm thick	m³	1.00			
C9.5.4		Walls up to 250mm thick	m³	5.50			
C9.5.5		Supply of Cement for items C9.5.3 and C9.5.4 above	t	3.00			
	8.4.4	Unformed Surface Finishes					
		a) Wood floated finish					
C9.5.6		Top of walls and base	m²	4.00			
Total Carried Forward							

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
Brought Forward							
		b) Steel floated finish to:					
C9.5.7		Benching	m²	1.00			
C9.6		SLUDGE PUMP BOX					
C9.7	SANS 1200 G	CONCRETE WORKS					
C9.8	8.2	SCHEDULED FORMWORK ITEMS					
	8.2.1	Rough formwork:					
C9.8.1		Vertical to walls (outside walls)	m²	10.00			
	8.2.2	Smooth formwork:					
C9.8.2		Vertical to walls (inside walls)	m²	10.00			
	8.2.5	Narrow Widths:					
C9.8.3		Narrow to footing up to 250mm in width (Rough)	m	6.00			
	8.2.6	Box out holes/From voids:					
		d) Large, other than circular, of area over 0.1m² and up to and including 0.5m²:					
C9.8.4		1) Rectangular, 0.45m x 0.45m, up to 0.25m deep	No.	1.00			
		Grouting: (Excluding Cement)					
C9.8.5		Grouting in of pipes ot fittings through box outs, of area over 0.1m² and up to and including 0.5m², in 250 mm thick concrete wall (all inclusive)	No	1.00			
C9.9	8.3	SCHEDULED REINFORCEMENT ITEMS					
	8.3.1	High tensile steel bars of diameter:					
C9.9.1		up to 20 mm	t	0.35			
C9.10	8.4	SCHEDULED CONCRETE ITEMS					
	8.4.2	Strength concrete: Grade 15 MPa/19 mm:(Excluding Cement)					
C9.10.1		50 mm thick Blinding layer	m²	2.00			
C9.10.2		Benching as per drawing	m³	0.25			
	8.4.3	Strength concrete: Grade 25 MPa/19 mm: (Excluding Cement)					
C9.10.3		Floor slabs up to 250 mm thick	m³	1.00			
C9.10.4		Walls up to 200mm thick	m³	3.00			
C9.10.5		Supply of Cement for items C9.10.3 and C9.10.4 above	t	2.00			
Total Carried Forward							

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
Brought Forward							
	8.4.4	Unformed Surface Finishes					
		a) Wood floated finish					
C9.10.6		Top of walls and base	m²	2.00			
		b) Steel floated finish to:					
C9.10.7		Benching	m²	0.50			
C9.11	SANS 1200 HA	STRUCTURAL STEELWORK (SUNDRY ITEMS)					
		Banded Grating floors (Supply and install):					
C9.11.1		Open grating Polyester grid, cast in frame complete including installation as per Detail A on drawing no. ST1077/G703	m²	1.50			
C9.12		REFURBISHMENT OF EXISTING STRUCTURES					
C9.13	8.2	SCHEDULED FORMWORK ITEMS					
	8.2.1	Rough formwork:					
C9.13.1		Vertical to walls	m²	10.00			
		Core Drill:					
C9.13.2		0.5m dia up to 0.30m deep	No	3.00			
		Grouting: (Excluding Cement)					
C9.13.3		Grouting in of pipes ot fittings through box outs, of area over 0.1m² and up to and including 0.5m², in 300 mm thick concrete wall (all inclusive)	No	3.00			
C9.14	8.3	SCHEDULED REINFORCEMENT ITEMS					
	8.3.1	High tensile steel bars of diameter:					
C9.14.1		up to 20 mm	t	0.25			
C9.15	8.4	SCHEDULED CONCRETE ITEMS					
	8.4.3	Strength concrete: Grade 25 MPa/19 mm: (Excluding Cement)					
C9.15.1		Walls up to 200mm thick	m³	3.00			
C9.15.2		Supply of Cement for items C9.15.1 above	t	1.50			
	8.4.4	Unformed Surface Finishes					
		a) Wood floated finish					
C9.15.3		Top of walls	m²	1.00			
Total Carried Forward To Summary							

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
C10		INTERCONNECTING PIPE WORK					
C10.1	SANS 1200 DB	EARTHWORKS (PIPE TRENCHES)					
	8.3.2	a) Excavate in all materials for pipe trenches, backfill, compact and dispose of surplus material for:					
		For pipes with a nominal dia up to 500mm					
		Over and Up to					
C10.1.1		0,0 m 1,5 m	m	1,200.00			
C10.1.2		1,5 m 2,5 m	m	200.00			
C10.1.3		2,5 m 3,5 m	m	50.00			
	8.3.2	b) Extra over for					
C10.1.4		1) Intermediate excavation	m³	50.00			
C10.1.5		2) Hard rock excavations	m³	25.00			
C10.1.6		3) Boulder, Class A	m³	10.00			
C10.1.7		4) Boulder, Class B	m³	10.00			
		Excavation ancillaries					
C10.1.8	8.3.2	c) Excavate and dispose of unsuitable material from trench bottom	m³	50.00			
C10.1.9	8.3.4	a) Shore trench opposite structures	m	50.00			
	8.3.5	Existing services that intersect or adjoin a pipe trench					
C10.1.10		a) Services that intersect a trench	No	25.00			
C10.1.11		b) Services that adjoin a trench	m	200.00			
C10.2	SANS 1200 LB	BEDDING					
	8.2.1	Provision of bedding from trench excavation					
C10.2.1		a) Selected granular material	m³	350.00			
C10.2.2		b) Selected fill material	m³	450.00			
	8.2.2	Supply only of Bedding by Importation					
	8.2.2.3	From Commercial sources:					
C10.2.3		a) Selected granular material	m³	350.00			
C10.2.4		b) Selected fill material	m³	650.00			
C10.3	SABS 1200 LD	SEWERS					
	8.2.1	Supply, lay, joint, bed and test pipes with flexible joints:					
Total Carried Forward							

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
Brought Forward							
		Class 6 uPVC:					
C10.3.1		200 mm dia	m	50.00			
C10.3.2		250 mm dia	m	50.00			
C10.3.3		355 mm dia	m	50.00			
C10.3.4		450 mm dia	m	100.00			
C10.3.5		630 mm dia	m	400.0			
		Class 9 uPVC:					
C10.3.6		200 mm dia	m	155.00			
C10.3.7		250 mm dia	m	630.00			
C10.3.8		355 mm dia	m	10.00			
C10.3.9		450 mm dia	m			Rate Only	
C10.3.10		630 mm dia	m			Rate Only	
	8.2.2	Extra-over Item for supply, lay, joint, bed, specials and fittings, including cut pipes to length where required to:					
		PVC fittings:					
		Bends Class 6:					
C10.3.11		200 mm dia x 22.5º	No	2.00			
C10.3.12		200 mm dia x 45º	No	4.00			
C10.3.13		200 mm dia x 90º	No	8.00			
C10.3.14		200 mm dia T-Piece	No	5.00			
C10.3.15		250 mm dia x 45º	No	5.00			
C10.3.16		250 mm dia x 90º	No	9.00			
C10.3.17		250 mm dia T-Piece	No	5.00			
C10.3.18		250 mm / 250 mm Y-Junction	No	1.00			
C10.3.19		355 mm dia x 45º	No	2.00			
C10.3.20		450 mm dia x 22.5º	No	2.00			
C10.3.21		450 mm dia x 45º	No	2.00			
C10.3.22		450 mm dia x 90º	No	8.00			
C10.3.23		630 mm dia x 22.5º	No	2.00			
C10.3.24		630 mm dia x 45º	No	5.00			
C10.3.25		630 mm dia x 90º	No	6.00			
Total Carried Forward							

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
Brought Forward							
		Bends Class 9:					
C10.3.26		200 mm dia x 22.5º	No	2.00			
C10.3.27		200 mm dia x 90º	No	3.00			
C10.3.28		315 mm dia x 22.5º	No	4.00			
		Steel specials to be stainless steel Grade 316					
C10.3.29		Puddle Flange with 200mm OD	No	2.00			
C10.3.30		Puddle Flange with 250mm OD	No	8.00			
C10.3.31		Puddle Flange with 315mm OD	No	1.00			
C10.3.32		Puddle Flange with 355mm OD	No	4.00			
C10.3.33		Puddle Flange with 450mm OD	No	3.00			
C10.3.34		Puddle Flange with 630mm OD	No	2.00			
C10.3.35		Puddle Flange to fit Flange Adaptor coupling with 200 mm OD	No	2.00			
C10.3.36		Puddle Flange to fit Flange Adaptor coupling with 250 mm OD	No	3.00			
C10.3.37		Puddle Flange to fit Flange Adaptor coupling with 450 mm OD	No	3.00			
		Plain End Couplings					
C10.3.38		To Fit a 200mm OD Stainless Steel pipe and 200mm dia. uPVC	No	3.00			
C10.3.39		To Fit a 250mm OD Stainless Steel pipe and 250mm dia. uPVC	No	8.00			
C10.3.40		To Fit a 315mm OD Stainless Steel pipe and 315mm dia. uPVC	No	1.00			
C10.3.41		To Fit a 355mm OD Stainless Steel pipe and 355mm dia. uPVC	No	4.00			
C10.3.42		To Fit a 450mm OD Stainless Steel pipe and 450mm dia. uPVC	No	6.00			
		Flange Adaptor Couplings one end plain and one end flanged to Table D16/3					
C10.3.43		Flange Adaptor Couplings to fit 200mm Pipe	No	3.00			
C10.3.44		Flange Adaptor Couplings to fit 250mm Pipe	No	3.00			
C10.3.45		Flange Adaptor Couplings to fit 315mm Pipe	No	1.00			
C10.3.46		Flange Adaptor Couplings to fit 355mm Pipe	No	2.00			
C10.3.47		Flange Adaptor Couplings to fit 450mm Pipe	No	2.00			
C10.3.48		Flange Adaptor Couplings to fit 630mm Pipe	No	2.00			
Total Carried Forward							

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
Brought Forward							
		HDG CC (Hot Dipped Galvanised Copn Coated) Specials to suit 450mm and 630mm dia Class 6 PVC pipe: (Flanges Drilled to Table 16/3)					
C10.3.49		355mm dia. HDG CC 4.5mm thick pipe with 550mm Bellmouth one end flanged (L = 1400mm)	No	1.00			
C10.3.50		355mm dia. HDG CC 4.5mm thick 90deg bend with duckfoot, medium radius bend with both ends flanged (R = 1065mm)	No	1.00			
C10.3.51		355mm dia. HDG CC 4.5mm thick 5.5deg lobster bend with both ends flanged (L = 295mm)	No	1.00			
C10.3.52		355mm dia. HDG CC Pipe 4.5mm thick both ends flanged (L =1800mm)	No	1.00			
C10.3.53		355mm dia. HDG CC Pipe 4.5mm thick both ends flanged (L =2000mm)	No	1.00			
C10.3.54		355mm dia. HDG CC Pipe 4.5mm thick both ends flanged (L = 2200mm)	No	1.00			
C10.3.55		355mm dia. HDG CC Pipe 4.5mm thick both ends flanged (L = 4750mm)	No	2.00			
C10.3.56		250mm dia. HDG CC 4.5mm thick 90de medium radius bend with both ends flanged (R = 950mm)	No	1.00			
C10.3.57		250mm dia. HDG CC Puddle Pipe 4.5mm thick both ends flanged (L = 500mm)	No	1.00			
C10.3.58		250mm dia. HDG CC Puddle Pipe 4.5mm thick both ends flanged (L = 640mm)	No	1.00			
C10.3.59		250mm dia. HDG CC Pipe 4.5mm thick both ends flanged (L = 4900mm)	No	1.00			
C10.3.60		250mm dia. HDG CC Pipe 4.5mm thick both ends flanged (L = 2175mm)	No	2.00			
C10.3.61		250mm dia. HDG CC Puddle Pipe 4.5mm thick one end flanged (L =1650mm)	No	1.00			
C10.3.62		250mm dia. HDG CC 4.5mm thick 22.5eg lobster bend with both ends flanged (L = 465mm)	No	2.00			
C10.3.63	8.2.8	Anchor/Thrust blocks: 19mm/25MPa: (Excluding Cement)	m^3	5.00			
C10.3.64		Supply of Cement for item 9C.3.53 above	t	1.75			
C10.3.65	8.2.11	Connect to existing sewer pipelines	No	4.00			
C10.3.66	8.2.11	Brake into and connect to existing manhole including flexible joints and make good all benching. (inclusive of all costs)	No	5.00			
C10.3.67	8.2.3	Supply, lay, joint, bed and test 200mm dia. PN 16 AVK anti-clockwise closing resilient seal gate valves with flanged ends, or equal approved	No	2.00			
Total Carried Forward							

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
Brought Forward							
C10.3.68	8.2.3	Supply, lay, joint, bed and test 250mm dia. PN 16 AVK anti-clockwise closing resilient seal gate valves with flangedends, or equal approved	No	3.00			
C10.3.69	8.2.3	Supply, lay, joint, bed and test 355mm dia. PN 16 AVK anti-clockwise closing resilient seal gate valves with flanged ends, or equal approved	No	2.00			
C10.3.70	8.2.3	Supply, lay, joint, bed and test 450mm dia. PN 16 AVK anti-clockwise closing resilient seal gate valves with flangedends, or equal approved	No	3.00			
C10.4	SANS 1200 L	MEDIUM-PRESSURE PIPELINES					
	8.2.13	Chambers					
		Valve chambers (Drg L-1 of SANS 1200 L) on pipes:					
C10.4.1		200mm dia up to 1,5 m depth	No	2.00			
C10.4.2		250mm dia up to 2.5m depth	No	3.00			
	8.2.14 (a)	Manholes					
		Construct precast concrete manholes on pipes up to 600 mm dia for depths:					
C10.4.3	8.2.14 (b)	1.0 - 2.0 m	No	2.00			
C10.4.4		2.0 - 3,0 m	No	1.00			
C10.4.5		3.0 - 5.5m	No	1.00			
C10.5		SUBSOIL DRAINAGE					
C10.5.1		Excavation for subsoil drains for depths up to 1.5m	m	500.00			
C10.5.2		Supply and install subsurface drains according to drawings	m	500.00			
C10.5.3		Connecting subsurface drains to manholes, kerb inlets, etc	No	5.00			
C10.5.4		Subsoil rodding eye	No	4.00			
C10.5.5		Water Reticulation System	Prov Sum	1.00			
C10.5.6		Handling costs and profit in respect of subitem above	%	50,000.00			
Total Carried Forward To Summary							

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
C11		ROADWORKS AND STORMWATER DRAINAGE					
C11.1	SABS 1200DM	EARTHWORKS (ROADS, SUBGRADE)					
	8.3.3	Treatment of Roadbed					
C11.1.1		a) 150mm thick Roadbed preparation and compaction of material to a minimum of 93% of MOD AASHTO maximum density	m^3	500.00			
		Import from commercial sources:					
C11.1.2	8.3.5	G7 Selected layer compacted to 93% of modified AASTHO maximum density	m^3	150.00			
	8.3.7	Cut to spoil or stockpile from:					
		(Excavate in all materials and stockpile and maintain on site at a location approved by the Engineer)					
C11.1.3		b) Intermediate excavation	m^3	200.00			
C11.1.4		c) Hard Rock excavation	m^3	50.00			
C11.1.5		d) Boulder excavation Class A	m^3	50.00			
C11.1.6		Extra-over for backfill or for fill material against structure, from stockpile material.	m^3	100.00			
C11.2	SANS 1200 ME	SUBBASE					
C11.2.1	8.3.3	Import from commercial sources, 100mm thick G5 natural gravel material for walkway, compacted to 95% of modified AASHTO maximum density	m^3	100.00			
C11.2.2	8.3.3	Import from commercial sources, 150mm thick G5 natural gravel material for road base, compacted to 95% of modified AASHTO maximum density	m^3	300.00			
C11.3	SANS 1200 MF	BASE					
C11.3.1	8.3.3	a) Import from commercial sources, 100mm thick G4 natural gravel material for road base, compacted to 98% of modified AASHTO maximum density	m^3	100.00			
C11.4	SABS 1200MJ	SEGMENTED PAVING					
C11.4.1	8.2.2	Roadway: Construction of Class 40/2.6 (old Class 35MPa), 80mm concrete interlocking pavers (Grey) with a 25mm blinding layer (all included)	m^2	1,900.00			
C11.4.2	8.2.2	Walkways/Around Buildings: Construction of Bevel Bond Paver Brick 50mm pavers (Terracotta) with a 25mm blinding (all included)	m^2	200.00			
C11.4.3	8.2.3	Cutting units to fit edge restraints (kerbs)	m	500.00			
Total Carried Forward							

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
Brought Forward							
C11.4.4	8.2.4	Rolling of units to lock-up condition as specified in clause 5.6.2 of SANS 1200 MJ	m²	1,900.00			
C11.4.5		Remove existing interlocking pavers and stockpile on site at a location approved by the Engineer	m²	520.00			
C11.4.6		Extra-over for reusing of existing interlocking pavers, from stockpile material	m²	500.00			
C11.5	SABS 1200MK	KERBING AND CHANNELING					
	8.2.1	Supply and lay concrete kerbing and edging complete with benching:					
C11.5.1		1) Type BK2 edging kerb with radius more than 20m	m	200.00			
C11.5.2		2) Type BK2 edging kerb with radius less than 20m	m	50.00			
C11.5.3		1) Type MK10 mountable kerb with radius more tha 20m	m	100.00			
C11.5.4		2) Type MK10 mountable with radius less than 20m	m	40.00			
C11.5.5		1) Type CK5 combination kerb with radius more than 20m	m	100.00			
C11.5.6		2) Type CK5 combination kerb with radius less than 20m	m	75.00			
C11.5.7		1) Type C1/C1 channel kerb with radius more than 20m	m	45.00			
C11.5.8		2) Type C1/C1 channel kerb with radius less than 20m	m	15.00			
	8.2.6	Ancillaries					
C11.5.9	8.2.6.1	Construct 2m long, 25Mpa cast-in-situ kerbing transition sections between transitioning kerbs	No	4.00			
C11.5.10		Demolish en remove existing edging kerbs and channel	m	350.00			
C11.5.11		Transport materials and debris to unspecified sites and dump (Provisional)	m³.km	15.00			
C11.6		STORMWATER DRAINAGE (PIPES AND SUBSOILS)					
C11.7	SANS 1200 DB	EARTHWORKS (PIPE TRENCHES)					
	8.3.2	a) Excavate in all materials for trenches and dispose of surplus material for a 300mm diameter stormwater pipeline:					
		Over and Up to					
Total Carried Forward							

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
Brought Forward							
C11.7.1		0.0m to 1.5m	m	15.00			
C11.7.2		1.5m to 2.5m	m	5.00			
	8.3.2	b) Extra - over item (a) above for:					
C11.7.3		1) Intermediate excavation	m^3	15.00			
C11.7.4		2) Hard Rock excavation	m^3	3.00			
C11.8	SANS 1200 LB	BEDDING (PIPES)					
	8.2.2.3	Provision of suitable bedding material from commercial sources:					
C11.8.1		a) Selected Granular material	m^3	15.00			
C11.8.2		b) Selected Fill material	m^3	30.00			
C11.9	SANS 1200 LE	STORMWATER PIPELINES AND CATCHPITS					
	8.2.1	Supply, handle, lay, bed in Class B bedding, concrete pipe with spigot and socket joints					
C11.9.1		375 mm diameter Class 75D	m	100.00			
	8.2.8	b) Supply and install catchpit as per Drawing					
		Over and Up to					
C11.9.2		0.0m to 1.5m	No	1.00			
C11.9.3		1.5m to 2.5m	No	1.00			
C11.9.4		Connect to existing stormwater system	No	4.00			
Total Carried Forward To Summary							

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
C12	SANS 1200 LC	CABLE DUCTS					
	8.2.2	Excavate in all materials for trenches for all cable ducts as specified and dispose of surplus material for depths over and up to:					
		Over and Up to					
C12.1		0.0m to 1.5m	m^3	400.00			
	8.2.5	Supply, Lay, bed and prove ducts:					
C12.2		(ii) 160mm diameter uPVC Class 34 heavy duty complying to SABS 791 spigot and socket rubber ring joints	m	700.00			
C12.3	8.2.8	a) Supply and install cable markers (route markers) as specified	No	45.00			
Total Carried Forward To Summary							

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
C13		MCC AND GENERATOR BUILDING					
C13.1	SANS1200 G	CONCRETE (STRUCTURAL)					
C13.2	8.4	SCHEDULED CONCRETE ITEMS					
	8.4.2	Blinding Layer in 15 MPa/19 mm concrete:					
C13.2.1		75 mm in thickness	m²	90			
C13.2.2		Benching	m²	9			
	8.4.3	Strength concrete: 35 MPa/19 mm					
C13.2.3		3) Floor slab, up to 300mm thick	m³	25			
C13.2.4		4) Plinth, up to 150mm thick	m³	2			
C13.2.5		5) Roof slab, up to 300mm thick	m³	30			
C13.2.6		Supply of Cement for items C13.2.5, C13.2.4. and C13.2.5 above	t	30.00			
C13.3	8.2	SCHEDULED FORMWORK					
	8.2.1	Rough:					
C13.3.1		1)Narrow to Footing up to 250 in width	m	65			
		Smooth:					
C13.3.2		1) Plinth	m²	5			
C13.3.3		3)Narrow roof slab up to 300 mm thick	m	110			
		Plain horizontal to slab soffits with prop height of:					
C13.3.4		3.0m height	m²	90			
	8.2.6	Box out holes:					
		b) Small, other than circular, of area up to and including 0.1m²:					
C13.3.5		1) Rectangular, 0.3m x 0.3m, up to 0.3m deep	No.	2			
		d) Large, other than circular, of area over 0.1m² and up to and including 0.5m²:					
C13.3.6		1) Rectangular, 0.7m x 0.7m, up to 0.3m deep	No.	2			
C13.3.7		2) Rectangular, 1.0m x 0.7m, up to 0.3m deep	No.	4			
	8.4.4	Unformed surface finishes					
		a) Wood floated finish					
C13.3.8		1) Footing/Base	m²	90			
		b) Steel floated finish					
C13.3.9		1) Top of floor slab	m²	155			
C13.3.10		2) Top of plinth	m²	10			
Total Carried Forward							

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
Brought Forward							
		d) Chamfer 20mm x 20mm:					
C13.3.11		1) Roof	m	80			
C13.3.12		2) Plinth	m	20			
C13.3.13		3) Floor Slab	m	40			
C13.4	8.3	SCHEDULED REINFORCEMENT ITEMS					
	8.3.1	High tensile steel bars of diameter					
C13.4.1		up to 20 mm dia	t	6.000			
		Supply and install, all inclusive:					
C13.4.2		I-Section, 203mm x 133 mm x 30kg/m	m	10.0			
C13.5		BUILDING WORK					
	8.2.4	Masonry					
		Brickwork:					
		All brickwork shall be golden harvest rustic clay bricks (222mm x 106mm x 73mm) with a minimum compressive strength of 30MPa and must comply with the requirements					
C13.5.1		220 mm width brick walls	m²	90			
C13.5.2		Air Bricks	No.	6			
C13.5.3		10 mm Plaster	m²	100			
		Corrosion protection of sump walls:					
C13.5.4		Supply and application of protective coating to internal sump walls and under soffit. Coating to provide protection against sewage gases corrosion of concrete similar to ABE Cote SF 356. Coating to be applied as per manufacturer's specifications.	m²	165			
		Doors:					
		Supply and install:					
C13.5.5		1) Single door, size 800mm x 2000mm, Bird/Rodent Proofing 8mm MESH, 60x60x6mm Galvanised Mild Steel equal leg angle,1000x50x6mm Rectangular hollow section, Galvanised Mild Steel inward opening door with lock system.	No.	2			
C13.5.6		2) Supply and install steel double door, 2 x 800 mm Type C3 with Louvres complete as per Drawing A1004/G705	No.	2			
		Windows:					
		Supply and install:					
Total Carried Forward							

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
Brought Forward							
C13.5.7		1) 1200 x 600mm, Dark Bronze coated, Galvanised Mild Steel window frame with 1 No. 600 wide x 600mm high fixed louverd section, Galvanised louverd to be of 6mm, complete with 20 x 20 x 1.8mm diamond galvinsed wire mesh screen, fixed to inside.	No.	5			
C13.6	SANS1200 MJ	SEGMENTED PAVING					
C13.6.1	8.2.2	Construction of Class 40/2.6 (old Class 35 MPa), 80mm concrete interlocking pavers with a 25mm blinding layer (all included)	m²	60			
C13.6.2	8.2.3	Cutting units to fit edge restraints (kerbs)	m	40			
C13.6.3	8.2.4	Rolling of units to lock-up conditions as specified in Clause 5.6.2 of SANS1200MJ	m²	60			
C13.7	SANS1200 MK	KERBING AND CHANNELING					
	8.2.1	Concrete Kerbing					
C13.7.1		Type E1 edging kerb	m	30			
Total Carried Forward To Summary							

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
C14		SECTION : FENCING					
		Provision and Installation of new fencing material as per drawing					
C14.1		Fencing (120mm THICK HOLLOW CORE WALLING SLABS)	m	910.00			
C14.2		3 STRANDS (150mm APART) OF1.2mm GRADE 316 STAINLESS STEEL ELECTRIC FENCE WIRED BRAIDED	m	910.00			
		Gates					
C14.3		6m sliding Gate	No	2.00			
C14.4		2m sliding Gate	No	1.00			
		Security camera system complete					
C14.5		Power Cable for 8 CCTV Points 2.5mm twin and Earth	m	300.000			
C14.6		40MM PVC Pipe	m	200.000			
C14.7		Shielded Cat5 Cable	m	500.000			
C14.8		HikVision 4 Port POE Switch DS- 3E0109P-E	No	9.000			
C14.9		Large Weather Proof Box	No	8.000			
C14.10		4U Wall Mount Box for NVR	set	1.000			
C14.11		32 Channel NVR with 8 Terabit HDD DS-7732NXI-I4/4S	set	1.000			
C14.12		Hikvision 4MP IP Camera DS-	No	21.000			
C14.13		Hikvision 4mp Mini bullet Camera DS-	No	4.000			
C14.14		32 " Monitor	No	1.000			
C14.15		Sundries,Trunking ect	Sum	1.000			
C14.16		Installation	Sum	1.000			
Total Carried Forward To Summary							

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
M1		INLET WORKS					
		Inlet Works - Fine Screening:					
		Inlet Works - Screening:					
M1.1	PS.M8	Front multiple rake 6mm fine mechanical bar screens and motors, including suitable framework, sole plate, flat bar rack, dead plate, endless chain conveyer system, multiple rakes, pivoting scraper, drive assembly, pivoting system, etc.	No	1			
M1.2	PS.M7	Manual rake screen, complete with draining platform, complete with fasteners and ancillary equipment	No	1			
M1.3	PS.M12	Screw conveying system, including centreless screw, drive assembly, troughs, trough covers, loading hopper, support legs, guards, chutes, safety equipment, etc.	No	1			
M1.4	PS.M10	Screenings washer / compactor unit, including washing chamber, inlet hopper, compression chamber, conveying and compressing screw, discharge chute, drainage trough, drainage pipework, support frame, drive assemblies, wash water connections, etc.	No	1			
M1.5		All equipment required for the linking of systems to ensure a fully functional screening system	Sum	1			
	PS.M11	Inlet Works - Grit removal:					
M1.6	PS.M11.3	Vortex grit removal equipment, including paddle system, drive assembly, chamber covers, complete set of all necessary piping for fluidising water, etc.	No	2			
M1.7	PS.M11.4	Grit removal self-priming pump set, complete on baseplate with motor, including all suction and delivery pipework, valves to convey grit from the vortex chamber to the grit classifier, for a fully functional operation	No	2			
M1.8	PS.M11.7	Grit classifier complete with motor, gearbox, pipework, discharge chute, drainage trough, support frame, trough liners, etc.,	No	1			
M1.9		All equipment required for the linking of systems to ensure a fully functional grit removal system	Sum	1			
	PS.M14	Inlet Works - Skip System:					
M1.10		Skip dolly system, complete with trolley suitable for 2x 6m³ skips, rails, drive assembly, etc.	No			Rate Only	
Total Carried Forward							

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
Brought Forward							
M1.11		Standard 6m³ skips	No	2			
M1.12		All equipment required for the linking of systems to ensure a fully functional skip dolly system	Sum	1			
		Inlet Works - Wash / Sparge Water:					
M1.13		Booster pump for all inlet works wash water requirments (duty/stanby)	No	2			
M1.14		Complete pipeline network to connect wash water / sparge water connections to the equipment water supply points, including all fittings, trenching / backfilling, valves, etc	Sum	1			
M1.15		1000 liter polyethylene storage tank	No	1			
M1.16		All equipment required for the linking of systems to ensure a fully functional wash water / sparge water system	Sum	1			
	PS.M5	Sluice Gates, complete with spindle and handwheel, headstock / frame, fasteners, castings, seals, etc.					
M1.17		Inlet works - Channel mounted (800x 1000)	No	2			
M1.18		Inlet works - Channel mounted (800x 1100)	No	2			
M1.19		Inlet works - Channel mounted (800x 1200)	No	2			
M1.20		Inlet works - Channel mounted (800x 1355)	No	2.00			
M1.21		Inlet Division Box- Walll mounted (750x 2200)	No	3.00			
	PS.M13	Inlet Works - Parshall Flume:					
M1.22		New Parshall Flume complete as specified	No	1			
M1.23		All equipment required for the linking of systems to ensure a fully functional Parshall Flumer system	Sum	1			
		Allow for all costs and expenses, including double handling (if stored) and final painting (if applicable), in connection with the Site installation, testing and commissioning of the following:					
		Plant supplied on Items:					
Total Carried Forward							

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
Brought Forward							
M1.24		Inlet Works - Screening	No	4			
M1.25		Inlet Works - Grit removal	No	5			
M1.26		Inlet Works - Skip System	No	3			
M1.27		Inlet Works - Wash/ Sparge Water Pipelines	No	1			
M1.28		Inlet Works - Sluice Gates	No	8			
M1.29		Inlet Works - Parshall Flume	No	1			
M1.30		All other site installation and general items not included above but which are nevertheless necessary to meet the Scope of Work and/or are required for the proper, safe and effective operation of the plant (Specify)	Sum	1			
M1.31		Complete MECHANICAL PERFORATED BAND SCREEN with all required items to operate fully automated.	No			Rate Only	
M1.32		Completely new screw compactor on the screw conveyor line system, including centreless screw, drive assembly, troughs, trough covers, loading hopper, support legs, guards, chutes, safety equipment, etc.	No			Rate Only	
Total Carried Forward To Summary							

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
M2	PS.M16	BIOLOGICAL REACTOR AND BLOWER BUILDING					
		Allow for all costs and expenses in connection with the design, manufacture, quality management, painting / coating, testing, supplying, delivery, offloading, and storage(if applicable), double handling (if applicable) and final painting of the following materials and equipment, including quality assurance, setting out of works and checking work carried out by others as well as in connection with the site installation, testing, commissioning, and upholding during the Trial Operation Period and Defects Liability period of the following complete equipment:					
		Biological Reactor - Mixers:					
M2.1	PS.M16.2	Vertical shaft mixers, complete with fasteners and ancillary etc. All as specified for installation in the anoxic basins	No	4			
M2.2		All equipment required for the linking of systems to ensure a fully functional mixer system	Sum	1			
		Biological Reactor - Aerators:					
M2.3	PS.M19	Surface mechanical aerators, complete with fasteners and ancillary etc. All as specified for installation in the aeration basin. (45kW)	No	4			
M2.4		All equipment required for the linking of systems to ensure a fully functional aeration system	Sum	1			
		Biological Reactor - Mixed Liquor Recycle Pumps:					
M2.5	PS.M17	A-mixed liquor recycle (A-MLR) pumps, complete with fasteners and ancillary etc. All as specified for installation of the mixed liquor pumps.	No	2			
		Conducting in situ pump tests, if and when ordered by the Engineer					
M2.6		Mixed Liquor Recycle Pumps	No	2			
M2.7		All equipment required for the linking of systems to ensure a fully functional mixed liquor pump system	Sum	1			
		Biological Reactor - Submersible WAS Pumps:					
Total Carried Forward							

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
Brought Forward							
M2.8		Submersible WAS Pumps complete with fasteners and anchors, etc. as specified, including autocouplings, guiderails and Lifting chains	No	2			
		Conducting in situ pump tests, if and when ordered by the Engineer					
M2.9		Submersible WAS Pumps	No	2			
		Pipework:					
M2.10		Pipework Complete, Supports, couplings, etc	Sum	1			
		Valves:					
M2.11		Isolating Gate Valves Complete, Supports, couplings, etc	No	2			
M2.12		Non-Return Valves Complete, Supports, couplings, etc	No	2			
		Structural steel:					
M2.13		MSHDG I-BEAM Gantry Complete, Supports, lifting chain, etc	No	1			
M2.14		Testing of Gantry as per SANS 10375	No	1			
M2.15		All equipment required for the linking of systems to ensure a fully functional Submersible Sludge Recycling Pumps system	Sum	1			
Total Carried Forward To Summary							

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
M3	PS.M15	SECONDARY SETTLING TANK AND DIVISION BOX					
		Allow for all costs and expenses in connection with the design, manufacture, quality management, painting / coating, testing, supplying, delivery, offloading, and storage(if applicable), double handling (if applicable) and final painting of the following materials and equipment, including quality assurance, setting out of works and checking work carried out by others as well as in connection with the site installation, testing, commissioning, and upholding during the Trial Operation Period and Defects Liability period of the following complete equipment:					
		Secondary Settling Tank:					
M3.1		New SST : Rotating bridge clarifier and thickener mechanism, including inlet arrangement, single rotating bridge, centre pivot, end carraige and drive unit, drive assembly, scrapers, picket fence, peripheral weirs, scum baffles, Stamford Baffle, scum skimmer, scum discharge hopper, pipework, etc	No	1.00			
M3.2		Telescopic valve, including spindle, handwheel, headstock, complete with fasteners:	No	1.00			
M3.3		All equipment required for the linking of systems to ensure a fully functional thickener system at the new SST	Sum	1.00			
		Scum Spray Bars					
M3.4		Supply, delivery and installation of one-off submersible pump, pipework and spray bar for the Clarifier stilling well scum spray.	No	1			
M3.5		All equipment required for the linking of systems to ensure a fully functional Scum Sprayer Bars system	Sum	1			
		Sluice Gates and Overflow Weirs, complete with spindle and handwheel, headstock / frame, fasteners, castings, seals, etc.:					
M3.6		Distribution Box -Wall mounted overflow adjustable weir	No	2.00			
M3.7		Rigging, transport, handling, etc. for all equipment in Schedule M3	Sum	1.00			
M3.8		All other items not included above but which are deemed necessary to meet the Scope of Work and/or are required for the proper, safe and effective operation of the plant (Specify):	Sum	1.00			
Total Carried Forward To Summary							

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
M4		PUMPS STATIONS					
		Allow for all costs and expenses in connection with the design, manufacture, quality management, painting / coating, testing, supplying, delivery, offloading, and storage(if applicable), double handling (if applicable) and final painting of the following materials and equipment, including quality assurance, setting out of works and checking work carried out by others as well as in connection with the site installation, testing, commissioning, and upholding during the Trial Operation Period and Defects Liability period of the following complete equipment:					
		New Return Activated Sludge Pump Station :					
M4.1		Submersible pump set, complete with motor, duckfoot-bend, guide rails, top brack and lifting chain	No	2.00			
M4.2		Submersible pump set, complete with motor, duckfoot-bend, guide rails, top brack and lifting chain	No	2.00			
M4.3		Complete delivery pipework, couplings, fasteners, pipe supports, etc.	Sum	1.00			
M4.4		Delivery valves complete including all fittings for the complete pump installation	Sum	1.00			
		Ancillary equipment					
M4.5		Pressure gauges on stand	No	2.00			
M4.6		Lifting Equipment, 1000 kg SWL chain hoist, including gear crawl complete to fit the overhead gantry I-Beam	No	1.00			
M4.7		Complete I-Beam gantry with a minimum 1000 kg SWL	Sum	1.00			
M4.8		All equipment required for the linking of systems to ensure a fully functional pumping system	Sum	1.00			
		Waste Activated Sludge Pump Station:					
M4.9		Sludge Holding Tank Feed 1 : Submersible pump set, complete with motor, duckfoot-bend, guide rails, top brack and lifting chain	No	2.00			
M4.10		Sludge Holding Tank Feed 1 : Complete delivery pipework, couplings, fasteners, pipe supports, etc.	Sum	1.00			
M4.11		Sludge Holding Tank Feed 1 : Delivery valves complete including all fittings for the complete pump installation	Sum	1.00			
M4.12		All equipment required for the linking of systems to ensure a fully functional pumping system	Sum	1.00			
		Ancillary equipment					
Total Carried Forward							

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
Brought Forward							
M4.13		Pressure gauges on stand	No	2.00			
M4.14		Lifting Equipment, 1000 kg SWL chain hoist, including gear crawl complete to fit the overhead gantry I-Beam	No	1.00			
M4.15		Complete I-Beam gantry with a minimum 1000 kg SWL	Sum	1.00			
M4.16		All equipment required for the linking of systems to ensure a fully functional pumping system	Sum	1.00			
		Irrigation Installation					
M4.17		Complete Irrigation network, including all piping, valves, controller sprinklers, etc	Prov Sum			Rate Only	
Total Carried Forward To Summary							

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
M5		Section 5					
	PS.M20	New Dewatering Equipment, Complete:					
M5.1		Gravity Thickener, complete with instrumentation	No	1.00			
M5.2		Belt Press, complete with instrumentation	No	1.00			
M5.3		Sludge Transfer chute	No	1.00			
M5.4		Sludge distribution box for Belt press	No	1.00			
M5.5		Sludge Feed pipework inside building, including all fittings and inline static mixer, complete	Sum	1.00			
M5.6		DN100 Knife gate valve	No	2.00			
M5.7		Electrical actuators to suit Knife Gate Valves	No	2.00			
M5.8		Gravity Thickener steel structure	Sum	1.00			
M5.9		Walkways and Stairways	Sum	1.00			
M5.10		All equipment required for the linking of systems and any other ancillary equipment required to ensure a fully functional dewatering plant	Sum	1.00			
		Polyelectrolyte Make-up System:					
M5.11		Polymer preparation unit, complete with tank, equipment and controls	Sum	1.00			
M5.12		Polyelectrolyte powder bags, for testing commissioning and trial operational period	Sum	1.00			
		Powder loading System:					
M5.13		Loading hopper, complete	Sum	1.00			
M5.14		Chute including heating element, complete	Sum	1.00			
		Polyelectrolyte Make-up Water Supply:					
M5.15		Storage tank, complete with all fittings	Sum	1.00			
M5.16		Booster pump set, complete with control and instrumentation	Sum	2.00			
M5.17		Complete pipework, including all valves	Sum	1.00			
M5.18		All equipment required for the linking of systems and any other ancillary equipment required to ensure a fully functional polymer make-up plant	Sum	1.00			
		Polyelectrolyte Dosing System:					
M5.19		Dosing pump sets, complete	No	2.00			
M5.20		Suction and delivery pipework complete including all fittings and supports, per dosing system	No	1.00			
M5.21		Suction and delivery valves complete including all fittings, per dosing system	No	2.00			
Total Carried Forward							

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
Brought Forward							
M5.22		All equipment required for the linking of systems and any other ancillary equipment required to ensure a fully functional polymer dosing installation	Sum	1.00			
		Wash Water System:					
M5.23		Wash water pump sets, complete	No	2.00			
M5.24		Suction and delivery pipework complete including all fittings and supports and ancillary equipment, per dosing system	No	1.00			
M5.25		Suction and delivery valves complete including all fittings, per system	No	2.00			
M5.26		Lifting equipment, complete	Sum	1.00			
M5.27		All equipment required for the linking of systems and any other ancillary equipment required to ensure a fully functional wash water installation	Sum	1.00			
		Dewatered Sludge Conveyers:					
M5.28		Horizontal sludge conveyor, centreless screw, complete	No	1.00			
M5.29		Inclined sludge Conveyor, centreless screw, complete	No	1.00			
M5.30		All equipment required for the linking of systems and any other ancillary equipment required to ensure a fully functional conveyer system	Sum	1.00			
		Sludge Silo Equipment:					
M5.31		Horizontal sludge conveyers, centreless screw	No			Rate Only	
M5.32		All equipment required for the linking of systems and any other ancillary equipment required to ensure a fully functional silo installation	Sum			Rate Only	
		Lifting Equipment:					
		Polymer Powder Lifting Equipment					
M5.33		Davit, complete	No	1.00			
M5.34		Electrical Hoist, complete	No	1.00			
M5.35		Trolley, complete	No			Rate Only	
M5.36		All equipment required for the linking of systems and any other ancillary equipment required to ensure a fully functional dewatering plant, including all ancillary processes	Sum	1.00			
M5.37		Rigging, transport, handling, etc. for all equipment in Schedule M2	Sum	1.00			
Total Carried Forward							

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
Brought Forward							
M5.38		All other items not included above but which are deemed necessary to meet the Scope of Work and/or are required for the proper, safe and effective operation of the plant (Specify):.....	Sum	1.00			
Total Carried Forward To Summary							

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
M6		Chlorination Equipment					
		Allow for all costs and expenses in connection with the following equipment. (Supply and installation					
		Chlorine gas system					
M6.1		Wallace & Tiernan vacuum regulator 10kg S10K C/O	No	2.00			
M6.2		All PVC piping inside chlorine building for chlorine vacuum lines	Sum	1.00			
M6.3		Wallace & Tiernan 19mm Injector, 140 F (requires 1200l/hr @ 2.2Bar)	Sum	1.0			
M6.4		Pipework, fittings and brackets for chlorine spreader bar at dosing point	Sum	1.00			
M6.1		GMS	set	1.00			
M6.1.1		Chlorine sensor	No	2.00			
M6.1.2		Light and siren	set	1.00			
M6.1.3		Safety sign set	set	1.00			
M6.1.4		Chlorine manifold with liquid trap, suitable for 2 x 70kg cylinder per bank	No.	2.00			
M6.1.5		Pressure gauge for chlorine manifold	No.	2.0			
M6.1.6		Heater for liquid trap	No.	2.0			
M6.1.7		Flex line 1.2m(4 x in-use and 2 x spare)	No	2.00			
M6.1.8		Emergency safety shower (single coulomb) with eye wash station, PP with PVC valve	set	1.00			
M6.1.9		Lead washers	No	50.0			
M6.1.10		Wall mount box chlorine PPE, Yellow aluminum	Sum	1.00			
M6.1.11		Wall mount enclosure for BA set	Sum	1.00			
M6.1.12		Gasmask and canister	Sum	1.00			
M6.1.13		Safety suit, gumboots + gloves	Sum	1.0			
M6.1.14		BA set with mask, cylinder and back plate	Sum	1.00			
M6.1.15		Ammonia leak tester	Sum	1.00			
M6.1.16		Flex line and chlorine spanner set	Sum	1.0			
M6.1.17		Windsock with a bracket	No	2.0			
M6.1.18		Chlorine cylinder brackets,	No.	8.00			
M6.1.19		Ramps for the scale (if scales can't be sunk into floor)	No	2.0			
M6.1.20		Cylinder trolly's	No.	1.00			
Total Carried Forward							

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
Brought Forward							
M6.1.21		Emergency shut-off system, complete with compressor, pneumatic closure motors inc, control panel and pneumatic equipment	No.	1.00			
M6.1.22		Installation and accommodation for new chlorine system	Sum	1.0			
M6.1.23		Commissioning including travel, accommodation	Sum	1.0			
M6.1.24		Health and safety file	Sum	1.00			
M6.1.25		Drawing	Sum	1.0			
M6.1.26		Chlorine handling training	Sum	1.00			
Total Carried Forward To Summary							

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
M7		DIVISION BOXES, CHLORINE CONTACT CHANNEL, SPLITTER AND OVERFLOW BOX					
		Allow for all costs and expenses in Connection with the design, manufacture, quality management, painting, testing, supply, delivery, offloading and storage of the following materials and equipment including quality assurance, setting out of works and checking work carried out by others:					
	PS.M5	Sluice Gates and Overflow Weirs, complete with spindle and handwheel, headstock / frame, fasteners, castings, seals, etc.					
		Sluice Gates					
M7.1		Inlet Division Box- Walll mounted (750x 2200)	No	3			
M7.2		SST's Division Box- Walll mounted (600x 900) (Upward Closing)	No	3			
M7.3		Chlorine Contact Channel - Walll mounted (800x 1000)	No	1			
M7.4		Mixed Liquor Recycle Pumps chamber - Wall mounted (800x 1000)	No	2			
M7.5		All equipment required for the linking of systems to ensure a fully functional sluice gates system	Sum	1			
		Overflow Weirs:					
M7.6		Chlorine Contact Channel - Stainless steel face mounted V-Notch (45°) (800 x 600mm), complete	No	1			
M7.7		Chlorine Contact Channel - Stainless steel face mounted Sharp crest weir (6mm x 100mm x 1000mm), complete	No	1			
M7.8		All equipment required for the linking of systems to ensure a fully functional stainless overflow weirs	Sum	1			
Total Carried Forward To Summary							

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
E1		LV SWITCHBOARDS					
		Existing Miniature Substation					
E1.1		Supply, deliver, install and connect 630 A TP Moulded Case Circuit Breaker in existing minisub	Sum	1.00			
		"MCC-1 (Existing Reactor)(Excluding PLC & HMI)"					
E1.2		Manufacture, Transport and Deliver to site	Sum	1.00			
E1.3		Install and connect	Sum	1.00			
E1.4		Power Factor Correction (PFC) System	Sum	1.00			
		"MCC-2 (New Reactor)(Excluding PLC & HMI)"					
E1.5		Manufacture, Transport and Deliver to site	Sum	1.00			
E1.6		Install and connect	Sum	1.00			
E1.7		Power Factor Correction (PFC) System	Sum	1.00			
		"MCC-DEW (Dewatering plant)(Excluding PLC & HMI)"					
E1.8		Manufacture, Transport and Deliver to site	Sum	1.00			
E1.9		Install and connect	Sum	1.00			
		"MCC-INL (Inlet Works)(Excluding PLC & HMI)"					
E1.10		Manufacture, Transport and Deliver to site	Sum	1.00			
E1.11		Install and connect	Sum	1.00			
		Distribution Board DB-MCC					
E1.12		Manufacture, Transport and Deliver to site	Sum	3.00			
E1.13		Install and connect	Sum	3.00			
		Distribution Board DB-DEW					
E1.14		Manufacture, Transport and Deliver to site	Sum	1.00			
E1.15		Install and connect	Sum	1.00			
		Distribution Board "Kiosk"					
E1.16		Manufacture, Transport and Deliver to site	Sum	3.00			
E1.17		Install and connect	Sum	3.00			
		Field Instrument Enclosures (FIE)					
E1.18		Supply and Install FIE (on wall or HDG stand)	No	7.00			
E1.19		Supply and Install HDG stand for FIE	No	7.00			
		Field Control Stations (FCS) including HDG stand					
E1.20		Supply and Install FCS (E-Stop + 1 x Start)	No	30.00			
Total Carried Forward							

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
Brought Forward							
E1.21		Supply and Install FCS (E-Stop + 2 x Start)	No	11.00			
		Work to be performed on existing installation					
E1.22		Isolate, Disconnect and remove existing Main MCC for Existing Reactor	Sum	1.00			
E1.23		Isolate, Disconnect and remove existing Main MCC for Existing Inlet Works	No	1.00			
Total Carried Forward To Summary							

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
E2		CABLING					
		PVC/SWA Copper cable:					
		150 mm² x 4 Core PVC/SWA					
E2.1		Supply and Deliver to site	m	240.00			
E2.2		Install in ground	m	210.00			
E2.3		Install on Cable tray	m	30.00			
E2.4		Terminate	No	12.00			
		120 mm² x 4 Core PVC/SWA					
E2.5		Supply and Deliver to site	m	650.00			
E2.6		Install in ground: 2 cables in parellel	m	520.00			
E2.7		Install on Cable tray: 2 cables in parellel	m	130.00			
E2.8		Terminate	No	6.00			
		95 mm² x 4 Core PVC/SWA					
E2.9		Supply and Deliver to site	m	100.00			
E2.10		Install in ground	m	90.00			
E2.11		Install on Cable tray	No	10.00			
E2.12		Terminate	No	2.00			
		70 mm² x 4 Core PVC/SWA					
E2.13		Supply and Deliver to site	m	700.00			
E2.14		Install in ground	m	580.00			
E2.15		Install on Cable tray	No	120.00			
E2.16		Terminate	No	4.00			
		50 mm² x 4 Core PVC/SWA					
E2.17		Supply and Deliver to site	m	260.00			
E2.18		Install in ground	m	210.00			
E2.19		Install on Cable tray	m	50.00			
E2.20		Terminate	No	8.00			
		35 mm² x 4 Core PVC/SWA					
E2.21		Supply and Deliver to site	m	1.00			
E2.22		Install in ground	m	1.00			
E2.23		Install on Cable tray	m	1.00			
E2.24		Terminate	No	1.00			
		25 mm² x 4 Core PVC/SWA					
Total Carried Forward							

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
Brought Forward							
E2.25		Supply and Deliver to site	m	115.00			
E2.26		Install in ground	m	100.00			
E2.27		Install on Cable tray	m	15.00			
E2.28		Terminate	No	4.00			
		16 mm² x 4 Core PVC/SWA					
E2.29		Supply and Deliver to site	m	630.00			
E2.30		Install in ground	m	500.00			
E2.31		Install on Cable tray	m	130.00			
E2.32		Terminate	No	16.00			
		10 mm² x 4 Core PVC/SWA					
E2.33		Supply and Deliver to site	m	60.00			
E2.34		Install in ground	m	50.00			
E2.35		Install on Cable tray	m	10.00			
E2.36		Terminate	No	2.00			
		6 mm² x 4 Core PVC/SWA					
E2.37		Supply and Deliver to site	m	600.00			
E2.38		Install in ground	m	450.00			
E2.39		Install on Cable tray	m	250.00			
E2.40		Terminate	No	28.00			
		4 mm² x 4 Core PVC/SWA					
E2.41		Supply and Deliver to site	m	305.00			
E2.42		Install in ground	m	195.00			
E2.43		Install on Cable tray	m	110.00			
E2.44		Terminate	No	12.00			
		2.5 mm² x 4 Core PVC/SWA					
E2.45		Supply and Deliver to site	m	685.00			
E2.46		Install in ground	m	430.00			
E2.47		Install on Cable tray	m	255.00			
E2.48		Terminate	No	28.00			
		1.5 mm² x 4 Core PVC/SWA					
E2.49		Supply and Deliver to site	m	1,885.00			
E2.50		Install in ground	m	1,325.00			
Total Carried Forward							

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
Brought Forward							
E2.51		Install on Cable tray	m	560.00			
E2.52		Terminate	No	60.00			
		1.5 mm² x 3 Core PVC/SWA					
E2.53		Supply and Deliver to site	m	1,685.00			
E2.54		Install in ground	m	1,225.00			
E2.55		Install on Cable tray	m	460.00			
E2.56		Terminate	No	68.00			
		Signal cable:					
		1.5 mm² x 7 core Multicore PVC/SWA:					
E2.57		Supply and Deliver to site	m	1,160.00			
E2.58		Install in ground	m	660.00			
E2.59		Install on Cable tray	m	500.00			
E2.60		Terminate	No	46.00			
		1.5 mm² x 11 core Multicore PVC/SWA:					
E2.61		Supply and Deliver to site	m	195.00			
E2.62		Install in ground	m	150.00			
E2.63		Install on Cable tray	m	45.00			
E2.64		Terminate	No	10.00			
		DEKABON 0.5 mm² x 2 Pair twisted pair Shielded					
E2.65		Supply and Deliver to site	m	620.00			
E2.66		Install in ground	m	400.00			
E2.67		Install on Cable tray	m	220.00			
E2.68		Terminate	No	26.00			
		DEKABON 0.5 mm² x 4 Pair twisted pair Shielded					
E2.69		Supply and Deliver to site	m	60.00			
E2.70		Install in ground	m	40.00			
E2.71		Install on Cable tray	m	20.00			
E2.72		Terminate	No	2.00			
		Fibre-Optic cable:					
		12 core F-O Armoured PVC/SWA:					
E2.73		Supply and Deliver to site	m	380.00			
E2.74		Install in ground	m	300.00			
Total Carried Forward							

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
Brought Forward							
E2.75		Install on Cable tray	m	80.00			
E2.76		Terminate	No	8.00			
E2.1		EARTHING					
		Main Earthing:					
E2.1.1		Crow's foor Earth electrode, 4 x 1.2 m Earth spikes, connected with 2.0 m lenghts of 70 mm² BCE, all joints CADWELDed	Sum	3.00			
		Bare Copper earth conductor:					
		70 mm² x 4 Core PVC/SWA					
E2.1.2		Supply and Deliver to site	m	990.00			
E2.1.3		Install	m	990.00			
E2.1.4		Terminate	No	20.00			
		Testing and Certifying:					
E2.1.5		Testing of Main Earth system	Sum	1.00			
E2.1.6		Earth continuity of all cables	Sum	1.00			
Total Carried Forward To Summary							

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
E3		CABLE SUPPORT SYSTEMS					
		Supply, Transport, Deliver to site and install, complete with all OEM fixings, splices and supports.					
		Heavy Duty HDG Cable ladder (2 mm thickness):					
		500 mm Wide:					
E3.1		Straight length, per running meter	m	130			
E3.2		Vertical bend	No	2		Rate Only	
E3.3		Horizontal bend	No	2		Rate Only	
E3.4		T-piece	No	2.00			
		300 mm Wide:					
E3.5		Straight length, per running meter	m	50			
E3.6		Vertical bend	No	6			
E3.7		Horizontal bend	No	4		Rate Only	
E3.8		T-piece	No	6.00			
		150 mm Wide:					
E3.9		Straight length, per running meter	m	1			
E3.10		Vertical bend	No	1			
E3.11		Horizontal bend	No	1			
		HDG Welded Wire Mesh Tray (Wire diameter: 4.0 mm):					
		200 mm Wide:					
E3.12		Straight length, per running meter	m	30			
E3.13		Vertical bend	No	8			
E3.14		Horizontal bend	No	4			
E3.15		T-piece	No	6.00			
		100 mm Wide:					
E3.16		Straight length, per running meter	m	60			
E3.17		Vertical bend	No	18			
E3.18		Horizontal bend	No	6			
E3.19		T-piece	No	6.00			
		Galvanized (PG) Wiring Channel (min 1.6 mm thickness):					
		41 mm x 41 mm ("P1000")					
E3.20		Straight length, per running meter	m	50			
Total Carried Forward							

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
Brought Forward							
E3.21		PG Cover	m	50			
		76 mm x 76 mm ("P8000")					
E3.22		Straight length, per running meter	m	30			
E3.23		PG Cover	m	30			
		Galvanized Conduit:					
		25 mm Diameter					
E3.24		Straight length, per running meter	m	15			
E3.25		90 deg Bend	No	5			
E3.26		End bushing	No	12			
Total Carried Forward To Summary							

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
E4		BUILDING SERVICES ELECTRICAL					
		Conduit and Accessories (20 mm SABS Approved PVC):					
E4.1		Per running meter, including all couplings, bends and fixing hardware, installed on surface	m	680			
E4.2		50 diameter Round outlet box	No	22			
E4.3		50 x 100 (2 x 4) outlet box	No	8			
E4.4		100 x 100 (4 x 4) outlet box	No	14			
		Switches and Socket Outlets:					
E4.5		Surface mounted 1-way, 1-lever, 16 A light switch	No	6			
E4.6		Surface mounted single 16 A Switch socket outlet	No	10			
E4.7		Surface mounted Non-metallic 3-phase, 16 A, 5-pin (3P+N+E) switched socket outlet, complete with matching plug	No	4			
		Wiring ("Slipdac"):					
E4.8		2.5 mm² PVC wiring for lighting circuits, installed in conduit	m	1,060			
E4.9		4.0 mm² PVC wiring for and plug circuits, installed in conduit	m	630			
		Luminaires:					
		Type B1 fitting -					
E4.10		Wall mounted industrial type bulkhead luminaire with cast aluminium body and high impact acrylic diffuser complete with 20 W LED lamp BEKA LED Nova 20W	No	8			
		Type B2 fitting -					
E4.11		Surface mounted Bulkhead fitting with polycarbonate diffuser and body, complete with 13 W LED lamp BEKA Bulkhead Series 31 - 13W	No	14			
		Type F1 fitting -					
E4.12		"Commercial corrosion protected fluorescent luminaire with IP66 rating, suitable for either wall or ceiling mounting with moulded glass fibre body and acrylic diffuser complete with 46 W LED lampBEKA Vapourline VLN LED-46W"	No	46			
		Type S1 fitting -					
E4.13		"Pole-mounted Outdoor, high-impactpolycarbonate diffuser complete with 1 x 19 W LED lamp, luminaire with Aluminium housing, high complete with spigot for pole mountingBEKA Ziya-1 19W"	No	14.00			
		S1 Pole -					
Total Carried Forward							

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
Brought Forward							
E4.14		GRP pole for S1 fitting: 9.2 m pole for 8.0 m Mounting Height, complete with galvanized gland plate, planted in hand-pickable soil	No	14			
Total Carried Forward To Summary							

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
E5		Section E5: Automation and Control					
		Rates for instrumentation shall include Procurement, Delivery to site, installation and configuration, including setup and commissioning.					
		Programmable Logic Controllers					
		"PLC for MCC-2(New Biological Reactor)"					
E5.1		Supply, deliver, install into MCC-2 and connect	Sum	1.00			
E5.2		System integration	Sum	1.00			
		"Remote I/O PLC for MCC-1(Existing Biological Reactor)"					
E5.3		Supply, deliver, install into MCC-1 and connect	Sum	1.00			
E5.4		System integration	Sum	1.00			
		"PLC for MCC-DEW(Dewatering Plant)"					
E5.5		Supply, deliver, install into MCC-DEW and connect	Sum	1.00			
E5.6		System integration	Sum	1.00			
		"PLC for MCC-INL(Inlet Works)"					
E5.7		Supply, deliver, install into MCC-INL and connect	Sum	1.00			
E5.8		System integration	Sum	1.00			
		Human-Machine Interface (HMI)					
		"HMI (15"") for MCC-2(New Biological Reactor)"					
E5.9		Supply, deliver, install into MCC-2 and connect	Sum	1.00			
E5.10		System integration	Sum	1.00			
		"HMI (15"") for MCC-1(Existing Biological Reactor)"					
E5.11		Supply, deliver, install into MCC-1 and connect	Sum	1.00			
E5.12		System integration	Sum	1.00			
		"HMI (15"") for MCC-DEW(Dewatering Plant)"					
E5.13		Supply, deliver, install into MCC-DEW and connect	Sum	1.00			
E5.14		System integration	Sum	1.00			
		"HMI (12"") for MCC-INL(Inlet Works)"					
E5.15		Supply, deliver, install into MCC-INL and connect	Sum	1.00			
E5.16		System integration	Sum	1.00			
		ÙPS - Rack mounted UPS for Power supply to PLCs, with 15 minute battery autonomy					
Total Carried Forward							

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
Brought Forward							
E5.17		Supply, deliver, install into MCCs and connect	Sum	1.00			
Total Carried Forward To Summary							

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
E6		Section E6: Instrumentation					
		Rates for instrumentation shall include Procurement, Delivery to site, installation and configuration, including setup and commissioning.					
		Float level Switches:					
E6.1		Float level switch with 5 m cable	No	4.00			
E6.2		Float level switch with 10 m cable	No	2.00			
E6.3		Weight with 10 m nylon rope	No	3.00			
E6.4		Stainless steel bracket for Float suspension	No	3.00			
		Ultrasonic level detectors:					
E6.5		Ultrasonic Level Detector (Single Sensor and Transmitter)	No	2.00			
E6.6		Ultrasonic Differential Level Detector (Two Sensors and 1 Transmitter)	No	1.00			
E6.7		Ultrasonic Level Detector (For Volume flow)	No	1.00			
E6.8		Stainless steel bracket for USR Mounting	No	5.00			
		Magnetic flow meters:					
E6.9		Magflow complete with DN250 sensor element and transmitter	No	2.00			
		Proximity switches:					
E6.10		Inductive Proximity switch	No	8.00			
E6.11		Stainless steel bracket for mounting of Proximity switch	No	8.00			
		Analytical Instruments:					
		Dissolved Oxygen measurement:					
E6.12		DO Sensor	No	2.00			
E6.13		Dedicated DO Transmitter	No	2.00			
		Suspended Solids (Turbidity) measurement:					
E6.14		Turbidity Sensor	No	2.00			
E6.15		Dedicated Turbidity Transmitter	No	2.00			
E6.16		Alternative Dual Transmitter for both DO and Turbidity sensors	No	1.00			
E6.17		Stainless steel mounting assembly for Analytical intruments	No	4.00			
Total Carried Forward To Summary							

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
E7		GENERATOR					
		Generating Set					
		Supply and install					
E7.1		Complete indoor set, excluding ancillaries listed below in 2	Sum			Rate Only	
		Ancillary Equipment					
		Supply and install					
E7.2		Hot air ducting	Sum			Rate Only	
E7.3		Intake and Exhaust Louvres, including installation into building	Sum			Rate Only	
		Sound attenuation					
E7.4		Design - 65dBA at 5m	Sum			Rate Only	
E7.5		Equipment at louvres and exhaust	Sum			Rate Only	
E7.6		Flame retardent sound panels for building walls, door and slab ceiling	m^3			Rate Only	
E7.7		Complete outdoor fuel tank for 24-hours, level sensor, earthing, automatic pumping system and piping, site glass, re-fuelling and static discharge points	Sum			Rate Only	
E7.8		Complete indoor day tank, within bunded area, complete with site glass, level sensor and earthing	Sum			Rate Only	
E7.9		Fuel and oil pumps, including connection and re-filling hoses and stand-pipes	Sum			Rate Only	
E7.10		Alternator power cable: Provisionally 3 x 185mm2 x 4 core, subject to final sizing offer	Sum			Rate Only	
E7.11		Control cables between generator and controller	Sum			Rate Only	
E7.12		Control/network cables for all required remote monitoring	Sum			Rate Only	
		Switchboard and Changover					
		Supply and install					
E7.13		Switchboard with changeover (complete) and networked controller	Sum			Rate Only	
		General Electrical, Installation and Ancillaries					
		Supply and install					
E7.14		Complete plant earthing and bonding	Sum			Rate Only	
E7.15		Cable connections (earthing, power and control)	Sum			Rate Only	
E7.16		Fuel for full fuel tank at hand-over	Sum			Rate Only	
Total Carried Forward							

ITEM NO	PAYMENT	DESCRIPTION	UNIT	QTY	RATE	AMOUNT	
						R	c
Brought Forward							
E7.17		Fuel for commissioning over a period of three weeks, where site peak loading exceeds Eskom NMD, including all associated transport, method statements, usage monitoring and re-fuelling costs	ℓ			Rate Only	
E7.18		Transport and rigging	Sum			Rate Only	
E7.19		Sundries such as cable boxes, notices and signage, conduit, tray, etc.	Sum			Rate Only	
E7.20		H&S compliance such as fire extinguisher, signage, Municipal approvals and applications, etc.	Sum			Rate Only	
E7.21		Factory Acceptance test for generator, switchboard and changeover	Sum			Rate Only	
E7.22		Two maintenance trips during the retention period	Sum			Rate Only	
E7.23		Any other expenses deemed to be incurred in complying with the full requirements of the Scope of Works	Sum			Rate Only	
Total Carried Forward To Summary							

SUMMARY OF SCHEDULE(S) OF QUANTITIES
CALCULATION OF CONTRACT PRICE

A: PRELIMINARY AND GENERAL

SECTION PG1: PRELIMINARY AND GENERAL	R ……

B: CIVIL

SECTION C1: SITE CLEARANCE AND EARTH WORKS	R ……
SECTION C2: INLET WORKS	R ……
SECTION C3: BIOLOGICAL REACTOR	R ……
SECTION C4: SST'S DIVISION BOX	R ……
SECTION C5: CLARIFIER	R……..
SECTION C6: ACTIVATED SLUDGE RECYCLE PUMP STATION (RAS)	R ……
SECTION C7: CHLORINATION CONTACT CHANNEL	R ……
SECTION C8: SLUDGE DEWATERING	R ……
SECTION C9: VARIOUS SMALL STRUCTURES	R……
SECTION C10: INTERCONNECTING PIPE WORK	R……
SECTION C11: ROADWORKS AND STORMWATER DRAINAGE	R……
SECTION C12: CABLE DUCTS	R ……
SECTION C13: MCC AND GENERATOR BUILDING	R ……
SECTION C14: FENCING AND SECURITY	R ……

C: MECHANICAL

SECTION M1: INLET WORKS	R ……
SECTION M2: BIOLOGICAL REACTOR AND BLOWER PLANT	R ……
SECTION M3: SECONDARY SETTLING TANK AND DIVISION BOX	R ……
SECTION M4: PUMP STATIONS	R ……
SECTION M5: MECHANICAL DEWATERING	R ……
SECTION M6: CHLORINATION EQUIPMENT	R ……
SECTION M7: DIVISION BOXES, CHLORINE CONTACT CHANNEL, SPLITTER AND OVERFLOW BOX	R ……

D: ELECTRICAL

SECTION E1: LOW VOLTAGE ELECTRICAL	R ……
SECTION E2: CABLING	R ……
SECTION E3: CABLE SUPPORT SYSTEMS	R ……
SECTION E4: BUILDING SERVICES ELECTRICAL	R ……
SECTION E5: AUTOMATION AND CONTROL	R ……
SECTION E6: INSTRUMENTATION	R ……
SECTION E7: GENERATOR	R ……

E: TOTAL OF SCHEDULE(S) (SUM OF A to D)	**R** ……..

F: CONTINGENCIES (The utilization of the contingencies is subject to final approval of the client) (**10%** of TOTAL E above)	**R** ……..

G: INFLATION (The utilization of the inflation is subject to final approval of the client) (**5%** of TOTAL G above)	**R** ……..

H: CONTRACT PRICE ADJUSTMENT (The utilization of the CPA is subject after 1 year after the contract commencement date). (**7.5%** of TOTAL H above) **(The sum provided is in terms of Subclause 6.8.2 of the General Conditions of Contract)**	**R** ……..

I: TOTAL (E+F+G+H)	**R ……..**

J: TOTAL VALUE ADDED TAX (15%) ON (I) ABOVE	**R ……..**

K: CONTRACT PRICE CARRIED FORWARD TO C1.1 FORM OF OFFER (I+J)	**R ……**

I/We, the undersigned, do hereby declare that these are the properly priced Bill / Schedules of Quantities forming part of this Contract Document containing Pages in consecutive order upon which my/our Tender for

CONTRACT NO.: T41/2022 - REFURBISHMENT AND UPGRADE OF ROBERTSON WASTEWATER TREATMENT WORKS has been based.

My/our total Contract Price for this work and above item (Total K) is (in words)

SIGNED ON BEHALF OF TENDERER:

SCHEDULE PBIE: PRICE BASIS FOR IMPORTED EQUIPMENT

VALUE OF IMPORTED RESOURCESS TO BE ADJUSTED					Customs Surcharge		Customs Duty*		Total in Rand of (C) + (D) + (E) included in Schedules of Quantities Item
Schedules of Quantities Item No.	Description of Resources	Value in Foreign Currency (A)	Rate of Exchange as at BASE DATE (B)	Value in Rand (A) x (B) (C)	%	Rand (D)	%	Rand (E)	(F)

*** State Customs Duty Tariff Reference for each item**

Note:

Note that any Resources not inserted in this schedule
shall be deemed to be manufactured / supplied in South Africa for the purposes of Contract Price Adjustment.
The BASE DATE referred to in column (B) will be7 calendar days before tender closing.

SIGNATURE OF TENDERER .....

DATE .....

PART C3 : SCOPE OF WORK

CONTENTS

C3.1 DESCRIPTION OF THE WORKS
C3.2 ENGINEERING
C3.3 PROCUREMENT
C3.4 CONSTRUCTION
C3.5 MANAGEMENT
C3.6 ANNEXES

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 Employer's objectives are to **UPGRADE OF THE ROBERTSON WASTEWATER TREATMENT WORKS** area.

The description of the project contained in the Scope of Work is merely an outline of the Contract Works and shall not limit the work to be carried out by the Contractor under this Contract. Details of some of the major items are given in this section and approximate detailed quantities for each type of work to be carried out in accordance with the Contract Documents are included in the Bill of Quantities.

3.1.2 OVERVIEW OF THE WORKS

The project entails REFURBISHMENT AND UPGRADE OF ROBERTSON WASTEWATER TREATMENT WORKS

The total works comprises of the following:

- Construction of a new Inlet Works Complete with all related mechanical and electrical equipment
- Construction of a new MLE reactor with all related mechanical and electrical equipment
- Construction of a new SST's Division box with sluice gates
- Construction of a new RAS Pump Station with all related mechanical and electrical equipment
- Construction of a 24m diam. secondary settling tank with rotating bridges and all related mechanical and electrical equipment
- Construction of new Dewatering Building with office building complete with all related mechanical and electrical equipment
- Construction of a new MCC and Generator building with a new generator and with all related mechanical and electrical equipment
- Demolishing of existing structures
- Supply and installation of all related Mechanical and Electrical Equipment to all new structures
- All interconnecting pipework
- Construction of Roadworks and Stormwater
- Construction of Various small structures
- Construction of New Security Fence

Work items under this tender shall include any one or more of the following:

- Establishment on site
- The supply of plant, labour, tools, equipment and materials necessary to complete the Works
- Setting out the works
- Concrete Construction
- Road construction
- Pipe work and pipe specials
- Mechanical Installations (design, supply and install by contractor)
- Electrical Installations (design, supply and install by selected contractor)
- Clearance of the site at completion

The work that is to be carried out under the contract is as provided for in the schedule of quantities. However, if during the course of construction conditions are found to differ from those anticipated, the Employer's Agent reserves the right to modify the scope of the work to suit the prevailing conditions and circumstances. Variations introduced in this manner will be measured and paid for at the rates tendered for appropriate items listed elsewhere in the schedule of quantities or in the absence of such rates, as extra work.

3.1.4 LOCATION OF THE WORKS

The site is located in the Western Cape, within the boundaries of the Langeberg Municipality at the existing wastewater treatment works in Robertson. All work will take place within the boundaries of the Existing Wastewater Treatment works.

3.1.5 TEMPORARY WORKS

a) Other services (telkom electricity etc.) / protection of existing works

Items have been allowed for in the Bill of Quantities for dealing with and protecting existing services where they are known. The Contractor will, however, ensure that prior to construction all the necessary Record Drawings and Way-leaves for all services have been obtained and verified on site by the relevant Service Providers in his presence. The Contractor must request in writing that the relevant official indicates the said services at least 48 hours prior to the commencement of the works.

The Contractor shall take whatever precautions are required to protect all existing services from damage during the period of the Contract. Any damage to existing services indicated by the relevant service providers or other damage as a result thereof, shall be for the Contractor's account.

Photographical evidence shall be taken by the contractor before any work is done in close proximity to existing property, services, structures or any other infrastructure.

b) Survey beacons and benchmarks

The Contractor shall be responsible for the preservation of all land survey, erf or other pegs, benchmarks or beacons. If damage or disturbance of any such pegs or beacons is caused due to vandalism, the operations of the Contractor or his subcontractors, the pegs are to be replaced by a Registered Land Surveyor at the cost of the Contractor. Benchmarks will be replaced by the Employer's Agent at the Contractor's expense.

Information regarding the position of all such pegs will be made available to the Contractor by the Employer's Agent on request.

The Contractor is to ensure that no spoil is placed over an erf peg or benchmarks and that they are adequately protected for the full duration of the Contract.

Where disturbances of boundary pegs is unavoidable due to excavation of other

operations adjacent to pegs, the Contractor shall advise the Employer's Agent or his Representative immediately, agreement is to be reached that disturbance of the peg is unavoidable and a strict record of such disturbed pegs is to be kept. Such pegs are to be replaced by a Registered Land Surveyor as described above and the Contractor is to submit proof of the cost of replacement of pegs. The Contractor will be reimbursed on a basis pro-rata to the total cost of peg replacement determined on completion of the Works.

c) Tidying up of the works

The Contractor shall take note that the progressive and systematic finishing and tidying will form an essential part of this contract. On no account shall spoil, stockpiles, rubble, materials, equipment or unfinished operations be allowed to accumulate in such a manner as to unnecessarily be a hindrance or impede the activities of other the public or the Client. In the event of this occurring, the Employer shall have the right to withhold payment for as long as may be necessary in respect of the relevant works in the area(s) concerned.

Upon completion of the Works, or any portion thereof, the ground, fences, gates and any structures that have been interfered with are to be carefully restored to their original condition or better and all rubbish, tools, tackle, plant and materials must be removed, so as to leave the Site in a clean and orderly condition. No additional payment will be made for such work.

d) Temporary traffic control

The Contractor will be responsible for the design and implementation of all temporary traffic control measures where the works shall impact the public road network. To this end, all traffic control measures implemented by the Contractor shall be in accordance with The South African Road Traffic Signs Manual, Volume 2, Chapter 13.

e) Shoring of excavations

The Contractor will be required to make allowance for shoring and protection against collapse of all excavations deeper than 1.5m from the surrounding natural ground level. Alternatively battering of side slopes of the excavation will be allowed.

f) Temporary scaffolding and structural support work

The Contractor will be responsible for the design, erection and dismantling of all temporary scaffolding and structural support work. Liability for damage, injuries or fatalities caused as a result of collapse or structural failure of the scaffolding or temporary support work will be borne by the Contractor.

C3.2 ENGINEERING

CONTENTS

3.2.1 DESIGN SERVICES AND ACTIVITY MATRIX
3.2.2 EMPLOYER'S DESIGN
3.2.3 DESIGN BRIEF
3.2.4 DRAWINGS

3.2.1 DESIGN SERVICES AND ACTIVITY MATRIX

- Concept, feasibility and overall process (Civil works (C) and Mechanical/Electrical (M&E)) - Employer
- Basic engineering and detail layouts to tender stage (C, M&E) - Employer
- Final design approved for construction stage (C) - Employer
- Final design approved for construction stage (M&E) - Contractor
- Temporary Works and Wayleaves (C, M&E) - Contractor
- Completion of all works (C, M&E) - Contractor
- Preparation of as-built data (C, M&E) - Contractor

3.2.2 EMPLOYER'S DESIGN

The Employer's Agent is responsible for the design of all permanent works up to procurement stage. From construction stage onwards, the Employer's Agent is only responsible for the design of the permanent civil works. The Employer's Agent will also be responsible for approval of the Contractor's designs for the permanent mechanical and electrical installations.

3.2.3 DESIGN BRIEF

The Contractor will be responsible for the Design of all temporary works as mentioned in section 3.1.5 above. Furthermore, the Contractor will be responsible for the "Design and Build" of all mechanical and electrical installations that form part of this contract. It is anticipated that the "Design and Build" of mechanical and electrical installations will be carried out by a selected subcontractor working under the supervision and management of a civils main contractor (the tenderer). The Contractor will also be expected to provide training to the Employer's staff on all mechanical and electrical installations upon completion. Procedures for procurement of the selected subcontractor is explained elsewhere in this document.

3.2.4 DRAWINGS

As mentioned in section 3.2.3 above, the Contractor will be responsible for detailed design/construction drawings for the mechanical and electrical installations. The Contractor needs to allow sufficient time in their construction programme for the design work required. General arrangement drawings, shop drawings and construction details for mechanical and electrical works need to be submitted to the Employer's Agent for approval before commencing with manufacturing and installation of the works.

The drawings listed below are attached to give an overview of the project. Additional construction drawings will, in terms of Clause 5.9 of the General Conditions of Contract (2015), be issued to the Contractor by the Employer's Agent/ Employer on commencement date and thereafter from time to time as required.

The drawings that form part of the tender document are to be used for tender purposes only. On award of the Contract, the successful bidder will receive three (3) sets of unreduced paper prints of each drawing free of charge. Any additional prints will be for the account of the Contractor. Only figured dimensions shall be used and drawings shall not be scaled unless so instructed by the Employer's Agent. The Employer's Agent shall supply all figured dimensions omitted from the drawings.

Any information in possession of the Contractor that the Employer's Agent requires in order to complete his as-built drawings shall be supplied to the Employer's Agent before a Certificate of Completion will be issued.

C3.3 PROCUREMENT

CONTENTS

3.3.1 PREFERENTIAL PROCUREMENT PROCEDURES

3.3.2 SUBCONTRACTING

3.3.1. PREFERENTIAL PROCURE MENT PROCEDURES

The works shall be executed in accordance with the conditions associated with the granting of preferences detailed in Returnable Schedule 18: Preferencing Schedule where preferences are granted in respect of B-BBEE contribution. In particular, where the Tenderer/Contractor has declared in Section 6.2 of Returnable Schedule 18 that "I/we DO NOT intend sub-contracting more than 25% of the value of the contract to sub-contractors that do not qualify for at least the points that I/we as prime contractor qualify for" then the Contractor may not sub-contract more than 25% of the value of the contract (as defined in Returnable Schedule 18) to sub-contractors that do not have an equal or higher B-BBEE status level than the Contractor, unless the sub-contractors are exempted micro enterprises that have the capability and ability to execute the sub-contract works.

A financial penalty, as described in Returnable Schedule 18, shall be applied in the event that the Contractor sub-contracts more than 25% of the value of the contract to sub-contractors that do not qualify for at least the preference points that the Contractor qualified for (unless proven to be beyond the control of the Contractor, or the sub-contractors are exempted micro enterprises).

Notwithstanding the application of penalties, the Contractor's attention is drawn to other sanctions that may be applied by the Employer (listed in Returnable Schedule 18) with due consideration to the circumstances.

3.3.2. SUBCONTRACTING

3.3.2.1 Scope of mandatory subcontract works

There are no scope of mandatory subcontract works that need to be employed on this contract

3.3.2.2 Preferred subcontractors/suppliers

There are no preferred subcontractors or suppliers that need to be employed on this contract.

3.3.2.3 Subcontracting procedures

Where monetary allowances for provisional sums or prime costs items have been provided in the Bills of Quantities, 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 R200 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 R200 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 R200 000 or in excess of R200 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.

The Contractor shall incorporate in the subcontract provisions that:

(a) In respect of the work or the goods that are the subject of the subcontract the Selected Subcontractor undertakes to the Contractor mutatis mutandis the obligations and liabilities as are imposed upon the Contractor to the Employer in terms of the Contract, and holds the Contractor harmless from and indemnifies him against the same and in respect of all claims, demands, lawsuits, damages, costs, charges and expenses whatsoever arising out of or in connection therewith, or arising out of or in connection with any failure to perform such obligations or to fulfil such liabilities, and,

(b) The Selected Subcontractor holds the Contractor harmless and indemnifies him against:

- (i) Shortcomings in the subcontract works if and where the works were designed by the Selected Subcontractor;
- (ii) defects in the goods if and where the goods were manufactured and/or supplied by the Selected Subcontractor;
- (iii) any negligence by the Selected Subcontractor, his agents, workmen and servants;
- (iv) any misuse by the Selected Subcontractor of any Constructional Plant, Temporary Works or materials provided by the Contractor for the purposes of the Contract;
- (v) any claims as aforesaid.

3.3.2.4 Attendance on subcontractors

The Contractor needs to allow in their tendered site supervision rates for sufficient attendance on all subcontractors to be employed during this contract. This includes all of the Contractor's own subcontractors.

3.3.2.5 Monitoring the use of sub-contractors

Notwithstanding the restriction (in the circumstances described in Clause 3.3.1 above) on sub-contracting more than 25% of the value of the contract to sub-contractors that do not qualify for at least the preference points that the Contractor qualified for, it is recognised that sub-contracting is an integral part of construction, which the General Conditions of Contract (Clause 4.4) make provision for. The Contractor shall submit to the Employer's Agent documentary evidence (either an original valid BBBEE status level verification certificate or an Exempted Micro Enterprise certificate issued by a registered auditor, accounting officer (as contemplated in section 60(4) of the Close Corporation Act, 69 of 1984)
or
an accredited verification agency in terms of the Construction Codes of Good Practice for Broad-BasedBlack Economic Empowerment, in terms of the Preferential Procurement Regulations, 2017) of the BBBEE 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.

C3.4 CONSTRUCTION

SECTION 1: CIVIL WORKS

3.4.1 WORKS SPECIFICATIONS (CIVIL)

3.4.1.1 Applicable SANS 1200 standards

The following relevant standardised specifications, as listed below, shall form the Standard Specifications and apply to this contract:

a) For the purpose of this Contract the latest issues of the following Standard Specifications for Civil Engineering Construction, applicable at the date of tender advertisement, shall apply -

SANS 1200A	1986	General
SANS 1200AB	1986	Engineer's Office
SANS 1200C	1982	Site Clearance
SANS 1200D	1990	Earthworks
SANS 1200DB	1989	Earthworks (Pipe Trenches)
SANS 1200DM	1981	Earthworks (Road and Subgrade)
SANS 1200G	1982	Concrete (structural)
SANS 1200GA	1982	Concrete (small works)
SANS 1200 H	1990	Structural Steelwork
SANS 1200L	1983	Medium Pressure Pipe Lines
SANS 1200LB	1983	Bedding (Pipes)
SANS 1200LC	1981	Cable ducts
SANS 1200LD	1982	Sewers
SANS 1200LE	1982	Stormwater Drainage
SANS 1200M	1996	Roads (General)
SANS 1200ME	1981	Subbase
SANS 1200MF	1981	Base
SANS 1200MJ	1984	Segmented paving
SANS 1200MK	1983	Kerbing and channelling
SANS 1200 MM	1984	Ancillary roadworks

b) The term project specifications appearing in any of the SANS 1200 standardised specifications must be replaced with the terms scope of work.

3.4.1.2 Applicable national and international standards

No other standards than those mentioned in 3.4.1 above are deemed to be applicable.

3.4.1.3 Particular/generic specifications

In certain instances, the Standard Specifications listed in 3.4.1 above allow a choice to be specified in the Scope of Work between alternative materials or methods of construction. Allowance is also made for additional requirements to be specified to suit each particular contract. Details of such alternatives of additions are contained in this part of the Scope of Works. In addition, it contains some supplementary specifications required for this particular contract. Subclauses referred to are those in the relevant Standardised Specification.

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

number used in the relevant section of the standard specifications.
The variations and additions to the specifications listed as follows:

PSA GENERAL

PSA.2.4 Interpretations: Abbreviations (SANS 1200A Cl 2.4)

Add to subclause 2.4(b):
"The acronym 'MAMDD' referred to throughout the document stands for Modified AASHTO Maximum Dry Density."

Add after subclause 2.4(b):
"References to South African National Standards or SANS shall be interpreted as references to South African Bureau of Standards or SABS and the two terms are used interchangeably."

PSA.3.1 Materials: Quality (SANS 1200A Cl 3.1)

Substitute the second sentence of subclause 3.1 with:
"Materials shall bear the official mark of the appropriate standard"

Add to the end of the clause:
"The Contractor is responsible for the cost of all testing to ascertain that materials do comply with the specific minimum requirements of the applicable standards. No additional payment will be made for such verification tests.

The Contractor shall inform the Employer's Agent of any control testing to be done at least 48 hours prior to the commencement of the tests and must allow time in his programme for necessary testing and processing of results. "

PSA.5.1 Construction: Survey (SANS 1200A CL 5.1)

Substitute the first paragraph in subclause 5.1.1 with the following:
"Setting out the works is the sole responsibility of the Contractor and shall be done from benchmarks as indicated on construction drawings. The Contractor shall, within 2 (two) weeks after the site has been handed over to him, ascertain himself of the correctness of all pegs and benchmarks. Any discrepancies must be immediately reported in writing to the Employer's Agent. Any costs or subsequent costs arising from discrepancies not reported shall be the sole responsibility of the Contractor. "

PSA.5.4 Construction: Protection of Overhead and Underground Services (SANS 1200A Cl 5.4)

Add the following after the first sentence:
"Although the services are indicated on the drawings, the Contractor will be responsible for locating the services on site using a cable detection device."

PSA.5.5 Dealing with water on works (SANS 1200A Cl 5.5)

Add the following:
"All work must be protected against flooding and damage by water (storm water, groundwater etc) and the Contractor's prices will be held to include for such protection and for any rectification that may be required (including drying out of material or layer works or any consequential losses, slow progress, deviations, cofferdams, sumps, well point, labour and pumping of water).

Care shall be taken that a free passage for water is maintained in all gutters and waterways. Special precautions shall be taken by the Contractor not to change existing conditions by leaving spoil in waterways or by diverting water onto private property.

The Contractor shall make good any damage and shall settle all claims at his own expense in the event of flooding of private or public property occurring through waterways being obstructed by his operations or through the effect of any other of his acts or omissions. The Contractor shall be responsible throughout the duration of the Contract,

inclusive of the Defects Liability Period, for the implementation and maintenance of all soil erosion preventative measures necessary to protect any pipeline and the properties through which it passes and land utilised by the Contractor during the Contract from any adverse effects of soil erosion, settlement, scour, etc, resulting from the contract works.

Notwithstanding the types and quantities of anti-erosion measures executed by the Contractor, whether ordered by the Employer's Agent or not, and notwithstanding the maintenance work performed on these works, the Contractor shall be responsible for repairing and remedying at his own cost all settlement in the trench or elsewhere, all erosion of the trench, of the working area and adjacent to it, and on any other areas occupied or used by him during the course of the Contract, all wash-away, scour at waterways, deteriorating of anti-erosion works and any other damage. He shall, therefore, be free to carry out at his own expense, such additional compaction of the backfill and such other anti-erosion or other works as, in his opinion, will reduce his restoration and repair work during the Contract Period including the Defects Liability Period and shall provide therefore in his Tender.

Unless otherwise allowed for in the Schedule of Quantities, the Contractor shall be responsible for all costs in dealing with water and must therefore allow for such costs in his tendered rates."

PSA.6.2 Tolerances: Degree of Accuracy (SANS 1200A Cl 6.2)
Degree of Accuracy II is applicable.

PSA.8.4 Measurement and Payment: Scheduled time related items (SANS 1200A Cl 8.4)
Add the following payment items:

PSA 8.4.6 Contractor's obligation in respect of Health and Safety .....Unit: Sum

The tendered sum shall include full compensation for compliance with the requirements of the OHS Act and Regulations for the full duration of the Contract. The Sum to include requirements of OHS specification Annexure 1 of this document. The sum will be paid to the Contractor in equal monthly payments subject to compliance.

PSA 8.4.7 Contractor's obligation in terms of Environmental Management.....Unit: Sum

The tendered sum shall include full compensation for compliance with the requirements of the construction Environmental Management Plan (EMP) and other applicable Environmental legislation for the full duration of the Contract. The Sum to include requirements of EMP specification Annexure 2 of this document. The sum will be paid to the Contractor in equal monthly payments subject to compliance.

PSA 8.4.8 a) Standing time costs: Plant.....Unit: Day

The item above will cater for all associated costs relating to standing time charged by the Contractor for Plant. This rate does not refer to singular items of plant, but the entire fleet of plant to be used during construction at any time.

PSA 8.4.8 b) Standing time costs: Labour.....Unit: Day

The item above will cater for all associated costs relating to standing time charged by the Contractor for Labour. This rate does not refer to single labourers, but the entire labour force to be used during construction at any time.

PSA 8.4.8 c) Standing time costs: Other resources (to be specified by the Contractor
.....Unit: Day
The item above will cater for all associated costs relating to standing time charged by the Contractor for any other resource not allowed for in (a) and (b). Should a rate be provided for this item the Contractor needs to specify the resource.

PSA.8.7 Measurement and Payment: Daywork (SANS 1200A Cl 8.7)

Add the following payment items:

PSA 8.7 a) Labour: Unskilled labour.....Unit: Hour
PSA 8.7 b) Labour: Semi-skilled labour.....Unit: Hour
PSA 8.7 c) Labour: Skilled labour.....Unit: Hour

The items above (8.7 (a) to (c)) will cover all costs related with the provision of labour in the mentioned categories on a dayworks basis. Only net working hours will be measured under daywork and it will be held that the Contractor has made provision in other rates for possible interruptions and standing time.

PSA 8.7 d) Plant: Excavators.....Unit: Hour
PSA 8.7 e) Plant: Graders..... Unit: Hour
PSA 8.7 f) Plant: Front-end loaders.....Unit: Hour
PSA 8.7 g) Plant: Rollers.....Unit: Hour
PSA 8.7 h) Plant: Trucks (5m^3) .....Unit: Hour
PSA 8.7 i) Plant: Water truck.....Unit: Hour
PSA 8.7 j) Plant: Plate compactor.....Unit: Hour
PSA 8.7 k) Plant: Pumps (18mm dia. pipe, maximum flow 600/min, maximum head 30m)
.....Unit: Hour
PSA 8.7 l) Plant: Pumps (150mm dia. pipe, maximum flow 1000/min, maximum head 30m)
.....Unit: Hour

PSA.7.4 Testing: Statistical Analysis of Control Tests (SANS 1200A Cl 7.4)

Substitute clause 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."

PSA.8.2.2 Measurement and Payment: Payment: Time-related Items (SANS 1200A Cl 8.2.2)

Add the following:

"The payment to the Contractor for time-related items shall be adjusted in accordance with the following formula in the event of an extension to the Contract:

$$\text{Sum of tendered amounts for all time related items} \times \frac{\text{Extended contractual period}}{\text{Tendered contract period}}$$

PSA.8.3.3 Measurement and Payment: Scheduled Fixed Charge and Value Related Items: Other Fixed Charge Obligations (SANS 1200A Cl 8.3.3)

Add the following:

"The Contractor will be responsible for obtaining all relevant wayleaves from all relevant bodies before commencing works. The costs, overheads and profits for obtaining wayleaves and liaising with relevant authorities will be deemed to be included in the rate tendered for this item. In addition, the Contractor will be solely responsible for obtaining these wayleaves and no claims for extension of time will be entertained in the event of works being stopped due to wayleaves not being obtained."

PSA.8.5 Measurement and Payment: Sums Stated Provisionally by the Employer's Agent (SANS 1200A Cl 8.5)

Add the following payment items:

All items stated as a provisional sum will cater for all costs associated with the provision of the relevant service. This includes but is not limited to all taxes, levies, accommodation, PPE, UIF, PAYE etc. The percentages tendered for shall cover the Contractor's overheads, charges and profits for the amounts provided for.

PSA.8.8.4 Measurement and Payment: Temporary Works: Existing Services (SANS 1200A Cl 8.8.4)

Add the following:

"Where the Employer or others carries out work which is the responsibility of the Contractor, all costs incurred by the Employer or the third party will be recovered by means of a deduction from the Contractor's monthly payment.
Where hand excavation around existing services does occur it shall be measured within 3 m above and on both sides of cables, and within 500 mm above and on both sides of pipes, as well as all excavations underneath the services.

PSAB ENGINEER'S OFFICE

PSAB.3.1 Materials: Nameboard (SANS 1200AB Cl 3.1)

Replace, after the words '…, decorating and detail…' in the first sentence:
"with the relevant standard project nameboard drawing as issued by the Employer's Agent."

PSAB.3.2 Materials: Office Buildings (SANS 1200AB Cl 3.2)

Add the following after the second paragraph:
"The Contractor shall supply one office for the exclusive use of the Employer's Agent and one for meetings. The Employer's Agents office shall have a minimum floor area of 12m^2 and the meeting room shall have a minimum floor area of 13m^2."

Substitute sub-paragraph (j) with the following:
"j) provision of an approved 12 000 BTU air-conditioner"

Add the following to Cl3.2 after the last paragraph:
"In addition, the Contractor must supply basic survey equipment and 2 survey assistants at no charge as reasonably required by the Employer's Agent. The Contractor must supply Site Instruction books as required by the Employer's Agent. The Employer's Agent shall have access to a fax machine and photocopier to be provided by the Contractor. The meeting room shall be furnished with a table and chairs to accommodate 10 people."

PSAB.4.1 Plant: Telephone (SANS 1200AB Cl 4.1)

Add the following to the last paragraph:
"The Employer's Agent will make use of his/her own cellular phone. The Contractor will supply the Employer's Agent with a wireless or 3G internet connection. The cost of telephone calls and internet usage/subscription will be covered by the Contractor under payment item 8.3.2.1 (b)."

PSAB.5.1 Construction: Nameboards (SANS 1200AB Cl 5.1)

Add the following to the last paragraph:
"The nameboards shall be erected within one month of acceptance and shall be placed at the position indicated by the Employer's Agent. Any damage to these boards shall be repaired within 14 days of damage. No payment shall be made in terms of the contract prior to the erection of these boards. In addition, the Contractor shall be permitted to erect a maximum of two of his own boards, in positions approved by the Employer's Agent. The Employer's Agent reserves the right to order the removal of these boards if they are not maintained in good condition."

PSAB.5 Construction (SANS 1200AB Cl 5)

Add the following subclause:
"5.6 SURVEY EQUIPMENT
The Contractor shall provide the following tested and approved survey equipment on site for the duration of the contract and for the use of the Employer's Agent whenever needed:

- One calibrated automatic level including staff and tripod
- One 5m and one 100m tape measure

The Contractor shall keep the equipment continuously insured and shall indemnify the Employer and Employer's Agent and all their agents against any claims for loss, damage or breakage in this regard. The Contractor will keep the equipment in working order and will keep it clean for the duration of the contract."

PSAB.6 Measurement and Payment (SANS 1200AB Cl 8.1)

Add the following:

"All costs, overheads and profits associated with the items listed above (including those specified in the project specifications) are deemed to be included in the rates tendered under SANS1200A (Preliminary and General)."

PSC SITE CLEARANCE

PSC.3.1 Materials: Disposal of Material (SANS 1200C Cl 3.1)

Replace the first sentence with the following:

"All materials generated by clearing, grubbing and demolition of fences and structures shall be disposed of at a licensed municipal dump site"

PSC.5.1 Construction: Areas to be Cleared and Grubbed (SANS 1200C Cl 5.1)

Add the following to the last paragraph:

"The Contractor shall programme his work in such a manner that re-clearing is not required. The cost of re-clearing shall be borne by the Contractor."

PSD EARTHWORKS

PSD.2.3 Interpretations: Definitions (SANS 1200D Cl 2.3)

Please add the following after the description of 'Restricted excavation':

"Where it is required that earthworks be carried out using labour intensive methods, the definition "restricted excavation" shall read "An excavation required to be carried out using only hand tools, or where so permitted in terms of the Project Specification, with restricted plant usage".

PSD.2.3 Interpretations: Definitions (SANS 1200D Cl 2.3)

Add the following definition before 'Specified Density':

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.

PSD.3.3.1 Materials: Selection: General (SANS 1200D CL 3.3.1)

Add the following to Subclause 3.3.1:

"The Contractor shall deal selectively with material from general excavation to ensure that usable material is not contaminated with unsuitable material. If usable material is contaminated, such contaminated material shall be removed 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."

PSD.5.1.2.2 Construction: Precautions: Existing Services: Detection, Location and Exposure (SANS 1200D Cl 5.1.2.2)

Add the following to Subclause 5.1.2.2:

"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. Exact details of these services will be given to the Employer's Agent. These services must also be indicated on the "As Built" drawings."

PSD.5.1.4.1 Construction: Precautions: Nuisance: Dust Nuisance (SANS 1200D Cl 5.1.4.1)

Add the following to Sub-clause 5.1.4.1

"The Contractor is responsible for dust control and is liable for any claims that may result from dust nuisance during the contract period. No payment regarding the above-mentioned will be made and all costs shall be deemed to be covered by the tendered rates."

PSD.5.1.6 Construction: Precautions: Road Traffic Control (SANS 1200D Cl 5.1.6)

Add, after the last paragraph, the following:

"During the construction of any works across or along public roads, the Contractor shall, in co-operation with, and in accordance with any instruction from the relevant traffic

authorities, take precautions for the protection of the Works and the safety of public and private vehicles and pedestrians in accordance with the requirements of Sub-clauses 5.2 and 5.7 of SANS 1200 A, 5.1.1 and 5.1.6 of SANS 1200 D. Temporary traffic signs shall be erected at all diversions. The number and layout of the traffic signs shall comply with the Site Manual entitled "Safety at Roadworks in Urban Areas", as published by the Department of Transport. Traffic signs shall have a yellow background with either a red / black border. All temporary signs shall be of the type and size required for urban roads, as applicable, as specified in the South African Road Traffic Signs Manual and Chapter 13, Roadworking Signage : Final Draft (June 1996), Road and Traffic Signs Sub-Committee, SCRA (January 1993)."

PSD.5.2.2.3 Construction: Methods and Procedures: Excavation: Disposal (SANS 1200D Cl 5.2.2.3)

Add the following to Sub-clause 5.2.2.3:

"Excess materials arising from the excavations shall generally be spread out on the adjacent area and levelled and shaped in such a manner that the material so spread allows the area to drain. Material arising from excavations and not utilised in the above manner shall be disposed of at a licensed municipal dumpsite, or in depressions, dongas and erosion gullies as directed by the Employer's Agent. All rates tendered shall be deemed to include any levies or fees payable at such dumpsite.

PSD 8.3 SCHEDULED ITEMS

PSD 8.3.2 Bulk Excavation

REPLACE THIS ITEM WITH THE FOLLOWING:

"PSD 8.3.2.1 Excavate in all materials and use for embankment or backfill as ordered, from:

(a) Necessary excavations.....Unit : m^3

(b) Designated Borrow Pits.....Unit : m^3

(c) Commercial Sources.....Unit : m^3

The unit of measurement shall be the cubic metre measured in place in accordance with Sub-clause 8.2 of SABS 1200.

Separate items will be scheduled for embankments and backfills for different parts of Works.

The tendered rates shall cover the cost of complying with all the precautions required in terms of Sub-clause 5.1 of SABS 1200D (as amended), in addition to the cost of excavating in all materials, basic selection, loading, transporting within the applicable freehaul distance, off loading, spreading or backfilling, watering, compacting, final grading, complying with the requirements of for tolerances, providing for testing, finishing and tidying, all in accordance with the specifications.

In addition to the foregoing, the tendered rate for sub-item (b) shall, further include for the cost of royalties (if applicable), whilst the tendered rate for sub-item (c) shall also include for the costs of finding a source of suitable material, for making arrangements with the owner of the source, for procuring the material, for the payment of all requisite royalties, charges or damages, and for transporting the material to the Site regardless of the distance involved. No payment will be made for the removal of overburden or stockpiling at the commercial source and no extra over payment shall apply for excavating in intermediate, hard or boulder material.

PSD 8.3.2.2 Excavate in all materials and dispose.....Unit : m^3

The unit of measurement shall be the cubic metre of material excavated, measured in place in accordance with Sub-clause 8.2 of SABS 1200D.

Separate items may be scheduled for excavations for different parts of the Works.

The tendered rates shall cover the cost of complying with all the precautions required in terms of Sub-clause 5.1 of SABS 1200D (as amended), in addition to the cost of excavation, basic selection, loading, transporting within the applicable freehaul distance, off-loading at the spoil site, maintaining and finishing the spoil site, all in accordance with the specifications.

PSD 8.3.2.3 Extra-over item PSD 8.3.2.1 (a), PSD 8.3.2.1 (b) and PSD 8.3.2.2 for :

(a) Intermediate excavation.....Unit : m^3

(b) Hard rock excavation.....Unit : m^3

(c) Boulder excavation, Class A.....Unit : m³

(d) Boulder excavation, Class B.....Unit : m³

The rate shall cover the additional cost of the operations enumerated in Subclause 8.3.2.1 and 8.3.2.2 above for any portion of the excavation that is classified as intermediate, hard rock, boulder excavation class A or boulder excavation class B as applicable.

PSD 8.3.3 Restricted excavation

REPLACE THE WORDS "in 1m increments" AT THE END OF THE FIRST SENTENCE OF SUB-ITEM (a) WITH "in the increments indicated in the schedule of Quantities".

REPLACE "in 5.2.2.1 5.2.2.3 (inclusive)" AT THE END OF SUB-CLAUSE (a) WITH "in Sub-clauses 5.2.2.1 to 5.2.2.5 (inclusive)".

ADD THE FOLLOWING SUB-SUB-ITEM:

"(c) Extra over sub-item 8.3.3 (a) for hand excavation.....Unit : m³

This item shall apply to hand excavation ordered by the Employer's Agent or when the Employer's Agent considers that, owing to circumstances, excavation by mechanical excavators is not practicable. It shall not apply to hand excavation for trimming or finishing an excavation made by mechanical means.

The tendered rate shall include full compensation for the additional cost of excavating by means of hand tools"

PSD 8.3.16 Treatment of Excavation Base.....Unit : m³

The unit of measurement shall be the cubic metre. The tendered rate shall include full compensation for the preparation of the excavation base and the compaction of the in-situ material using a 12 ton roller to a maximum density of 95% MOD AASTHO up to depth of 1m below the excavation.

PSD 8.3.17 Extra over for soilcrete against or at the bottom of structures.....Unit : m³

The unit of measurement shall be the cubic metre of soilcrete of soilcrete placed on instruction by the Employer's Agent. The tendered rate shall cover the cost, additional to backfilling, for supplying the cement (5% cement by mass of the backfill material), for selecting, mixing and placing the soilcrete as well as for the cost of shuttering if required.

PSD.5.2.2 Construction: Methods and Procedures: Excavation (SANS 1200D Cl 5.2.2)

Add the following Sub-clause:

5.2.2.4 Excavation by hand around existing services. 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.

PSD.5.2.5 Construction: Methods and Procedures: Transport for Earthworks (SANS 1200D Cl 5.2.5)

Replace sub clause 5.2.5.1 with the following:

"Freehaul – all material transported within the boundaries of the site or from a commercial source will be regarded as being hauled under freehaul. No overhaul will be paid.

Replace sub clause 5.2.5.2 with the following:

"Overhaul – Transportation of all excavated material beyond the boundaries of the site will be regarded as being hauled under freehaul. No overhaul will be paid under this contract. Hauling and transportation costs will be deemed to be included under the relevant payment items.

PSD.8.3.2 Measurement and Payment: Scheduled Items: Bulk Excavation (SANS 1200D Cl 8.3.2)

Add the following after the item description:

"The rate for excavation shall include for the loading and carting and the off-loading, spreading out or spoiling of the material. The rate shall include for spreading out of the material on the site in a manner which allows the site to drain and prevents any ponding on iste. It will also allow for all shaping trimming and tidying of the spoiled material in a uniform layer not exceeding 200mm in thickness and for the compaction to 100% of MAMDD. The trimming and tidying of the spoiled material at the designated spoil site, or in depressions, dongas and erosion gullies shall include for the spreading of the material to depths not exceeding 2m in 200mm layers and for compaction to 100% of MAMDD."

PSD.8.3.11 Measurement and Payment: Scheduled Items: Grassing or Other Vegetation Cover (SANS 1200D Cl 8.3.11)

Add the following:

"Payment for grassing and covering with other vegetation of designated areas will be made in stages as follows:

First Payment

When the area has been prepared and planted, 60 % of the rate tendered per square metre shall be paid.

Second Payment

When the area has been initially accepted by the Employer's Agent, a further 30 % of the rate tendered per square metre shall be paid in respect of the re-measured area which is accepted.

Third Payment

At the end of the maintenance period the outstanding amount will be paid in respect of the actual re-measured area of grass and other vegetation finally accepted by the Employer's Agent for payment. The rate tendered and paid for shall include full compensation for trimming of existing slopes, supply and spreading of compost and/or manure, preparation of the soil, watering, supply and planting of grass and other vegetation and maintenance of the covered areas, including all labour, supervision, specialist advice, materials, transport, plant, equipment and incidentals necessary to complete the work and bring the covered areas into the condition required for final acceptance, and shall include for any loss due to vegetation failing to establish a satisfactory cover of living vegetation in which gaps larger than 150 mm do not occur."

PSDB EARTHWORKS (PIPE TRENCHES)

PSDB.3.5 Materials: Backfill Material (SANS 1200DB Cl 3.5)

Replace "from trenches" in Cl 3.5(a) with:

"…from trenches, channels and other excavations"

PSDB.3.7 Materials: Selection (SANS 1200DB Cl 3.7)

Add the following:

"Notwithstanding the above, in terms of which the Contractor has a choice regarding methods of selection, the Contractor must use selective methods of excavation. The Contractor shall selectively remove and separate the suitable material from unsuitable material and place it adjacent to the trench for reuse as backfill, selected fill, selected granular material or for other use as ordered by the Employer's Agent.

Material which, in terms of Sub-clause 6.2 of SANS 1200 D or SANS 1200 LB, is too wet for immediate use in the trench (but which is otherwise suitable) will not be regarded as "unsuitable" material and, if so ordered by the Employer's Agent, the Contractor shall spread such material in a suitable area until it has dried sufficiently for later use.

When preparing his programme and construction methods, the Contractor shall make allowance for selective excavation and the handling and drying out of material which is too wet for immediate use "

PSDB.4.1 Plant: Excavation Equipment (SANS 1200DB Cl 4.1)

Add the following:

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

PSDB.4.2 Plant: Control of Water (SANS 1200DB Cl 4.2)

Add the following:

"One set of dewatering equipment shall consist of pumps, pipes, well points and other equipment necessary for keeping the trenches sufficiently free from water for dewatering of excavations up to 4 m depth and a trench length of 45 m for both sides or 70 m on one side."

PSDB.5.6.2 Construction: Backfilling: Material for Backfilling (SANS 1200 DB Cl 5.6.2)

Substitute "from trench excavations" *in the first paragraph of Cl 5.6.2 with* "from trench or other excavations".

PSDB.5.6.3 Construction: Backfilling: Disposal of Soft Excavation Material (SANS 1200 DB Cl 5.6.3)

Add the following:

"All surplus and unsuitable material as described in DB 5.6.3 shall be disposed of as described in D 5.2.2.3."

PSD8.3.5 Measurement and Payment: Scheduled Items: Existing Services That Intersect or Adjoin a Pipe Trench (SANS 1200DB Cl 8.3.5)

Add the following to the end of sub clause (a):

"Existing services with a depth of cover exceeding 300 mm, measured from the bottom of excavation to the top of the existing service shall not be measured and paid for. These will be distinguished between existing trunk services and existing erf connection.

The rate shall also allow for the following costs:

i) Sufficient photos have to be taken of existing services and handed over to the Employer's Agent before they are being crossed, if there is a possibility of a difference in opinion over the condition of those services, especially on private property.

ii) If such a service is damaged, it has to be repaired to its original condition or if possible, to a standard agreed to in writing with the relevant owner. This agreement has to be approved by the Employer's Agent.

iii) If such a service is removed, it has to be replaced as per original."

Add the following to the end of sub clause (b):
"The unit "number" will only be used for services such as poles and trees.

No payment will be made for overhead services that do not rest directly on the ground except where allowance is made for this in the schedule of quantities.

Existing services that rest directly on the ground e.g. poles, walls and structures are handled in the same way as underground services, but the axis of the service will be determined as follows:

The vertical axis is defined as the nearest side or corner of the existing structure to the excavation, measured at the point where the structure and natural ground level intersect.

The horizontal axis will be at the point where the structure and the natural ground level intersects. In this instance, where the excavation falls above the 45° line but within 1,0 meter horizontally from the structure, the service will also be measured as adjoining.

If the structure, according to the abovementioned, does not qualify as an adjoining service but the foundation of the structure is such that if a 45° line drawn from the nearest bottom corner thereof cuts through the excavation, the structure will be measured as an adjoining service if approved by the Employer's Agent. These will be distinguished between existing trunk services and existing erf connection.

PSDB.5.7.2 Construction: Compaction: Areas Subject to Traffic Loads (SANS 1200DB Cl 5.7.2)

Add the following:
"Backfill of all pipe trenches that fall under roadways shall be compacted to 95% of MAMDD density for cohesive materials and sand backfilling shall be compacted to 100 % of MAMDD density."

PSDB.8.1.2 Measurement and Payment: Basic Principles (SANS 1200DB Cl 8.1.2 (b))

Replace subclause (b) with the following:
"Separate items will be scheduled for lengths of trench of depths not exceeding certain depths as per the bill of quantities".

PSDB.8.1.2 Measurement and Payment: Basic Principles (SANS 1200DB Cl 8.1.2 (c))

Replace the last sentence of subclause (c) with the following:
"The ground surface will be that existing after any bulk excavation has been carried out and before any embankment has been constructed, unless a portion of the embankment has to be constructed in order to achieve an acceptable cover over a pipe that is to be installed, in which case measurement will be made from the level of embankment that produces an acceptable minimum cover over the pipe. The depth of the excavation for measurement and payment purposes will be as specified in Sub-clause 8.1.2 (b)."

PSDB.8.3.2 Measurement and Payment: Scheduled Items: Excavation (SANS 1200DB Cl 8.3.2)

Add the following after the last paragraph under subclause (a)):
"The rates for excavation of trenches shall also cover the costs of battering trench sides or providing shoring to trenches as deemed necessary by Contractor in light of his obligations under the Occupational Health and Safety Act.

Where battering of trench side slopes is chosen in lieu of shoring, the rate shall also cover any additional protection of services, replacement of erf pegs or any other additional cost resulting from battering the side slopes.

The depth of excavation in street reserves shall be measured from the final finished level.

In cases where services lay parallel to steep slopes, the depth of the excavation will be measured along the centre of the trench (on the route of the service).

Electric cable trenches

Excavation for electric cables not laid with other services will be measured and paid for separately under the relevant depth increments. The rate shall provide for excavation, preparing trench lengths as requested by the electrical subcontractor, backfilling and compaction thereof.

Combined trenches

The rate for excavation and backfilling of trenches with more than one service, shall allow for trench widths as set out in PS DB 5.2 and the bill of quantities. Extra bedding and fill blanket will be measured as in the case of normal pipe trenches.

The depth increment for combined trenches is determined by the deepest pipe in the trench."

"Existing services with a depth of cover exceeding 300 mm, measured from the bottom of excavation to the top of the existing service shall not be measured and paid for. These will be distinguished between existing trunk services and existing erf connection.

PSDB.8.3.6 Measurement and Payment: Scheduled Items: Finishing: (SANS 1200DB Cl 8.3.6)

Add the following payment item:

PSDB 8.3.6.2 Remove and reinstate vibracrete wall fencing.....Unit: m

The rate shall cover the cost of removing panels of vibracrete fencing to the height specified to allow trench excavations to pass through, stockpiling the removed panels and reconstructing the vibracrete wall panels once trenching and pipe laying works have been completed. The rate should also cover the costs of replacing any sections damaged as a result of the works.

PSDM EARTHWORKS (ROAD, SUBGRADE)

PSDM.5.2.2.4 Construction: Methods and Procedures: Cut and Borrow: Temporary Stockpiling of Materials (SANS 1200DM Cl 5.2.2.4)

Add the following:

"The Contractor shall program the works in such a manner that suitable excavated material shall, if practically possible, be placed directly in the appropriate position to ensure that temporary stockpiling is limited to an absolute minimum"

PSDM.5.2.3.3 Construction: Methods and Procedures: Treatment of Roadbed (SANS 1200DM Cl 5.2.3.3)

Add the following to subclause (a):

"The road bed shall be scarified to a depth of 150mm, watered, shaped and compacted to 100% of MAMDD."

PSDM.7.3.2 Testing: Routine Inspection and Testing (SANS 1200DM Cl 7.3.2)

Add the following after the table:

"No density shall be less than the specified minimum density for the relevant layer. The cost of all routine testing done by the Employer's Agent, and of which the results do not comply with the specified minimum requirement for the material, shall be borne by the Contractor."

PSDM.8.3 Measurement and Payment: Scheduled Items (SANS 1200DM Cl 8.3)

Add the following payment items:

"**PSDM 8.3.17 Shaping and Trimming of Road Reserves** Unit: m^2

The areas between the top of cuts and the toes of fills and the erf boundaries are to be lightly shaped and trimmed in such a manner as to present visually clean uniform slopes, lines and levels. The unit measurement shall be the square meter of surface shaped, trimmed, levelled and compacted. The tendered rate shall include for all trimming, shaping and compaction to 90% of MAMDD.

PSG CONCRETE (STRUCTURAL)
G 3 MATERIAL

PS G3.2.1 Applicable Specifications

Substitute G 3.2.1 with the following:
All cement types shall comply with the requirements of SANS EN 197 1.
For this contract CEM I portland cement shall be used.
Where Malmesbury hornfels (shale) is used as aggregate in concrete, a blend (by mass) of 50 % CEM I 42,5 or CEM I 42,5R and 50 % milled granulated blast-furnace slag shall be used in the concrete mix.

PS G3.2.3 Storage of Cement

Add the following to G 3.2.3:
Consignments of cement shall be used in the same sequence as that in which they are delivered to site. No cement shall be used which has been stored on site for a longer period than 6 (six) weeks. All cement so stored for a longer period than 6 (six) weeks, all cement damaged in any way, and all cement which does not comply with the specification, shall be removed immediately and permanently from the site.

PS G 3.5.2 Air-entraining Agents

Substitute G 3.5.2 with the following: Air-entraining agents shall not be used in concrete.

G 4 PLANT

PS G 4.5.3 Ties

Add the following to 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 5.1.3 Cover

Substitute G 5.1.3 with the following:

(a) The cover of concrete over reinforcement, unless otherwise indicated on the drawings, shall in no case be less than 40 mm.

(b) Only fibre cement cover blocks shall be used for this contract.

PS G 5.2.1 Classification Of Finishes

Add the following to G 5.2.1:
The following surface conditions are required on the various portions of the finished concrete:

(c) **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.

PS G 5.2.5 Removal of formwork

In Table 2 of G 5.2.5.2, substitute “portland cement and portland cement 15” in columns 2, 3 and 4

with “CEM 1 portland cement, delete columns 5, 6 and 7 and substitute “portland blast-furnace cement” in columns 8, 9 and 10 with “CEM III blast-furnace cement or blends of CEM I portland cement with milled granulated blast-furnace slag”.

PS G 5.4 PIPES AND CONDUITS

Add the following to 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

a) 5 mm plus the maximum size of coarse aggregate, whichever is the greater.

G 5.5 CONCRETE

PS G 5.5.1.5 Durability

Substitute 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. Minimum cement content of 320 kg/m^3 shall apply to all water retaining structures.

PS G 5.5.1.7 Strength concrete

Add the following to G 5.5.1.7:

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) Mass concrete under floors and foundations……...20 MPa/19 mm

b) Blinding layers……..20 MPa/19 mm

c) Encasing of pipes…… 20 MPa/19 mm

d) Strip foundations……..30 MPa/19 mm

e) Benching and screeds…… 20 MPa/10 mm

f) All reinforced concrete……... 35 MPa/19 mm

PS G 5.5.1.8 "No-Fines" concrete

"No-fines" concrete shall consist of one-part cement to eight parts aggregate graded from minimum 6 mm to maximum 13 mm size. Only CEM I 42,5N or CEM I 52,5N cement shall be used in "No-Fines" concrete. The addition of pozzolans other than PFA, in whatever form, will not be permitted.

The quantity of water used shall be just sufficient to form a smooth grout which shall completely coat every particle of aggregate and also to ensure that the grout is just wet enough to form a small fillet at each point of contact between the stones. "No-fines" concrete mixed with excessive water, which results in a thin grout, which drops off the aggregate, will be rejected

"No-fines" concrete shall be placed in its final position within 20 minutes of mixing and shall be placed in continuous horizontal layers. Concrete shall be spade worked sufficiently to ensure that it fills the forms but vibrating, tamping or ramming will not be permitted.

PS G 5.5.5 Placing

Substitute G 5.5.5.5 with the following:

PS G 5.5.5.5 Concrete shall not be allowed to fall freely through a height of more than 2 m for water retaining structures or more than 3 m for any other structures, unless otherwise approved.

PS G 5.5.7 Construction Joints

Add the following to G 5.5.7.1:

(a) Construction joints shall be limited to the minimum and shall only be made in positions as shown on the drawings or in positions as specifically approved by the Engineer. Construction joints between tank bottoms, floors, or wall bases, and the walls standing on them shall not be made flush with the supporting surface but shall be made in the wall 150 mm above the base. The 150 mm high riser wall shall be cast as an integral part of the bottom, floor or base, i.e. the concrete in the riser shall be deposited simultaneously with the concrete in the bottom, floor or base adjacent to it. Where there is a fillet at the bottom of a wall, the construction joint shall be made 150 mm above the fillet.

(b) A metal/PVC water stop be installed at all construction joints in walls of water retaining structures. The size of the water stops shall be 150 mm in walls thinner than 200 mm and 300 mm in walls of 200 mm thickness and more.

(c) Construction joints in water-retaining structures:

Depending on the weather conditions, the surface of the concrete shall be sprayed with a high-pressure water jet within 24 hours of casting to remove all laitance and fine particles to a depth of at least 10 mm and to expose the coarse aggregate embedded in sound concrete. The
Contractor shall ensure that the green concrete is not damaged or disturbed during the preparation of the joint and that waterstops are not damaged.

After the reinforcement for the next pour has been fixed and the formwork erected, the construction joint shall be cleaned thoroughly with a pressurised water jet. The joint shall then be wetted continuously with water for 24 hours to completely saturate the concrete to achieve a saturated surface dry condition immediately before new concrete is cast. Before the new concrete is cast all water shall be removed from the construction joint. The Contractor shall either use an approved applicator of the product and/or request technical assistance in the application of the continuous strip product from the manufacturer, which is provided free of charge. The new concrete shall be cast directly onto the prepared surface.

PS G 5.5.7.4 Movement joints

(d) Movement joints shall be formed in positions and in accordance with details as shown on the drawings. All expansion joints shall be formed with an approved closed cell polyethylene fill material similar to "SPV 120" as supplied by Sondor, with a single part polyurethane sealant similar to Silkaflex – PRO 2HP as supplied by Sika. Rearguard S type PVC waterstops with centre bulbs shall be installed under floors and Hydrofoil PVC waterstops with centre bulbs in walls, as shown on the drawings.

(e) All sealants, fill material and waterstops shall be installed strictly in accordance with the specification of the manufacturers and to the satisfaction of the Engineer. The sealant shall be installed in one operation and jointing to already hardened sealant will not be permitted.

(f) <u>Waterstops:</u>

Waterstops shall be the type to be accepted by the Engineer and shall be indicated on construction drawings

(g) Splices:

Splicing of waterstops shall comply with the following:

- waterbar intersections shall be factory pre-manufactured by the supplier, in such a manner that all bulbs, ribs and protrusions line up properly and intersections of the flanges, bulbs, ribs and protrusions have been fused together so that these elements are continuous and watertight;
- site splicing of waterstops may only be conducted by personnel who have been properly trained by the supplier of waterstops, or be done by a sub-contractor specialising in the installation of waterstops;
- the ends of waterstops to be spliced shall be cut cleanly, perfectly straight and square with a compound mitre saw or guillotine. Cutting with handheld knives of any sorts will not be permitted;
- site splicing of waterstops shall be done with the aid of a jig into which the two pieces of waterbar to be spliced fits in tightly to ensure exact alignment of the flanges, bulbs, ribs and protrusions;
- the ends of both elements to be spliced shall be heated and softened, and not the end of one element only. Heating shall be performed with a dedicated heating tool;
- at least a three mm bead of melted material is required around
- the entire perimeter of each waterstop;
- the waterstop should not darken when melted. If it does, the welding iron is too hot;
- all bulbs, ribs and protrusions of site splices shall line up perfectly and intersections of the flanges, bulbs, ribs and protrusions shall be fused together so that these elements are continuous and watertight.

(h) Quality control of splices

Quality control on splicing of waterstops shall be as follows:

- at initial site splicing of waterstops by the Contractor must be inspected by the supplier until such time when consistent quality of splicing is maintained. All substandard splicing shall be rejected and redone. Thereafter, the supplier shall conduct regular random inspections on splicing to ensure consistent quality;
- all welds shall be inspected visually and tested for water-tightness with a spark tester.

Grounds for rejection of splices will be inter alia the following:

- the tensile strength at the weld is less than 80% of the parent material;
- misalignment of the centre bulb, ribs, protrusions and end bulbs;
- any visible signs of lack of fusion on part of or the complete cross-sectional area of the centre bulb, ribs, protrusions or end bulbs;
- misalignment over the thickness of the flange of the waterstop;

- visible signs of splice separation when a cooled splice is bent at a sharp angle;
- visible porosity in the weld;
- charred or burnt material at the weld;
- failure of the spark test.

(i) Fixing of waterstops

Waterstops shall be held firmly in position and at such close spacings to prevent displacement, folding, curling or deflection thereof during concreting. Rearguard waterstops (e.g. those underneath floor slabs) shall be held flat onto the surface on which it is supported with the aid of fibre cement cover blocks at regular intervals underneath the reinforcement such as to prevent concrete from flowing in underneath waterstop which would result in lifting of these from the substrate. Internal waterstops shall be fixed to fixing reinforcement with special waterstop clips supplied by the manufacturer. External waterstops (such as on vertical joints in walls) shall be nailed to the formwork in accordance with the manufacturer's specifications and supported to reinforcement with fixing clips according to the manufacturer's specifications.
(This clause is applicable to all water containing structures)

PS G 5.5.8 Curing and Protection

Substitute G 5.5.8. with the following:

After formwork has been removed (see 5.2.5) and as soon as it is practicable in the opinion of the Engineer, all concrete shall, subject to the provisions of 5.5.9.1, be protected from contamination and loss of moisture by one or more of the following methods:

a) Ponding the exposed surfaces by means of water;

b) continuously spraying the exposed surfaces with water.

PS G 5.5.7.6 Bond breaker under floor

A 500 micrometre polyethylene bond breaker shall be installed between the blinding layer and the floor of the reservoir, as indicated on the drawings.

PS G 5.5.9 Adverse Weather Conditions

Add the following to 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 Concrete Surfaces

Add the following to 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 5.5.10.4 Wood-floated finish

Where wood floating is specified or scheduled, the surface shall first be given a finish as specified in G 5.5.10.1 and after the concrete has hardened sufficiently, it shall be floated to a uniform surface free from trowel marks. The screeded surface shall be wood-floated, either by hand or machine, only sufficiently to produce a uniform surface free from screed marks

PS G 5.5.10.5 Steel-floated finish

Where steel floating is specified or scheduled, the surface shall be treated as specified in PS G 5.5.10.4 except that, when the moisture film has disappeared and the concrete has hardened sufficiently to prevent laitance from being worked to the surface, the screeded surface shall be steel-trowelled under firm pressure to produce a dense, smooth, uniform surface free from trowel marks.

PS G 5.5.11 Watertight Concrete

Substitute 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 water tightness of structures

Substitute G 5.5.11.2 with the following: BS 8007:1987 Section 9.2

For a test of a liquid retention, the structure should be cleaned and initially filled to the normal maximum level with the specified liquid (usually water) at a uniform rate of not greater than 2 m in 24 h.

When first filled, the liquid level should be maintained by the addition of further liquid for a stabilizing period while absorption and autogenous healing take place. The stabilizing period may be 7 days for a maximum design crack width of 0.1 mm or 21 days for a 0.2 mm or greater.

After the stabilizing period the level of liquid surface should be recorded at 24-hour intervals for a test period of 7 days. During this 7-day test period the total permissible drop in level, after allowing for evaporation and rainfall, should not exceed 1/500th of the average water depth of the full tank, 10 mm or another specified amount.

Notwithstanding the satisfactory completion of the test, any evidence of seepage of the liquid to the outside faces of the liquid-retaining walls should be assessed against the requirements of the specification. Any necessary remedial treatment of the concrete, cracks, or joints should, where practicable, be carried out from the liquid face. When a remedial lining is applied to inhibit leakage at a crack it should have adequate flexibility and have no reaction with the stored liquid.

Should the structure not satisfy the 7-day test, then after the completion of the remedial work it should be refilled and if necessary, left for a further stabilizing period; a further test of 7 days duration should be undertaken in accordance with this clause.

Backfilling around structures shall not commence until a satisfactory test result has been obtained.

The water tightness of the dry well of the pump station shall be monitored visually until the end of the defects liability period. If any damp penetration from the outside is noticed, the Contractor shall take immediate remedial steps.

(The above paragraph is applicable where dry wells of pump stations, etc. are below ground level.)

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 water tightness 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 water tightness of the structure is satisfactory.

PS G 5.6 **Sterilisation Of Structures Holding Potable Water**

The structures shall be sterilised before testing, and before retesting, for watertightness.
The walls, floors and soffits of roof slabs shall be hosed down and brushed until clean and free from loose material.
The structures shall then be filled with clean water containing 150 g/m^3 of calcium hypochlorite, to a water depth of 150 mm. The walls shall be thoroughly washed down after which all dirty water shall be flushed out.
Staff doing the washing down with the chlorine solution shall wear rubber boots.

PS G 5.7 Subsoil Drain Under Settling Tank Floor

A subsoil drain consisting of 110 mm diameter perforated or slotted uPVC pipes in a 300 mm x 400 mm bed of 19 mm stone, all as specified in PS **D** 3.4, shall be installed on the inside of the wall footing and under the reservoir floor. The pipes shall be connected with approved couplings and a gradient of 1 in 200 must be maintained towards the discharge point.

PS G 5.9 Joining New Concrete To Existing

Where partial demolition is required for extension work to existing structures, the contact face shall be cut to predetermined line and level, and any loose and fragmented material shall be removed, and projecting steel cleaned and bent as directed by the Engineer. Where partial

demolition is not required but extension work only, the contact surface shall be scabbled and cleaned of all dirt and loose particles.

If dowels are required, they shall be installed in holes drilled into the existing structure, in accordance with the details shown on the drawings, and secured by means of an approved type of epoxy bonding compound such as Epidermix 372 or similar.

Fresh concrete shall be bonded to the old concrete with an aproved type of epoxy bonding compound, such as Epidermix 344 or similar.

PS G 5.11 Mould For Parshall Flume

A mould of glass reinforced polyester (GRP) shall be used as permanent formwork for the construction of the Parshall flume. The mould shall be manufactured by a firm specialising in such work and approved by the Engineer before manufacture.
All resins used shall be high quality isophaltic polyester resins specially formulated for use in flumes for sewage.

The rate at which resins are applied shall be adjusted for conditions during manufacture, such as temperature and humidity, in order to limit shrinkage.

The dimensions shown on the drawings are internal dimensions and the departure from these dimensions shall nowhere be more than 0,5 %.

The GRP layup shall consist of the following:

a) One gel-coat of resin, pre-mixed at the factory with silvery grey pigment paste, at a rate of not less than 600 g/m2 (i.e.

b) One C-glass tissue layer impregnated with resin at a rate of 1:1, Resin: C-glass.

c) One layer 300 g/m^2 chopped strand mat (CSM) impregnated with resin at a minimum rate of 2:1; Resin: CSM.

d) Five layers of 450 g/m^2 each of CSM impregnated with resin at a minimum rate of 2:1; Resin: CSM.

e) One flow-coat at a rate of not less than 600 g/m^2.

The resin for the mechanical layers and the flow-coat shall be pre-mixed with 3 % silvery grey pigment paste.

For improvement of adhesion to the concrete, sand, as specified for concrete, shall be sprinkled over the flow-coat whilst still wet.

Anchors of 50 mm x 2 mm galvanised hoop iron, with the last 50 mm of both ends split in two halves and bent back 90° in opposite directions, shall be moulded into the mould in positions as detailed on the drawings. The anchors shall enter the concrete by at least 100 mm.
If, after manufacture, cutting of the mould is required to obtain final dimensions, the cut ends shall be treated with a top coat as specified in paragraph (a).

The struts for the mould, used during manufacture, shall be kept in place until the casting of concrete underneath and on the sides of the flume has been completed, in order to act as support during casting of the concrete.

PSG 8 MEASUREMENT AND PAYMENT

PSG 8.1 MEASUREMENT AND RATES

PSG 8.1.1 Formwork

DELETE “or splays over 20 mm x 20 mm” FROM THE FIRST LINE OF PARAGRAPH 8.1.1.2

Add the following to paragraph 8.1.1.2:

“Splays up to and including 25 mm x 25 mm will not be measured separately and will be deemed to be included in the formwork costs.”

ADD THE FOLLOWING PARAGRAPHS:

”8.1.1.7 For construction joints at kickers, all additional costs for formwork to edges up to 300 mm high will be deemed to be included in the rates tendered for vertical formwork to sides of walls and will not be measured separately in narrow widths.

“8.1.1.8 No formwork will be measured to edges of blinding layers under structures and the cost thereof, (if needed), will be deemed to be included in the rates tendered for concrete in blinding layers.

“8.1.1.9 Back-shuttering or formwork to top revealed surfaces of sloping – or conical formwork will only be measured to surfaces of over 40° and up to 85° to the horizontal.

“8.1.1.10 Formwork to horizontal surfaces in pump stations, valve chambers, manholes or sumps can either be removed through the manhole cover opening or the contractor may use permanent formwork at his own cost as no claims in this regard will be considered.”

PSG 8.1.2 Reinforcement

Replace the contents of this subclause with the following:

“The unit of measurement for steel bars shall be the ton of reinforcement in place, in accordance with the drawings or as authorised by the Employer’s Agent.

The unit of measurement for welded steel fabric shall be the kilogram of fabric reinforcement in place, and the quantity shall be calculated from the net area covered by the mesh, excluding overlaps.

Clips, ties, separators, stools and other steel used for positioning reinforcement will not be measured, unless these are shown on the bending schedules.

The tendered rate shall include full compensation for the supply, delivery, cutting, bending, welding, placing and fixing of the steel reinforcement, including all tying wire, stools, supports and waste.”

PSG 8.1.3 Concrete

DELETE “or the plan size of the excavation where additional excavation is provided to facilitate erection of forms” *from the second line of paragraph 8.1.3.1 (c).*

PSG 8.4 SCHEDULED CONCRETE ITEMS

PSG 8.4.3 Strength concrete, grade

Add the following after the last sentence:

“In the case of structural floor screeds, the unit of measurement shall be the square metre and the average thickness and proportions will be stated.”

Replace “Unit : m^3” with “Unit : m^3, m^2.”

PSG 8.4.4 Uniformed surface finishes

Add the following item:

"(c) Extra over steel-floated finish to top of walls for special finishing tolerances measured by laser to top of outside ringwalls as specified.....Unit : m²

The quoted rate shall include full compensation for the additional cost of finishing the ringwalls to closer tolerances as specified on the drawings and in clause PSG 6.2.3(h)."

PSG 8.5 JOINTS

"REPLACE "Unit : m" WITH "Unit : m or m²"

ADD THE FOLLOWING ITEMS:

PSG 8.9 MISCELLANEOUS WORK OTHER THAN METAL WORK.....Unit : as scheduled

Separate items will be scheduled for each type of miscellaneous work.

The tendered rates shall include full compensation for providing all labour, materials and equipment required to carry out the work, for all preparatory work, for constructing the work scheduled in a workmanlike manner and for finishing-off and cleaning up when the work has been completed.

PSG 8.13 CAST IN OF PIPES WITH OR WITHOUT PUDDLE FLANGES THROUGH CONCRETE:

(a) Up to 300 mm nominal bore:
  (i) Through (description and thickness of structure elements)
  .....Unit : number

(b) Over 300 mm up to 600 mm nominal bore:
  (i) Through (description and thickness of structure elements)
  .....Unit : number

(c) Etc for other nominal bores in increments of 300 mm

The unit of measurement shall be the number of each size of pipe installed.

The tendered rates shall include full compensation for installing the pipe where new pipes are used (with or without a puddle flange) in the exact position as shown on the drawings, for splitting or cutting the formwork where required using sealant as specified on the Drawings, for ensuring watertightness where required and for all additional costs required to install the pipes specified or shown on the drawings.

New pipes shall be measured under the items of the relevant section of the specifications.

PSG 8.14 SCREEDS:

(a) 1:3 floor screeds with falls and a smooth steel trowelled finish/power float finish to top:

  (i) Descriptions of application of thickness.....Unit : m²

(ii) Etc for other applications and thicknesses

The unit of measurement shall be the square metre of screeds constructed.

The tendered rate shall include full compensation for constructing the screeds as specified including the supply of all materials, preparing the concrete surface to receive the screeds and for all else that may be necessary to complete the work.

As an alternative the Tenderer may price for the installation of granolithic screed/benching as specified in Subclause PSG 5.5.20, indicating so in the Schedule of Quantities.

PSG 8.14.1 Granolithic screeds general

Before placing any granolithic screeds the base concrete shall be chipped to expose the aggregate over 100% of the area to be screeded and soaked with water for at least 24 hours.

The base concrete shall be thoroughly cleaned by scrubbing and all standing water removed after soaking. A 1:2 cement/sand grout shall then be brushed into the prepared surface followed by the granolithic screed before the grout sets. The granolithic screed shall be of the driest feasible consistency with a slump not exceeding 50 mm and shall be formed true to profile and shape as required and shown on drawings. Before placing granolithic screed against an adjacent band of granolithic screed the edge of the latter shall be prepared by chipping back to firm material, wire brushing and brushing with grout as for the base concrete.

PSG 8.14.2 Screed to clarifier floor

A screed of approximately 50 mm thickness is required to the clarifier floor.
The screed shall be formed from granolithic concrete as specified in PSG 8.14.1. The screed shall be applied after the mechanical equipment has been erected by the mechanical contractor and shall be laid in alternate concentric rings not greater than 2,00 m in width. A period of 24 hours shall elapse before the intervening rings are laid.
The Contractor shall supply and fit plywood template to the clarifier mechanism to act as a guide in determining the finished screed level. He shall not use the template to physically form the screed surface nor shall he place an excessive load on the scraper mechanism.

The Contractor shall only operate the scraper mechanism in strict accordance with the instructions of the manufacturer and the Engineer, and he shall make good any damage resulting from the use of the machinery.

Granolithic concrete shall be placed in position for a distance of approximately 3,0 m in front of the template and consolidated and roughly trimmed to level. The surface of the screed shall then be trimmed of to the level of the template which shall be moved as required by hand operation of the mechanism.

The trimmed surface shall be steel float finished and the edges of the ring left in a rough vertical condition to provide a key for the adjoining ring.

The preparation of the base concrete shall be done in accordance with PSG 8.14.1. Before placing granolithic concrete against an adjacent band of granolithic concrete the edge of the latter shall be prepared by chipping back the firm material, wire brushing, and brushing with grout as for the base concrete

PSG 8.15 BRICKWORK.....Unit : m²

Separate items will be scheduled for brickwork of different thicknesses.

The unit of measurement shall be the nett area (on elevations) of brickwork constructed to the specified thickness, measured in square metres.
The tendered rate shall include full compensation for constructing the brickwork as specified including the provision of all materials and clearing up on completion of the work.

PSG 8.16 PLASTERWORK, PAVIOR AND TILER :

(a) Plaster (state thickness and description of area to be plastered).....Unit : m²

(b) Fillets, skirtings, etc (state dimensions).....Unit : m

The unit of measurement for subitem (a) shall be the nett area of plasterwork constructed to the specified thickness, measured in square metres or for subitem (b) the nett length of corners, fillets, skirtings, etc constructed to the specified dimensions, measured in linear metres.

The tendered rate shall include full compensation for constructing the plasterwork including the supply of all materials, mixing, applying, finishing, rounded corners and all else that may be required to complete the work as specified.

PSG 8.16.1 Plaster

Plaster for walls shall be prepared by mixing one part lime to five parts dry sand.
Immediately before use one part cement shall be thoroughly mixed with twelve parts of the above lime/sand mix.
Plaster for rendering to concrete surfaces, beams and manholes shall be composed of one part cement to three parts sand.

PSG 8.16.2 Screeds

Screeds shall be composed of 3:1 sand/cement mortar

PSG 8.16.3 Granolithic

Granolithic floors shall be made from:

- Cement 1 part
- Sand 1.25 parts
- Course aggregate 2 parts

The coarse aggregate shall consist of granite or other approved chippings which shall pass a 10 mm sieve and be retained on a 5 mm sieve.

PSG 8.17 OTHER MISCELLANOUS WORK.....Unit : as scheduled

Separate items will be scheduled for each type of miscellaneous work.

The tender rates shall include full compensation for providing all labour, materials and equipment required to carry out the work for all preparatory work, for carrying out the work scheduled in a workmanlike manner and for finishing-off and cleaning up when the work has been completed.

PSG 8.18 EPOXY CONCRETE PROTECTION.....Unit : m²

The unit of measurement shall be the square metre of epoxy applied. The unit rate shall cover the cost of all materials, labour and equipment required to clean the concrete surface and apply the epoxy-cement according to the manufacturer's instruction."

PSG 8.20 POLYETHELENE SHEETING.....Unit : m²

The sheeting will be measured by square metre.

The unit rate shall cover the cost of the supply, cutting and placing of the sheeting to the base of the sludge drying beds as shown on drawings.

PSL MEDIUM PRESSURE PIPELINES

PSL.3.7.1 Materials: Other Types of Pipe: uPVC pipes (SANS 1200L Cl 3.7.1)

Replace the clause with the following:

"All uPVC pipes and fittings shall be fitted with spigot and socket rubber ring joints and shall comply with the relevant requirements of SANS 966, of the class and size as specified on drawings and schedule.

Bends shall be uPVC, class 16. Standard specials such as tees, flange adaptors, reducers, etc shall be fabricated from cast iron and shall be rated at not less than the pressure rating of the pipeline."

PSL.3.9.1 Materials: Corrosion Protection: CI Pipes (SANS 1200L Cl 3.9.1)

Replace the clause with the following:

"All internal cast iron surfaces valves and specials shall be thoroughly cleaned by grit blasting to SA 2,5 finish in compliance with the requirements of SIS 05 09 00 before applying Copon EP 2300 epoxy paint, applied in three coats to give a dry film thickness of not less than 250 microns. All external cast iron surfaces valves and specials shall be cleaned and coated in accordance with B4772. After it has set, coating shall be such that it will not flow when heated to temperature of 75^{o}C."

PSL.3.9.5 Materials: Corrosion Protection: Joints, Bolts, Nuts and Washers (SANS 1200L Cl 3.9.5)

Replace the clause with the following:

"All bolts, nuts and washers shall be stainless steel."

PSL.3.10 Materials: Valves (SANS 1200L Cl 3.10)

Add the following:

"Notwithstanding the above, all gate valves shall be of type CE-WS 15:1993."

PSL.3.11.4 Materials: Manholes and Surface Boxes: Step Irons (SANS 1200L Cl 3.11.4)

Replace the clause with the following:

"Step irons shall consist of polypropylene coated 12 mm high tensile steel such as calcamite or similar. The installation of the step irons shall be in accordance with the specification of the manufacturer."

PSL.5.1.4 Construction: Laying: Depths and Cover (SANS 1200L Cl 5.1.4)

Add the following after the first sentence:

"Unless otherwise shown on the drawings, All pipes smaller and equal to 110mm diameter shall be laid to provide a minimum cover of 1,0m from finished ground or roadway level within road reserve and 0,8m elsewhere. Pipes larger than 110mm diameter shall be laid to provide a minimum cover of 1,2m."

PSL.5.6.1 Construction: Valve and Hydrant Chambers: General (SANS 1200L Cl 5.6.1)

Replace the clause with the following:

PSL.7.3.1 Testing: Standard Hydraulic Pipe Test: Test Pressure and Time of Test (SANS 1200L Cl 7.3.1)

Add the following to Cl 7.3.1.1:

"Pipes shall not be tested against isolating valves. Special blank flanges or end caps, fully anchored, shall be provided for testing."

Substitute Cl 7.3.1.2 with the following:

"The test pressure for field testing shall be 1,5 times the rated maximum working pressure of the pipe."

Substitute CL 7.3.1.3 with the following:

"The test pressure applied according to Cl 7.3.1.2, must, with allowance for any level differences along the pipeline, be such that the pressure at any point in the pipeline will be at least 1,25 times and not more than 1,5 times the rated working pressure of the pipe."

PSL.8.2.11 Measurement and Payment: Scheduled Items: Anchor/Thrust Blocks and Pedestals (SANS 1200L Cl 8.2.11)

Under item (b) delete the following item:

Reinforcement Unit: t

Replace the first sentence under "Reinforcement" *with the following:*

"Anchor and thrust blocks shall be measured per cubic metre concrete and the tendered rate shall include for all reinforcement for the required dimensions"

PSL.8.2 Measurement and Payment: Scheduled Items (SANS 1200L Cl 8.2)

Add the following items:

"**PSL 8.2.16 Cut Into and Connect To Existing Mains** Unit: No

The cutting into existing mains shall be measured by the number of each type and diameter of pipe cut into.

The tendered rate shall include full compensation for all arrangements with the relevant authorities, isolating the main, cutting into the main to accommodate the connecting fitting, dewatering, excavating, removing of excess material, taking steps to prevent the ingress of soil, stones and other material into the main as well as all material and labour to connect the pipe."

PSLB BEDDING (PIPES)

PSLB.1.1 Scope (SANS 1200LB Cl 1.1)

Add, after the first sentence, the following:

"This specification also covers the bedding required for electric cables and cable ducts."

PSLB.3.1 Materials: Selected Granular Material (SANS 1200LB Cl3.1)

Replace the clause with the following:

"Selected granular material shall be an aggregate, sand or granular material, all of a non-cohesive nature and free from any organic material, of which the grading analysis shows 100 % passing a 13,2 mm sieve and not more than 5 % passing a 0,075 mm sieve.

The Contractor shall, at least 14 days before commencing bedding operations, submit a sample of the material he intends to use as selected granular material to the Employer's Agent for approval.

Where selected granular material from excavations on site the Contractor shall ensure it conforms to the above requirements.

In very wet conditions and if so ordered by the Employer's Agent, a non plastic crushed material with the specification as stated below should be used for bedding cradle.

a) Grading

Sieve size (mm)	% Passing		
19,0	100		
13,2	84	-	100
9,5	70	-	84
4,75	45	-	65
2,36	29	-	47
1,18	19	-	33
0,60	13	-	25
0,30	10	-	18
0,15	6	-	13
0,075	4	-	10

b) Crusher value

The aggregate crushing value, calculated at minus 13,2 mm plus 0,5 mm fraction, may not exceed 29.

PSLB.3.2 Materials: Selected Fill Material (SANS 1200LB Cl 3.2)

Replace the clause with the following:

"Selected fill material will comply with the provisions of SANS 1200LB Cl 3.1 as amended"

PSLB.3.3 Materials: Bedding (SANS 1200LB Cl 3.3)

Replace the first sentence with the following:

"For rigid pipes, Class B bedding will be used throughout."

PSLB.5.1.4 Construction: General: Compaction (SANS 1200LB Cl 5.1.4)

Replace "…90% MAMDD" *with* "93% MAMDD (100% for sand)"..

PSLB.8.1.3 Measurement and Payment: Principles: Volume of Bedding Materials (SANS 1200LB Cl 8.1.3)

Add the following:

"The volume of bedding material shall be measured net, and shall exclude the volume occupied by the pipe."

PSLB.8.1.4 Measurement and Payment: Principles: Separate Items for Cradle and Blanket (SANS 1200LB Cl 8.1.4)

Replace the clause with the following:

"No distinction shall be made as regards material for the bedding cradle and selected fill blanket, and the material shall comply with the requirements for material for bedding cradle."

PSLB.8.1.5 Measurement and Payment: Principles: Disposal of Displaced Material (SANS 1200LB Cl 8.1.5)

Add the following:

"All surplus and unsuitable material as described in Cl 8.1.5 shall be disposed of as described in SANS 1200D Cl 5.2.2.3 and PSD.7."

PSLB.8.2.2 Measurement and Payment: Scheduled items: Supply only of bedding by importation (SANS 1200LB Cl 8.2.2)

Add the following payment item:

PSLB 8.2.2.4 a) Provision of bedding by importation from stockpile: Selected granular mater.....Unit: m^3

PSLB 8.2.2.4 b) Provision of bedding by importation from stockpile: Selected fill mat.....Unit: m^3

The rate shall cover the cost of acquiring, from stockpiles on site, bedding that complies with the relevant requirements of the specification, of delivering it to points alongside the trench spaced to suit the Contractor's methods of working, and of disposing of displaced material.

PSLD SEWERS

PSLD.3.1.5 Materials: uPVC Pipes (SANS 1200LD Cl 3.1.5)

Replace with the following:

"Sewer pipes and fittings shall be Heavy Duty (Class 34) uPVC pipes. No alternative pipe types will be considered."

PSLD.3.5.2 Materials: Manholes, Chambers etc.: Precast Concrete Sections (SANS 1200LD Cl 3.5.2)

Add the following to LD 3.5.2:

"Precast concrete sections with an inside diameter of at least 1 000 mm shall be used for manholes with sewer lines smaller or equal to 200 mm diameter. Sectional spun concrete cylinders shall have been manufactured from dolomitic aggregate. For all manholes the invert level of the outlet shall be 30 mm lower than the lowest inlet invert level. The joint between the manhole and the concrete roof slab shall be sealed effectively with a sealant, to the prescriptions of the manufacturers and approval of the Employer's Agent, to prevent the infiltration of subsurface water or stormwater. Lifting holes shall be sealed off effectively, with an epoxy, after installation and before backfilling. The soffits of all inlet pipes in a manhole shall be on the same level. If the outlet pipe is bigger than all the inlet pipes, it shall have the same soffit level as the inlet pipes. All manholes complete with bottom, shall be able to accommodate a water pressure of the full manhole depth, as specified on the drawings, with an additional 50 % safety factor."

PSLD.3.5.7 Materials: Manholes, Chambers etc.: Step Irons (SANS 1200LD Cl 3.5.7)

Replace the subclause with the following:

"Step irons shall be installed in all manholes deeper than 1,2 m. Step irons shall consist of polypropylene coated 12 mm high tensile steel, such as Calcamite or similar. The installation of the step irons shall be in accordance with the specification of the manufacturer."

PSLD.3.5.8 Materials: Manholes, Chambers etc.: Manhole Covers and Frames (SANS 1200LD Cl 3.5.8)

Add the following to the subclause:

"All manhole covers and frames shall be in accordance with the details on drawings."

PSLD.3.6 Materials: Marker Posts (SANS 1200LD Cl 3.6)

Add the following:

"The positions of erf connections shall be marked by means of incisions on the face of the kerb. The mark shall be 5mm thick with 75mm high lettering. The marking shall be painted with red acrylic paint. Position of markers shall be in accordance with the details on drawings."

PSLD 5.11 Backfilling around manholes

Material used to backfill around manholes that fall within the road reserve must comply with SABS 1200 LB subclause 3.1. Material used to backfill around other manholes must comply with SABS 1200 DB subclause 3.5.

Material adjacent to the walls of the manholes must be watered and mixed to its optimum moisture content, and compacted in layers not exceeding 150mm in the compacted state. Compaction must be minimum 100% MOD AASTHO for non-cohesive material, and minimum 93% of MOD AASTHO density for cohesive materials.

PSLD.5.6.1 Construction: Manholes, Inspection Chambers etc.: General (SANS 1200LD Cl 5.6.1)

Substitute LD 5.6.1(a) with the following:

"Manholes shall be of precast concrete sections and shall be constructed as shown on drawings.

1. Final cover levels of manholes in streets and paved areas shall be to the same level as the street or paved area.
2. On side walks, lawns and garden areas the cover level shall be 20 mm above the final ground level.
3. In midblock sewers it shall be 50 mm above ground level.
4. Outside the road reserve or erf boundaries, it shall be 100 mm above natural ground level.

If a manhole is positioned at a low point or in a hollow where stormwater infiltration may occur, the manhole cover level must be raised to a level to avoid the danger of infiltration, or to a level as agreed with the Employer's Agent."

PSLD.5.6.3 Construction: Manholes, Inspection Chambers etc.: Step Irons (SANS 1200LD Cl 5.6.3)

Add the following to LD 5.6.3:

"Step irons shall only be installed in manholes deeper than 1,2 m."

PSLD.5.9.1 Construction: Connecting Sewers: Location and Details (SANS 1200LD Cl 5.9.1)

Add the following to Cl 5.9.1:

"Erf connections shall be installed on the exact positions as indicated on the drawings. All connecting sewers shall be laid at a gradient of 1:60, except where otherwise ordered by the Employer's Agent. Erf connections for foul sewers shall be in accordance with the relevant construction drawings."

PSLD 8.2.5 Inspection chambers etc.:

Replace the contents of the subclause with the following:

"Separate items will be scheduled for manholes, backdrops, and inspection chambers, etc of each type and of each depth in increments of 0,5m. The rate shall cover the cost of dealing with any excavation (in all materials including disposal of surplus) and backfilling with suitable material in accordance with PSLD 5.11 (including import of material if required) additional to what is measured under SABS 1200 DB Subclauses 8.2.2 and 8.2.3. The rate shall cover the cost of construction of manholes complete with channels, benching, short pipes (1m long) and all flexible connections in accordance with the detail shown on the drawings.

The depth category of manholes shall be measured as the difference between the cover level and the deepest invert level of the manhole."

PSLD.7.1.5 Testing: General (SANS 1200: LD Cl 7.1.5)

Add the following:

"All tests shall be repeated after the completion of backfilling of pipe trenches."

PSLD.7.1.6 Testing: General (SANS 1200: LD Cl 7.1.6)

Add the following:

"d) A water test will be conducted on all sewer lines after installation."

PSLD.8.2.3 Measurement and Payment: Scheduled Items: Manholes (SANS 1200LD Cl 8.2.3)

Add the following:

"Manholes shall be measured complete as indicated on the drawings and the rate shall be all inclusive for benching, step irons, cover and frame, and it shall make provision for all additional excavation and backfilling.

Manholes deeper than 1,5 m shall be provided with an additional concrete base, if specified by the Employer's Agent. All costs involved in additional excavation, backfilling, material and labour shall be included in the rate for the additional base.

The depth of manholes as mentioned in the schedule of quantities, shall be measured from the final cover level to the outlet invert level (flow level).

PSLD.8.2.11 Measurement and Payment: Scheduled Items: Connection to Existing Sewer (SANS 1200LD Cl 8.2.11)
Add the following:

The tendered rate shall include full compensation for constructing erf connections to existing sewer lines and will include any additional channelling and benching associated with the connection, cutting the pipe to suit the connection, supplying and building in the short junction pipe, extra couplings, dealing with existing flow, preventing foreign material from entering the sewer and making the connection. Where a direct connection is made to an existing pipe, the rate covers all labour involved in opening the existing pipe, the removal of the existing end cap and disconnection at the pipe."

PSM ROADS (GENERAL)

PSM.5 Construction: (SANS 1200M Cl 5)

Add the following:

"The relevant widths and road details are shown in the cross sections contained in the relevant drawings.

PSM.7.3.3 Testing: Routine Inspection and Testing (SANS 1200M Cl 7.3.3)

Replace the subclause with the following:

"Statistical evaluation of test results shall not be applicable to this contract"

PSM.3 Testing: Routine Inspection and Testing (SANS 1200M Cl 7.3)

Add the following subclauses:

7.3.4 The Contractor shall bear the costs of process control tests carried out by the Employer's Agent at the request of the Contractor or as specified for process control.

7.3.5 The cost of refilling and compacting the density test holes shall be included in the rate tendered for the construction of that layer."

PSME SUBBASE

PSME.3.2.1 Materials: Physical Properties: Regional Factor (SANS 1200ME Cl 3.2.1(d))

Replace the last sentence with the following:

"The regional factor for his area is 0,60 and the regional minimum CBR value for sub-base material is thus 45%."

PSME.7.2.2 Testing: Process Control and Routine Inspection and Testing: Routine Inspection and Testing (SANS 1200ME Cl 7.2.2))

Add the following:

"Notwithstanding subclause 7.2.2 and Table 3, no single test result which is below the specified density will be accepted."

PSME.8.3.2 Measurement and Payment: Scheduled Items: Construct the subbase course with material from designated excavations (SANS 1200ME Cl 8.3.2)

Add the following:

"'Designated excavations' shall include material from the stockpile of recovered material."

PSMF BASE

PSMF.3.2.2 Materials: Physical and Chemical Properties: Graded Crushed Stone (SANS 1200MF Cl 3.3.2)

Replace subclause (a) with the following:

"The maximum size of the crushed stone shall be 37.5mm"

Add the following subclause:

"d) The CBR at specified density shall be at least 80%"

PSMF.7.3.2 Testing: Routine Inspection and Testing (SANS 1200MF Cl 7.3.2)

Add the following:

"Notwithstanding subclause 7.3.2 and Table 4, no single test result which is below the specified density will be accepted."

PSMK KERBING AND CHANNELLING

PSMK.3.2.3 Materials: Precast Kerbing and Channelling: Strength (SANS 1200MK Cl 3.2.3)

Replace subclause with the following:

"Precast kerbs, edging and channels shall be of grade 25 MC PA/19 mm concrete."

PSMK.3.9 Materials: Bedding Materials (SANS 1200MK Cl 3.9)

Replace subclause with the following:

"The material on which concrete kerbs, channels and edging are bedded, shall be in accordance with the drawings"

PSMK.5.2 Construction: Precast Concrete Kerbing and Channelling (SANS 1200MK Cl 5.2)

Replace the first sentence of the subclause with the following:

"The material on which concrete kerbs, channels and edging are bedded, shall be in accordance with the drawings"

SECTION 2: BUILDING WORK

SCOPE

1 WORK SPECIFICATION (BUILDING WORK)

This section specifies the general requirements for the construction of buildings.

INTERPRETATIONS

1.1 SUPPORTING SPECIFICATIONS

(a) Project Specification;

(b) SABS 1200 A or SABS 1200 AA as applicable;

(c) SABS 1200 C;

(d) SABS 1200 D or SABS 1200 DA as applicable;

(e) SABS 1200 G or SABS 1200 GA or SABS 1200 GB as applicable.

1.2 GENERAL

Building work shall be carried out in accordance with the National Building Regulations and Building Standards Act, 1977, and these specifications.

References to specifications and codes of practice of the South African Bureau of Standards shall be taken to be references to the latest edition of such specifications and codes of practice as amended. Where possible the SABS mark shall appear on all articles, materials or items where it is required to comply with such SABS specification.

1.3 COMMERCIAL PRODUCTS

In all instances where the Contractor handles, stores, uses, applies or fixes commercial products, the work shall be strictly carried out according to the instructions of the manufacturer of such products.

1.4 SAMPLES

The Contractor shall furnish without delay, such samples as called for or may be called for by the Engineer. Materials or workmanship not corresponding with approved samples, may be rejected by the Engineer and shall be removed from the works at the cost of the Contractor.

MATERIALS

2.1 CEMENT

Cement for masonry work comply with the requirements of SANS EN 431-1 and cement for concrete work shall be CEM I portland cement or CEM III blast-furnace cement complying with the requirements of SANS EN 197-1.

Separate storage facilities shall be provided fort he various types of cement.

2.2 WATER

Water shall be clean and free from clay, silt, oil, acid, alkali, organic or other matter which would impair the required strength and durability of mortar, plaster or floor screed.

2.3 LIME

Lime shall be hydrated bedding mortar lime complying with the requirements of SABS 523.

2.4 AGGREGATE

Sand for plaster and mortar shall comply with the requirements of SABS 1090, whereas the aggregates for normal and granolithic floor creeds shall comply with the requirements of BS1199 and BS1201 respectively.

2.5 BURNT CLAY BRICKS

Burnt clay bricks shall comply with the requirements of SABS 227 and shall also be equal in all respects to the three samples of each type of brick furnished by the Contractor prior to commencement of the works and as approved by the Engineer.

General purpose (special) bricks shall be used in foundation walls and lintels.

The colour and texture of face bricks shall be as specified in the project specifications. Care shall be taken to avoid damage to arisses and faces during transport and handling.

Fire bricks shall be of well burnt refractory fire clay, resistant to spalling and cracking and of same size as the ordinary bricks.

2.6 CONCRETE MASONRY UNITS

Pre-cast concrete masonry units shall comply with the requirements of SABS 1215 and shall be solid unless specified otherwise in the project specifications.

2.7 CALCIUM SILICATE MASONRY UNITS

Calcium silicate masonry units shall comply with the requirements of SABS 285.

2.8 WALL TIES

Wall ties shall comply with the requirements of SABS 28.

2.9 AIR BRICKS

Air bricks shall be well-burnt terra-cotta air bricks in external faces of walls and 250 mm x 150 mm rectangular gypsum air bricks covered with copper mosquito gauze in internal faces.

2.10 BRICK REINFORCEMENT

Brick reinforcement shall be hard drawn mild steel comprising two 3,15 mm diameter wires spaced 75 mm apart and 2,8 mm diameter cross wires spaced at not exceeding 300 mm apart welded to main wires.

2.11 QUARRY TILES

Quarry tiles shall be of approved quality, even in thickness, truly square, free from cracks, twists and blemishes and uniform in colour and unless otherwise specified, shall be of approved red colour.

2.12 CERAMIC TILES

Glazed ceramic tiles for walls shall comply with the requirements of SABS 22 and, unless otherwise specified, shall be white, size 150 mm x 150 mm x 6,5 mm thick.

Ceramic tiles for floors shall comply with the requirements of SABS 1449 and, unless otherwise specified, shall be unglazed, size 240 mm x 115 mm x 20 mm thick and of approved colour.

2.13 CONCRETE PAVING SLABS

Concrete paving slabs shall be precast units of grade 25 MPa/13 mm concrete and shall be of approved manufacture, at least 50 mm thick and sizes 250 mm x 250 mm minimum and 600 mm x 600 mm maximum.

Concrete slabs shall be even in thickness, truly square, free from cracks, twists and blemishes, with a uniform natural cement colour and surface finished smoothly in the mould and shall also be equal in all respects to the samples furnished by the Contractor prior to commencement of the works and as approved by the Engineer.

2.14 DAMP-PROOF MEMBRANE

Damp-proof membrane under floors, unless otherwise specified, shall be of poly-ethylene sheeting complying with the requirements of SABS 952 as Type C-plain surfaces specified therein, 250 microns in dry areas and 375 microns in wet areas.

2.15 DAMP-PROOF COURSE IN WALLS

Horizontal and vertical damp-proof course, unless otherwise specified, shall be of bituminous sheeting complying with the requirements of SABS 248 and as Type FV (Fibre Base) sheeting or as Type GH (Hessian Base) sheeting specified therein, or of polyethylene sheeting complying with the requirements of SABS 952 and as Type A-plain surfaces 450 microns or as Type B-embossed surfaces 375 microns as described therein.

2.16 TREATMENT OF TIMBER

All timber shall be given a preservative treatment suitable for the duty for which the timber is intended in accordance with SABS code of practice 05, and no untreated timber shall be used. The preservative treatment shall not impair the final finish. The timber shall be impregnated throughout. When surface coating is specified, the compounds applied on the surfaces of the timber shall form an unbroken film.

2.17 STRUCTURAL TIMBER

Structural timber, unless otherwise specified, shall be of South African softwood (pine) complying with the requirements of SABS 563 or SABS 1245 and, unless otherwise specified or shown on the drawings, shall be of Grade 4 and shall be marked as laid down in the specification.

Roof battens and other structural timbers not less than 50 mm or more than 65 mm in width and not less than 38 mm or more than 50 mm thickness, shall be of South African softwood (pine) complying with the requirements of SABS 653.

All structural timber shall bear the full standardisation mark of the South African Bureau of Standards.

The tolerance by which "actual" dimensions may vary from the "nominal" dimensions specified or stated on drawings of South African sawn structural softwood, shall be as laid down in SABS 563, SABS 653 and SABS 1245 where relevant.

2.18 STRUCTURAL LAMINATED TIMBER

(a) **Stock glued laminated timber of S.A. pine**

Stock glued laminated timber of S.A. pine shall comply with the requirements of SABS 1089 and shall be marked as laid down in the specification and shall also bear the standardisation mark of the SABS.

(b) **Designed glued laminated timber**

Structural glued laminated timber shall comply with the requirements of SABS 876 and shall be marked as laid down in the specification and shall also bear the standardisation mark of the SABS.

The timber shall be of -

(i) softwood or hardwood;

(ii) the density group and grade;

(iii) the exposure category;

(iv) moisture content; and

(v) of Class A or Class B appearance;

as specified and, in services having timbers treated against infestation by insect pests, shall be treated against pests as laid down in the specification for laminated timber.

2.19 GALVANISED STEEL ROOFING SHEETS

Galvanised steel roofing sheets shall be of the profile as scheduled or shown on the drawings, of 0,60 mm thick mild steel (before galvanising) and shall be galvanised on both sides to the requirements of SABS 934 for a Class Z250 coating, unless a Class Z600 coating is specified, and shall be passivated.

2.20 METAL RIDGING FOR STEEL COVERED ROOFS

Galvanised iron ridging for ridges and hips of steel covered roofs shall be of 0,60 mm thick flat mild steel (before galvanising), galvanised as specified for roofing sheets in clause 3.19.

2.21 FIBRE CEMENT ROOFING SHEETS

Fibre cement roofing sheets shall be of the profile scheduled or shown on the drawings and shall comply with the requirements of SABS 685. The sheets shall be not less than 6 mm thick.

2.22 ADJUSTABLE FIBRE CEMENT RIDGING

Adjustable fibre cement ridging for ridges of fibre cement covered roofs, shall be of same manufacture as the roofing sheets, of not less than 6 mm thick material, with overlapping end joints and shall suit the profile of the roofing sheets. Width of wing shall be not less than 300 mm measured from the centre of roll.

2.23 FASCIAS AND BARGE BOARDS

Fascias and barge boards shall be, unless otherwise specified, of pressed fibre cement boards of section described in long lengths.

2.24 FIBRE CEMENT FLASHINGS

Fibre cement flashing for horizontal top edges of roofs butting against vertical wall or other surfaces, shall be of same manufacture as the roofing sheets of not less than 6 mm thick material and with overlapping end joints. The flashings shall suit the profile of the roofing sheets and shall extend not less than 300 mm onto the roof sheeting, shall have plain upstands against the vertical surfaces and shall be flashed over with metal as described.

2.25 FIBRE CEMENT GUTTERS

Fibre cement gutters shall be of approved manufacture, of not less than 6 mm thick material and with spigot and socket ends.

Gutter brackets shall be heavy quality galvanised steel or non-ferrous metal brackets as supplied by the manufacturers of the gutters.

2.26 FIBRE CEMENT RAINWATER DOWN PIPES

Fibre cement rainwater downpipes shall be of approved manufacture, with spigot and socket ends. The material in circular rainwater downpipes 75 mm diameter shall be not less than 6 mm thick, and in circular pipes over 75 mm diameter and in all sizes of square and rectangular pipes, shall be not less than 8 mm thick.

Holderbats for rainwater downpipes shall be heavy quality galvanised steel or non-ferrous metal holderbats.

2.27 CONCRETE ROOFING TILES

Concrete roofing tiles shall comply with the requirements of SABS 542, except that the concrete in the body of the tile need not be coloured where tiles have natural stone granular finish, and shall be of pattern and colour specified.

Unless otherwise specified, the tiles shall have natural stone granular finish.

2.28 COVERING TO CEILINGS

(a) **Gypsum plasterboard ceilings with plaster finish**

Gypsum plasterboard for ceilings shall be 6,4 mm thick gypsum ceiling board, complying with the requirements of SABS 266.

The cover strips shall be galvanised or lacquered wire gauze not less than 60 mm wide. The plaster shall be a retarded semi-hydrate wood-fibre plasterboard bonding gypsum plaster.

(b) **Fibre cellulose board ceilings**

Fibre cellulose board for ceilings shall comply with the requirements of SABS 803 and, unless otherwise specified, shall be 6 mm thick and of flat (unpressed) type.

2.29 COVE CORNICES TO CEILINGS

(a) **Gypsum plasterboard cornices**

Cove gypsum plasterboard cornices to ceilings shall comply with the requirements of SABS 622 and shall be of 82 mm or 120 mm girth as specified.

(b) **Timber cornices**

Timber cornices to ceilings shall be 32 mm hardwood Scotia's.

2.30 FLAT FIBRE CEMENT SHEETS

Flat fibre cement sheets other than fibre cellulose boards described in subclause 3.28(b), shall comply with the requirements of SABS 685.

2.31 TIMBER FOR JOINERY

Softwood for joinery shall comply with the requirements of SABS 1359 and hardwood with the requirements of SABS 1099.

Timber for joinery shall be of clear grade, unless otherwise specified. Counter tops and other tops, where only one face side is visible, shall be of semi-clear grade timber.

2.32 FRAMED AND LEDGED BATTEN DOORS

(a) **Softwood doors**

To be 44 mm thick framed and ledged batten doors complying with the requirements of SABS 545, but the timber shall comply with the requirements of SABS 1359 and shall be of clear grade.

(b) **Hardwood doors**

To be 44 mm thick framed and ledged batten doors complying with the requirements of SABS 545, but the timber shall comply with the requirements of SABS 1099 and shall be of clear grade. The hardwood shall be solid without any laminations.

2.33 FLUSH DOORS

Flush doors shall be solid laminated, chip core or hollow-core as specified and shall comply with the requirements of SABS 545. All glue used in the manufacture of the doors shall comply with the requirements of the above specification.

Unless otherwise specified, face veneers shall be rotary cut, and shall be of timber specified or where doors are to be painted shall be of timber suitable for painting.

Edge-strips to conceal the vertical edges of doors shall be not less than 10 mm thick and of the same timber as face veneers; edge strips to meeting edges of doors in two leaves where edges are to be rebated, shall be not less than 20 mm thick.

Faces of doors shall be machine-sanded to a smooth and even surface.

All glueing together of core strips and glueing on of veneers, edge-strips, etc. shall be done under hydraulic pressure.

The top and bottom edges of doors showing end grain, shall be sealed with lacquer, or other suitable material, before leaving the manufacturer's works, and similarly sealed after doors are fitted into frames if the edges of doors are disturbed during fitting.

2.34 IRONMONGERY

All ironmongery shall be of best quality and shall be approved by the Engineer, before fixing.

Screws for fixing of articles shall be of similar metal than the articles.

Locks shall comply with the requirements of SABS 4 and shall be supplied with two keys each.

Unless otherwise specified, interior and exterior doors shall be fitted with two and four lever heavy-duty mortice locks respectively, which shall be master-keyed.

No key shall pass a second lock. On no account shall the keys be delivered with the doors or locks to the building site. Failure to observe these instructions may entail the provision of new locks and keys.

2.35 HOT-DIP GALVANISING TO STEELWORK

Where prescribed, all steelwork built in as the work proceeds, shall be hot-dip galvanised after fabrication and before leaving the manufacturer's works, in accordance with SABS 763.

Where they occur, site welds shall be zinc sprayed in order that the zinc coating be even and continuous over all surfaces.

2.36 PRESSED STEEL DOOR FRAMES

Pressed steel door frames shall comply with the requirements of SABS 1129 and shall be constructed of 1,6 mm thick mild steel sheeting, pressed or rolled to the required shapes, properly mitred, welded and reinforced.

Frames shall be of widths required to suit the thickness of walls into which they are built and shall be fitted with suitable tie-bars and braces at bottom, and lugs for

building in, three to each jamb of frames without fanlights and four to each jamb of frames with fanlights.

Where fanlights are shown over doors, the frames shall be fitted with transoms of pressed or rolled steel sheet as above and rebate for fanlights and for doors if required.

The rebates in frames and transoms for doors and fanlights shall be of width required to suit the thickness of doors and fanlights.

Frames shall each be fitted in the rebate of one jamb with a pair of approved 100 mm steel butt hinges, and transom to opening fanlights hung at bottom shall each be fitted with a pair of approved 75 mm steel butt hinges, all set flush into recesses in frames and either fixed with countersunk screws or securely welded on.

Frames shall be holed as and where required for screws fixing fanlight openers, keeps of spring catches, etc. Where fanlights are shown to be fixed into frames, the frames shall be holed in the rebates, for screws, securing the fanlights, four to each frame.

Frames shall each be fitted in one jamb, with approved chromium plated or stainless steel (unless otherwise specified) adjustable striking plate keep, boxed in at back of frame with sheet metal box welded on, and not less than two rubber buffers.

All welding shall be cleaned off smooth and flush on exposed faces and frames shall be cleaned and primed as described for steel windows before leaving the manufacturer's works.

2.37 STEEL DOORS, SIDELIGHTS AND FANLIGHTS

Steel doors, sidelights and fanlights shall, in the case of stock types, comply with the requirements of SABS 727, and in the case of purpose made types with the constructional and other requirements of the above specification wherever applicable, and shall in addition be equipped with the following:

(a) Suitable weather bars where required to render doors, etc., perfectly watertight;

(b) Suitable lugs, or holes at the same spacing as the standard fixing lugs, for screwing frames to plugs in the concrete, where frames of doors, etc. are to be fixed to concrete columns, beams, etc.,

(c) A primer as described for steel windows, except where hot-dip galvanising is prescribed.

Doors, sidelights and fanlights, unless otherwise shown shall be of "one piece" construction, but where shown to be in two or more "one piece" units, the units shall be coupled together with standard coupling-mullions and/or transoms.

Bottom openings in doors and sidelights shall be fitted with kicking plates of one thickness of 1,6 mm thick mild steel sheet fixed with metal beads.

Frames of outward opening doors shall be fitted at bottom with sills of door framing section (stepped sills) and of inward opening doors with metal ties, welded to frames, for embedding in thresholds (flush sills).

Stock doors, sidelights and fanlights shall be of the types shown on drawings and purpose made doors, sidelights and fanlights shall be constructed to the forms and sizes shown on drawings.

Unless otherwise specified, the doors shall be of not less than 33 mm universal sections and the sidelights and fanlights of standard 25 mm sections.

Fanlights shall be hung and fitted as described for steel windows in clause 3.39.

2.38 BALANCE TYPE STEEL DOOR

The balance type steel door shall be of the "back track" type tip-up door, constructed of not less than 0,8 mm thick mild steel sheeting, pressed to form troughed or fluted pattern horizontal panels, each approximately 200 mm wide, all strongly reinforced at back with 1,2 mm thick top hat section mild steel braces and/or stiffeners and provided all round exposed edges with 1,2 mm thick mild steel channels, all properly welded together and with all welding cleaned off smooth and flush.

The door is to be hung on two galvanised flexible steel cables of not less than 5 mm diameter, connected at lower ends to 125 mm diameter steel encased counterweights of such length and mass as will balance the door in the full open position and connected at upper ends to door unit by passing cables over 140 mm diameter bushed cast aluminium pulleys, securely fixed to 2,50 mm thick mild steel top plates.

The movement of door is to be controlled by means of sintered metal rollers, (nylon rollers are not acceptable) securely fixed at top and centre of outer edges to door unit to operate in horizontal and vertical runner guides respectively. The guides are to be formed of 37 mm x 32 mm x 25 mm mild steel channels and with vertical channels fitted at upper ends with horizontal channels, welded on to form back track for top rollers. Each vertical channel is to be four times bolted to jamb of door opening and each horizontal channel is to be secured in position to internal wall with mild steel angle bracket, twice bolted to wall to form rigid construction.

The counterweights to door to be encased with 2,50 mm thick mild steel cover plates, each the full height of door and securely fixed to wall and channel guide.

Door to be fitted near bottom with cast aluminium lifting handle for operating the door and with chromium plated locking handle, complete with control rods and with striking plate bolted to lintel, over door opening. The locking handle is to be operated from outside and is to be provided with two keys.

Before leaving the manufacturer's works, all metal is to be given a protective priming coat of paint in accordance with the requirements of SABS 909.

2.39 STEEL WINDOWS

Stock residential and industrial type steel windows shall comply with the requirements of SABS 727 and all other types both stock and purpose made shall comply with the constructional and other requirements of the above specification wherever applicable, and shall in addition be equipped with the following:

(a) Suitable weather bars where required to render the windows perfectly watertight;

(b) Suitable lugs, or holes at the same spacing as the standard fixing lugs, for screwing frames to plugs in the concrete where frames of windows are to be fixed to concrete columns, beams, etc.;

(c) Windows and components, except where specified to be hot-dip galvanised, shall before leaving the manufacturer's works, be cleaned by acid pickling rinsing and drying, as laid down in SABS code of practice 064, or by other approved means, to remove all scale, rust, grease, oil and foreign matter and then primed with red oxide zinc chromate primer complying with the requirements of SABS 909, applied by dipping or by means of spray gun.

Ventilators hung at side to open out in windows above ground floors and not accessible for cleaning from an adjoining opening ventilator in the same window or from verandas, balconies and the like, shall be hung on projecting hinges.

Windows, unless otherwise specified, shall be of "one piece" construction, but where shown to be in two or more "one piece" units, shall be coupled together with standard coupling mullions and/or transoms.

Windows shall be fitted with solid brass handles, stays, catches and other fittings, those to windows constructed of universal sections having polished finish and to all other windows rumbled finish. The fittings shall be fixed in such a way as to be removable after windows are glazed.

2.40 RESILIENT FLOOR FINISHINGS

Semi-flexible vinyl (vinyl-fibre) floor tiles shall comply with the requirements of SABS 581; flexible vinyl (PVC) floor tiles and sheeting shall comply with the requirements of SABS 786 and thermoplastic (asphaltic) floor tiles shall comply with the requirements of SABS 586. Unless otherwise described, the flooring shall be of marbled pattern and of approved light colour and tiles shall be 230 mm x 230 mm or 250 mm x 250 mm in size.

Vinyl cove skirtings shall be of approved manufacture and colour and unless otherwise stated, 70 mm in height.

2.41 GLASS FOR GLAZING

Glass for glazing shall comply with the requirements of CKS 55.

Glass not exceeding 0,75 square metre surface area of glass pane, shall be flat drawn clear sheet glass of "QQ" quality (ordinary glazing quality) and of 3 mm thickness.

Glass exceeding 0,75 square metre and up to 1,5 square metres surface area of glass pane, shall be clear float glass of "GG" quality (glazing quality) and of 4 mm thickness.

Laminated safety glass for glazing shall be of "SQ" quality (selected glazing quality) and of 6 mm thickness unless otherwise specified. If high impact strength glass is used, whether cut to size or not, the stencil mark is to appear in a prominent place on the glass.

Toughened safety glass for glazing up to 3 square metres shall be, unless otherwise specified, of 4 mm thickness and must be ordered to the correct size as toughened glass can not be cut, and each piece of glass to be marked in a clear and permanent fashion. (For bigger sizes, manufacturer's instructions are to be followed).

Any pane of glass installed in any door shall, where not made of safety glass, be not more than 1 m^2 in area and shall have a nominal thickness of not less than 6 mm.

Obscure glass for glazing, unless otherwise specified, shall be Arctic or other similar approved figured rolled glass, of a nominal thickness of not less than 3 mm for glass panes up to a surface area of 0,75 square metre and not less than 5 mm over 0,75 square metre.

Putty for glazing shall comply with the requirements of SABS 680, of Type I for glazing in wood and of Type II for glazing in steel windows, doors, etc. Putty used for glazing in unpainted hardwoods, shall be tinted to match the colour of the wood.

2.42 PAINTS

All materials for paint work for which South African Bureau of Standards specifications have been published, shall comply with the requirements of such specifications and shall bear the standardisation mark of the South African Bureau of Standards on the container or packing. Materials for paint work for which no SABS specifications have been published shall be of brand and manufacture approved by the Engineer.

All materials for paint work must be brought on to the site in unopened containers and no adulteration will be allowed.

Undercoats for paint work shall be as supplied by the manufacturer of the paint being used for the finishing coat.

Paints shall be suitable for application on the surfaces on which they are to be applied, and those used externally shall be of exterior quality or suitable for exterior use.

If necessary, paints shall be strained free from skins and similar impurities immediately before application.

The various primers, undercoats, paints and distempers shall comply with the requirements of the specifications quoted hereunder and shall be of the type of grade stated, viz:

(a) **Primers**

(i) For wood:

SABS 678. Type I shall be used on exterior woodwork and Type III on interior woodwork.

(ii) For metal:

Dip or spray application (red oxide zinc chromate). For steel windows, doors, door jambs, and other articles normally dip or spray primed in the manufacturer's works: SABS 909.

Brush application (zinc chromate). For all metal surfaces primed on site and then painted: SABS 679, Type I.

(iii) For structural steel (red lead)

SABS 312, Type II, Grade I.

(iv) For galvanised iron

SABS 912.

(v) For galvanised metal surfaces and surfaces of non-ferrous metals

Wash primer (metal etch primer) : SABS 723.

(b) **Undercoats**

For all surfaces under HIGH GLOSS, OIL GLOSS, FLAT and EGGSHELL finishing paints : SABS 681, Type II.

(c) **Paints**

(i) High gloss : SABS 630

(ii) Oil gloss : SABS 631

(iii) Flat and eggshell : SABS 515

(iv) Emulsion paint (interior) : SABS 633, Grade I

(v) Emulsion paint (exterior) : SABS 634, Synthetic Polymer Base Type, but pure acrylic resin base for fibre cement surfaces

(vi) Aluminium paint : SABS 682, Grade II

(vii) Roof paint : SABS 683, Type B

(viii) Structural steel paint : SABS 684, Type B

(ix) Epoxy tar : SABS 801 (types as specified)

(d) **Distemper**

SABS 322

(e) **Varnish for interior use**

SABS 887, Type I with eggshell finish.

PLANT

3.1 GENERAL

The Contractor shall have at his disposal the normal plant necessary for the proper and neat completion and rounding off of all facets of the building work.

CONSTRUCTION

3.2 BRICKLAYER

3.3 Cement Mortar

Cement mortar shall, unless otherwise specified, be composed of four parts by volume of sand **and one part by volume of cement for normal brickwork, and three parts by volume of sand and** one part by volume of cement for reinforced brickwork.

The ingredients for cement mortar shall be measured in proper gauge boxes on a boarded platform and thoroughly mixed. Alternatively mixing may be by means of an approved mechanical batch mixer. Only when the dry ingredients have been thoroughly mixed and a mixture of uniform colour has been obtained may the water be added in sufficient quantity to obtain mortar with the required consistency.

Care shall be taken in mixing cement mortar to remove from the mixing machine or platform any old mortar that has already set, as such mortar must not be incorporated in any new batch.

Cement mortar shall be produced in such quantities as can be used before commencing to set, as no cement mortar that has once commenced to set shall be used in any way.

3.4 Brickwork

Brickwork, wherever practicable and not otherwise specified, shall be built in English bond. No false headers shall be used, and none but whole bricks employed, except where legitimately required to form bond.

The brickwork, unless otherwise specified, shall be built in 4:1 cement mortar. Brick arches and brick lintels shall be built in 3:1 cement mortar.

The bricks shall be laid on a solid bed of mortar and all joints thoroughly grouted up solid throughout the whole width of each course.

The brickwork shall be carried up in a uniform manner, no portion being raised more than 1,2 m above an adjacent portion.

The bricks shall be well saturated with water, in the stack or dump, approximately two hours before being used. The tops of walls left off, shall be well wetted before work is recommenced.

All rough and fair cutting and cutting of splays, skew backs, chamfers, etc., shall be properly performed.

All necessary openings for pipes, etc., shall be formed or left and made good after pipes, etc., are fixed in position.

Walls generally shall be taken up two courses above panelled ceilings in the same mortar as the wall below and cut between ties, etc.

Where hollow concrete masonry units are used brick-force shall be built into the walls every third course. Mortar for hollow concrete masonry units shall consist of one part cement, two parts lime and nine parts sand by volume. All cavities below floor level shall be filled with Grade 15 MPa/19 mm concrete.

3.5 Mortar Joints

Mortar joints to brickwork generally shall be 10 mm in thickness.

The joints in brickwork receiving plaster, tiling or similar finishings, shall be raked out whilst the mortar is soft to form key for the plaster or mortar backing. The depth of the raking out will depend on the condition of the bricks; the rougher the bricks on face the shallower the raking out and the smoother the bricks the deeper the raking out.

The joints in brickwork shall be flushed off where walls are to be bagged, in readiness for the bagging.

3.6 Brickwork In Thicknesses

Walls built in two or three thicknesses shall be tied together with and including metal ties of sufficient length to allow not less than 75 mm of each end to be built into brickwork and shall be spaced not more than 1 m apart to every third course and staggered.

3.7 Brickwork In Linings

Linings to concrete shall be tied with and including 4 mm diameter galvanised crimped wire ties of necessary length to allow 75 mm to be bedded into concrete and 75 mm of the other end to be built into brickwork and evenly spaced 1 m apart to every third course and staggered.

3.8 Half Brick Thick Walls

Half brick thick walls shall be built in 4:1 cement mortar and reinforced with 75 mm wide brick reinforcement, one row to every eighth course in height, and built 100 mm into main connecting walls. The reinforcement shall be lapped 150 mm at end joints, where these are necessary, and 75 mm at angles.

3.9 Cavity Walls

Cavity walls, unless otherwise specified, shall be built with two half brick thicknesses of brickwork in stretcher bond with 50 mm cavity between, and the two thicknesses tied together with 200 mm long metal wall ties of the butterfly type, spaced at not more than 1 m centres alternately to every third course of brickwork.

Unless otherwise specified, the brickwork shall be built in 4:1 cement mortar.

The cavities shall be carried up from one course of brickwork below damp course level up to two courses below wall plate level, unless otherwise shown or specified. The brickwork above cavities shall be built solid, and where 270 mm thick shall be cut and well bonded where possible. Cavities in foundation walls of cavity walls shall be filled with Grade 15 MPa/19 mm up to 150 mm below the damp-proof course level.

The cavities shall be kept free of all rubbish, mortar droppings and projecting mortar.

The tops of walls shall be covered with planks or sacking during wet weather to prevent rain from entering the cavities.

The cavities shall not be ventilated.

At door, windows and other openings, the cavities shall be stopped 110 mm back from jambs of openings with the inner thickness of brickwork returned and stopped against the outer thickness and not bonded to same. A 110 mm wide strip of damp-proof sheeting as described for damp-proof course in clause 3.15 shall be built in between the two thicknesses in the joint formed by the return and the outer thickness. The damp-proof strip shall be lapped at least 50 mm on to the sheeting between the two thicknesses of sills and between the two thicknesses of lintels.

Sills to windows shall be divided into external and internal thicknesses with strips of damp-proof sheeting as above, built in line with the damp-proof sheeting in jambs and extending 100 mm beyond the jambs of openings.

The lintels shall be provided with damp-proof sheeting as described under lintels.

Unless otherwise specified, cavities shall be stopped one course below and one course above and 110 mm from sides of openings for air bricks and the like.

3.10 Reinforced Brick Lintels

Reinforced brick lintels shall be built with sound machine made bricks, in 3:1 cement mortar, with all vertical and horizontal joints filled solid with mortar throughout the required number of courses and to a distance of at least 330 mm on either side of the clear opening.

The number of courses in lintels over the various size openings shall be as specified in table hereunder, and reinforcing steel wires or rods shall be built into the first horizontal joint over the bottom course as laid down therein, viz.:

LINTEL SPAN	NUMBER OF COURSES	REINFORCEMENT
Not exceeding 1 m	4	One row of 75 mm wide brick reinforcement for each half brick width soffit.
Over 1 m tot 1,5 m	6	One row of 75 mm wide brick reinforcement for each half brick width soffit.
Over 1,5 m tot 2,1 m	7	Three 6,3 mm diameter mild steel rods for each half brick width of soffit.

The reinforcing wires and rods shall be of length at least equal to the width of the clear opening plus 330 mm at each end. The reinforcement shall be evenly spaced in the brick joints, with the outer wires or rods having at least 20 mm cover from face of brickwork.

Brick lintels in 270 mm thick cavity walls shall be built in two half brick thicknesses in stretcher bond, with inner face of outer thickness for a depth of three courses above soffit, covered with sheeting as for damp-proof course, the full length of lintels, and space between the two thicknesses for the depth of the sheeting filled in solid with Grade 15 MPa/19 mm concrete. Where cavities continue above lintels, the sheeting shall be taken up and turned on to top of first course of brickwork to inner thickness of wall, above the concrete filling in lintels.

The lintels, except where built over pressed steel door frames and the like, shall be supported on temporary formwork left in position for at least fourteen (14) days.

3.11 Beam Filling

Beam filling, unless otherwise specified, shall be half brick thick, built in similar mortar as used in the walls below, cut in between roof timbers and carried hard up to underside of roof covering, and flushed up in mortar.

3.12 Bagged Finish To Brickwork

Bagged finish to brickwork, if done whilst the mortar in joints is still soft, shall be formed by rubbing over the wall surfaces with wet rough sacking, until all joints and crevices are filled up and an even surface is obtained. Mortar, as used for building the brickwork, shall be added as may be necessary.

If bagging to walls is done after the mortar in joints has set the wall surfaces shall be rubbed over with wet rough sacking as above, but cement grout shall be added as necessary to fill up the joints and crevices and to obtain an even surface.

3.13 Building In Inbrick Work

Ends of timbers, hold-fasts, cramps, gratings, air bricks, dowels, etc., shall be built-in in cement mortar.

Door and window frames and the like shall be set up in positions for building in and securely strutted to prevent distortion whilst the brickwork, lintels, etc., are being built.

Pressed steel door frames shall be grouted in solid at back with cement mortar as the work proceeds.

Wood slips, fixing bricks, hoop iron, roof ties, etc., shall be built in as the work proceeds.

Ventilators shall be built into openings formed in the walls, in 3:1 cement mortar, and grouted in solid with similar mortar and wall finishes made good if disturbed.

Wood frames to doors, windows, etc., shall be set up in position for building in as described and built in as the work proceeds with cramps to jambs of 1,6 mm thick galvanised hoop iron, 32 mm wide, with ends turned 50 mm up against stiles of frames and each twice screwed to frame, and built 450 mm into wall with end turned up into brickwork joint. Cramps shall be built in approximately 0,3 m up from bottom and approximately 0,3 m down from head of frames and intermediately at not exceeding 0,85 m apart. No frame shall have less than two cramps to each jamb irrespective of height.

Cramps to frames in 270 mm thick cavity walls shall be cranked as necessary and built into inner and outer thicknesses of walls alternately.

The stiles of wood door frames, and similar frames not having sills framed in, shall be doweled to concrete, brick, stone and similar thresholds with 10 mm diameter mild steel dowels 75 mm long, one to each stile.

3.14 Securing Of Roofs

Roof trusses shall be fixed at each support to walls with ties of 1,2 mm thick galvanised hoop iron, 30 mm wide, built 750 mm deep into brickwork or embedded 300 mm deep into concrete or wrapped around bottom layer of reinforcing in a reinforced concrete beam and, unless otherwise specified, wrapped over truss and fixed with four galvanised nails, 60 mm long and taken up to and lapped round the nearest purlin and well spiked thereto.

3.15 Bedding And Pointing

All door, window and similar frames shall be bedded and pointed in 3:1 cement mortar. All wall plates shall be set true and level and bedded in 4:1 cement mortar.

Steel door and window frames shall be carefully pointed all round and made perfectly watertight.

Where steel door and window frames are specified to be pointed with mastic compound they shall be pointed all round externally with an approved waterproof compound, of such composition that it will not stain surrounding surfaces, and that it will adhere tenaciously, remain plastic without sagging or running, be capable of accommodating any normal movement of the joint sealed, and will receive paint without "bleeding". The pointing material shall be forced into the joints, which shall have been previously prepared to receive same, by means of a pressure gun, or by other suitable method, all in accordance with the manufacturer's instructions.

3.16 Faced Brickwork

Faced brickwork shall be built fair and the joints shall be square recessed to a depth of approximately 6 mm, formed with a square jointing tool well pressed into the joints as the work proceeds.

The Contractor shall construct a test section of 10 m^2 which shall be approved by the Engineer, before continuing with faced brickwork.

Face bricks shall be sorted by the brick manufacturer at his yard or by the Contractor on the site, to ensure that proper mixing of the bricks within the colour range of each type of facing brick being used is obtained; sudden changes in the general colour of face work in any one type of facing brick will not be acceptable.

Sand in mortar for all faced brickwork shall all be from one source.

Faced brickwork shall be kept perfectly clean and rubbing down of the brickwork shall not be allowed. Scaffold boards shall be turned back during rain to avoid splashing. Soiled brickwork shall be cleaned at the Contractor's expense, and the cleaning method shall be approved by the Engineer.

3.17 Fibre Cement Sills

Sills shall be in single lengths cut between reveals, fitted with fixing lugs and solidly bedded in 3:1 cement mortar with a slight projection beyond the finished wall face below.

Internal sills shall be level. External sills shall be set sloping on cut brickwork or on fine concrete filling under.

3.18 Laying Of Quarry Tiles

Joints to paving shall be continuous in both directions.

Tiles shall be solidly bedded and jointed in 3:1 cement mortar with joints, unless otherwise specified, 6 mm wide and slightly pointed with a round jointing tool. Tiles shall be well soaked in water before fixing and thoroughly cleaned off after fixing.

Tiles in sills, copings, etc., shall be set with slight projection over finished wall face, and where full tiles do not fit into the length, two cut tiles shall be used, symmetrically placed as directed.

3.19 Installation Of Electrical Service

The Contractor shall embed in the concrete and/or brickwork, as the work proceeds, all conduits, boxes, etc., which will be fixed in position by the electricians, and must cut all necessary chases and holes in walls for conduits and form recesses in walls for distribution boards, all in the positions directed, notwithstanding whether the installation of the electrical service is carried out by the Contractor or under a separate contract. Alternatively, distribution boards may be built into walls as the work proceeds, providing prior approval is obtained from the Engineer.

The Contractor shall afford every facility and shall render reasonable assistance to the electricians in carrying out their work, and shall make good where necessary, in all trades, after installation has been completed.

3.20 Installation Of Mechanical Equipment

Where the installation of mechanical equipment is carried out under a separate contract the Contractor shall arrange for the building in of special fittings, leaving holes and openings or forming chases in floors, walls, etc., for pipes, cables etc., and for the building in of pipes, sleeves, pipe clips, bolts, etc., as required or directed.

All cutting of holes through finished floors, walls, etc., after the concrete or mortar has set, must be avoided as far as possible, and the Contractor must give ample notice to the Engineer who will ascertain the exact positions where pipe sleeves, pipes, pipe clips, etc., are to be built in.

3.21 Protect And Clean Down Brickwork, Etc.

Angles of face brickwork, reveals, steps, etc., liable to damage shall be covered up and protected during the progress of the remaining work, and any damage done shall be made good at the Contractor's expense and to the satisfaction of the Engineer.

Face brickwork and brick and tile sills, copings, etc., shall be cleaned down as the work proceeds, and surfaces liable to be soiled by mortar or plaster splashes during the progress of the remaining work shall be covered with paper, pasted on, or by other approved means. At completion of the works the coverings shall be removed and the surfaces again cleaned down to the satisfaction of the Engineer.

Any detergent or other materials used in the cleaning down of face brickwork, etc., shall be of such nature that will not harm adjoining paint and other finishings in any way.

All tile and other pavings shall be thoroughly cleaned off after laying to remove all traces of mortar and other substances, covered up and protected from damage during the progress of the works, and again cleaned off at completion.

3.22 TILER

3.23 Laying Of Glazed Ceramic Wall Tiles

The tiles shall be fixed direct to walls in 3:1 cement mortar with horizontal and vertical joints continuous, and shall have all joints rubbed in solid with neat white cement grout. Tiles shall be well soaked in water before fixing and thoroughly cleaned off after fixing.

Unless otherwise specified, the wall tiling shall project approximately 4 mm beyond face of adjoining plaster with all exposed edges finished with glazed rounded edge tiles.

Tiling shall be returned into reveals of openings and on to window sills, and shall be butted at internal angles and provided with glazed rounded edged tiles to external angles, unless otherwise specified.

All necessary cutting to tiles shall be properly performed.

Walls shall be well wetted before tiling is commenced.

3.24 Laying Of Ceramic Floor Tiles

Ceramic tiles shall be bedded to a true and even surface on 3:1 cement mortar and with joints not exceeding 2 mm wide.After the tiles have been allowed to set for a

period of not less than twenty four hours the joints shall be grouted in to with approved epoxy compound, or acid proof cement mortar.

3.25 PLASTERER AND PAVIOR

3.26 Cement Plaster

Cement plaster for one coat work on walls shall be composed of four parts of sand and one part of cement for internal work, and five parts of sand and one part of cement for external work, all by volume, and mixed as described for cement mortar in clause 5.1.1.

Cement plaster on concrete surfaces shall be composed of three parts by volume of sand and one part by volume of cement.

3.27 Forming Key To Concrete For Plaster Finish

All surfaces of concrete receiving plaster, or similar finishings, shall be well wetted and wire brushed immediately after the formwork is removed and slushed over with 2:1 cement grout to form key for the finish, to the approval of the Engineer. The slushing to be allowed to set hard before the finish is applied.

Other methods may be used if approved by the Engineer.

Particular care shall be taken in forming the key for plaster where steel shuttering is used, and if considered necessary the surface of the concrete shall be hacked.

3.28 Thickness Of Plaster

Plaster on walls shall be not less than 12 mm or more than 20 mm in thickness, and plaster on concrete ceilings and beams shall be not less than 9 mm or more than 16 mm in thickness, unless otherwise specified.

3.29 Application Of Plaster

Walls shall be well wetted before plastering is commenced.

The surfaces of internal plaster shall be steel trowelled to a smooth, even and true finish. External plaster shall be finished to a true and even surface with a wood float. All plaster surfaces shall be free from blemish.

Plaster shall be returned into reveals and soffits of openings, and all angles shall be true and straight with salient angles slightly rounded.

The rendering coat of plaster in two coat work shall be approved by the Engineer before the setting coat is applied, and notice shall be given to the Engineer when it is ready for inspection.

All cracks, blisters and other defects shall be cut out and made good and the whole left perfect at completion.

NB – See clause 5.3.2 for forming key for plaster on concrete.

3.30 Normal Screeds To Floors

Concrete sub-floors finished with wood mosaic, vinyl sheeting and tiles, and similar finishings, shall be screeded with 3:1 cement mortar, of thickness required, but in no case less than 12 mm, and steel trowelled to a true and smooth surface suitable to receive finishings.

The screeding shall be laid before the concrete sub-floors have matured otherwise the exposed surfaces of concrete shall be thoroughly cleaned with a wire brush, and a coat of neat cement grout applied immediately before the screeding is laid.

The screeding shall be laid in good time to allow of it being perfectly dry when the finishings are laid.

No traffic shall pass over nor shall any building operations take place on the screeding without proper covering first being provided.

3.31 Granolithic Screeds

Granolithic screeds shall be composed of two parts by volume of cement and three parts by volume of aggregate with sufficient water added to obtain a consistency as dry as may be practicable. The screed shall be rendered with a wood float and struck off with a steel trowel after set has commenced.

Granolithic screeds to floors, treads of steps, thresholds, and similar horizontal surfaces unless otherwise specified, shall be not less than 25 mm thick. Granolithic screeds to stair risers, sides of kerbs, and other vertical surfaces, shall, unless otherwise specified, be not less than 20 mm thick. Exposed salient angles of granolithic screeds shall be neatly rounded to approximately 20 mm radius, unless otherwise specified.

The granolithic screeds shall be laid before the concrete sub-floor has matured otherwise the exposed surface of concrete shall be thoroughly cleaned with a wire brush, and a coat of neat cement grout applied immediately before the granolithic screed is laid.

The granolithic screeds shall be laid in panels not exceeding 9 m^2 in area, and joined to lines of panels and lined into smaller squares as directed with sunk V-joints. The joints between the panels shall coincide with joints in the concrete sub-floor where possible.

Where granolithic screed is to be tinted it shall be laid in two layers, a lower layer laid to within 6 mm of the finished level, and an upper layer into which the requisite quantity of approved colouring pigment shall have been mixed. **No dusting on of colouring material will be allowed.**

All granolithic work shall be done by experienced workmen, and shall be protected from injury caused by rain or other extreme weather for twelve hours after being laid, and against too rapid drying whilst hardening, by being covered with wet sacks, or other suitable material, and shall be protected from injury and discolouration during the progress of the remaining work.

Edges of granolithic floors butting against different floor finishings, and edges of margins, etc. shall be true and sharp, and shall be protected by fixing temporary wood strips, which shall remain, in position until the commencement of the laying of the adjoining flooring material.

3.32 Reedings To Steps, Etc.

The treads of granolithic finished steps and upper surfaces of granolithic finished external thresholds shall be rendered non-slip by reeding same near front edges for a width of 100 mm stopped 100 mm from ends.

3.33 Power Floated Finish

Power floated finish to floors etc., unless otherwise specified, shall be floated mechanically to smooth and even surfaces before the concrete has set. Small surfaces and inaccessible places to be floated by hand in a similar way. Under no circumstances is cement mortar to be added while floating the concrete.

3.34 Laying Of Concrete Paving Slabs And Paving Bricks

Concrete paving slabs and paving bricks shall be bedded and jointed on a layer of 30 mm clean dry river sand. Joints shall be 6 mm wide, continuous in both directions, filled solidly with 3:1 cement mortar and slightly pointed with a round jointing tool. Lengths in excess of 10 metres shall be provided with expansion joints.

3.35 WATERPROOFING

3.36 Damp-Proof Course In Walls

The damp-proof course shall be the full thickness of walls above foundations and shall be laid without longitudinal joints. At end joints, angles and intermediate junctions the sheeting shall be lapped 150 mm.

Where so specified all laps in the damp-proof course shall be sealed over the whole area of laps, to an approved method. Care shall be taken not to tear or otherwise damage the sheeting.

3.37 Damp-Proof Membrane

The damp-proof membrane under floors, etc., shall be laid in the widest practical widths to minimise joints and shall be turned up, dressed to load bearing walls and if applicable lapped with the damp-proof course in the walls. All joints shall be sealed with pressure sensitive tape applied over the leading edge of the joint.

3.38 Expansion Joints

Expansion joints shall be at least 10 mm wide and filled in with approved bitumen impregnated soft board or closed cell expanded polyethylene strip. Expansion joints shall be sealed with a two-component poly-sulphide joint sealer, 12 mm deep, according to instructions of the manufacturers.

3.39 CARPENTER **AND JOINER**

3.40 Protection **Of Timber On Site**

Timber stored on site shall be properly stacked when received, and adequately protected against extremes of weather and exposure to the sun, until required for use.

3.41 Wrought **Faces**

Exposed woodwork, unless otherwise specified, shall be wrought to a smooth surface, and properly sand-prepared to remove all machine or other tool marks.

For each wrought face on structural timber, an allowance will be made off the “nominal” dimensions specified or stated on the drawings, as follows:

(a) 2,5 mm for “nominal” dimensions up to and including 76 mm;

(b) 3,5 mm for “nominal” dimensions over 76 mm.

For each wrought face on joinery timber, an allowance will be made off the "nominal" dimensions specified or stated on the drawings, as follows:

(a) 3 mm for "nominal" dimensions up to and including 76 mm;

(b) 5 mm for "nominal" dimensions over 76 mm.

The above will be the nett allowances permitted off the "nominal" dimensions specified or stated on the drawings and will not be additional to the tolerances specified for sawn timbers.

All exposed angles of wrought woodwork, unless otherwise specified, shall be arris rounded. The term "arris rounded" denotes that the angles shall be rounded off to approximately 3 mm radius.

Angles of wrought woodwork specified to be angle rounded shall be rounded off to 6 mm radius, unless otherwise shown on the drawings, and shall include, in framed joinery, for housed and mitred joints.

3.42 Lengths Of Timbers And Methods Of Jointing

Plates, purlins, battens, laths, slats, etc., shall be in single lengths, but where this is not possible the end joints will be formed as described below. The jointing of plates, battens, etc. at junctions and angles shall also be formed as stated hereunder, viz:

(a) Wall plates shall be halved at joints and well spiked together, and also at junctions and angles;

(b) Purlins shall be splayed or spliced at joints and, unless otherwise specified, using timber side plates of the same dimensions as purlins, not less than 600 mm long and four times bolted with M10 mild steel bolts, with two washers each. Adjacent purlins shall not be splayed or spliced in the same bay or on the same rafter;

(c) Sawn battens, laths, slats, etc., shall be butt jointed at heading joints and angles, and wrought battens, laths, slats, etc., shall be splayed at heading joints and mitred at angles, all over points of support and where adjacent, shall not be jointed on the same rafter.

3.43 Joints In Roof Trusses

(a) The number of connecting devices to be used at each intersection between two members at any heel joint or any splice in a truss shall be determined from the following table:

SPAN m	3 (90 x mm) NAILS PLUS M10 BOLTS AS SPECIFIED BELOW	M16 BOLTS ONLY	50 mm TOOTHED RING CONNECTIONS
3	2	2	1
4	3	2	1
5	3	2	2
6	4	3	2
7	5	3	2
8	5	3	2
9	6	4	3
10	6	4	3

(b) In the case of any joint other than a heel joint or splice, one M10 bolt plus three 90 x 4 mm nails shall be used.

3.44 Prefabricated Roof Trusses

Prefabricated timber roof trusses shall be constructed of South African pine as described in clause 3.17 to the designs shown on the detail drawings. The timber shall be of cross-sectional dimensions shown, cut to correct lengths with ends square or cut to the required angle, and shall be assembled in truss fabricating jigs with the truss having the proper camber, and tightly clamped together and joints secured with approved connector plates of galvanised steel sheet, pressed into the timber simultaneously on both sides of the truss with hydraulic press capable of exerting such pressure as will ensure complete penetration of the teeth into the timber. The connector plates shall be of such size as will ensure that the joints so made will adequately withstand the forces exerted on the joints, and to have at least two coats Epoxy Tar finish for coastal areas.

3.45 Valleys In Roofs

Valleys in roofs covered with galvanised steel or fibre roofing sheets or with roofing tiles shall each be formed with two 228 mm x 25 mm sawn boards, spiked down to roof timbers, and purlins fixed along outer edges where in galvanised steel and fibre sheet covered roofs and battens along outer edges where in tile covered roofs.

3.46 Purlins

Unless otherwise specified, purlins shall be 50 mm x 76 mm and shall be securely nailed to roof timbers at not exceeding 1,14 m centres, ranging perfectly straight and square to the roof with but joints at heading joints and angles and in the case of wrought purlins splayed joints at heading joints and mitred joints at angles.

3.47 Brandering To Ceilings

The brandering shall be 38 mm x 38 mm, securely spiked up to the supporting timbers with 88 mm wire nails at 380 mm centre-to-centre. Cross brandering shall be cut in between the longitudinal brandering and securely skew nailed to same with 75 mm wire nails at joints in ceilings and at edges where required for fixing of cornices.

3.48 Steel Roofing Sheets

The sheets shall be secured to wood purlins with approved galvanised iron roofing screws each provided with a plastic or asphalt felt washer and a galvanised steel cup washer over the plastic or felt washer and secured to steel purlins with M6 galvanised hook bolts, provided with similar washers under nut.

Screws and bolts at ends of sheets and at end laps shall be spaced at not exceeding two corrugations apart wherever possible, but in no case more than three corrugations apart, and at intermediate purlins at not more than four corrugations apart; screws or bolts shall, in all cases, be provided in the outermost corrugations of the upper sheets.

All necessary cutting to sheets shall be properly performed. Cut edges at sides of valleys, and elsewhere exposed, shall be perfectly straight.

At exposed verges of roofs the iron shall be finished with neatly formed rolls.

The sheets shall have side laps of not less than one and a half corrugations. The minimum roof slopes and sheet end laps shall be, unless otherwise specified, as prescribed in Table 2 of Schedule 2 of Part L of the National Building Regulations and Building Standards Act, 1977.

3.49 Metal Ridging For Steel Covered Roofs

The ridging shall be 450 mm girth with roll top and bent down edges, and shall be lapped 225 mm at end joints, cut and properly lapped and fitted at intersections of ridges, hips and valleys, and close beaten into corrugations of roofing iron. Roll shall be closed at feet of hips and at end of ridging.

Ridging shall be fixed with screws to wood purlins and hook bolts to steel purlins, with washers under heads and nuts, respectively, all as described for fixing roofing sheets, and spaced at not exceeding 300 mm centres.

3.50 Fibre Cement Roofing Sheets

The sheets shall be mitre-cut at corners as necessary and laid with smooth surface on top, and shall be secured to wood purlins with 7 mm diameter galvanised drive screws not less than 114 mm long, and to steel purlins with M8 galvanised hook bolts, each provided with a plastic or asphalt felt washer and a galvanised steel cupped washer over the plastic or felt washer.

Screw and bolt holes in sheets shall be drilled (not punched), and shall be 0,2 mm larger than the diameter of screws and bolts.

The fixing screws, and nuts on fixing bolts, shall not be tightened more than is necessary for the holding down of the sheets and for the proper seating of the washer over the corrugations, so as to allow for slight movement between the sheets and the supporting structure. On no account shall sheets be deflected at the intermediate purlins in an attempt to make the sheets bear on such purlins.

The side laps of sheets shall be sheltered from the prevailing wind by laying the sheets from left to right, or from right to left, depending on the direction of the prevailing wind, the sheets being laid in the opposite direction to that of the wind.

All necessary cutting to sheets shall be properly performed. Cut edges at sides of valleys, and elsewhere where exposed, shall be perfectly straight.

The minimum roof slopes and sheet end laps shall be, unless otherwise specified, as prescribed in Table 1 of Schedule 2 of Part L of the National Building Regulations and Building Standards Act, 1977.

The manufacturer's instructions regarding laying and fixing of sheets, including side laps, mitring of corners and spacing of screws or bolts, shall be followed in all cases.

One month after fixing, the roof covering shall be thoroughly examined, any defects made good and loose screws or bolts tightened.

Roof boards shall be used by all workmen for safety and to avoid damage to the sheeting.

3.51 Adjustable Fibre Cement Ridging

The ridging shall be secured to wood purlins with screws and to steel purlins with hook bolts, passed through the roofing sheets, and provided with plastic or felt and steel washers, all as described for fixing fibre cement roofing sheets.

The manufacturer's instructions regarding laying and fixing of the ridging, including spacing of screws or bolts, shall be followed in all cases.

3.52 Fascias And Barge Boards

Fascias and barge boards of pressed fibre cement boards shall be butt jointed with 75 mm wide x 3 mm thick galvanised steel plates four times bolted with M6 galvanised bolts over joints.

3.53 Fibre Cement Flashings

Fibre cement flashings shall be secured to wood purlins with screws and to steel purlins with hook bolts, passed through the roofing sheets, and provided with plastic or felt and galvanised steel cupped washers, all as described for fixing fibre cement roofing sheets.

The manufacturer's instructions regarding fixing of the flashings, including spacing of screws or bolts shall be strictly adhered to.

3.54 Fibre Cement Gutters

Fibre cement gutters shall be bedded in approved bituminous mastic compound and secured with M6 galvanised gutter bolts with heads of bolts on inside of gutters and each bolt provided with asphaltic felt and galvanised steel washer under head and nut, all in accordance with the manufacturer's instructions. The inside surfaces of sockets and the outside surfaces of spigot ends shall be coated with a thin solution of bitumen to enable the compound to adhere fast when applied, and surfaces of washers in contact with each other and with gutters hall be coated with bitumen. After tightening the bolts, all surplus compounds from the joints shall be removed, and the joints externally finished with neatly trowelled fillets of 2:1 cement mortar.

The spigot ends of gutters shall be lapped on to the socket ends in the direction of the flow wherever possible.

The gutters shall be fixed with proper falls on gutter brackets of the fascia type where fixed to fascia boards and of the purlin type where fixed to purlins. Brackets shall be securely screwed to the roof timbers, at not exceeding 1 m centres, and with extra brackets at angles and outlets.

Gutters shall be provided with all necessary angles, stopped ends, outlet nozzles, etc., jointed to gutters as described above.

3.55 Fibre Cement Rainwater Down Pipes

Fibre cement rainwater downpipes shall be jointed with tarred hemp rope gasket caulked into each joint, and the joint filled with a suitable bitumen compound and finished off with neatly trowelled fillet of 2:1 cement mortar.

The pipes shall be fixed to walls with holderbats, bolted around pipes immediately below the socket, and with tails builds into walls in 3:1 cement mortar.

Rainwater downpipes shall be provided with all necessary swan necks, branch pieces, plinth bends, radius bends, shoes, etc., jointed to pipes as described above.

3.56 Concrete Roofing Tiles

Tiling shall be "straight or broken bond", and vertical joints between tiles and bottom edge of each course of tiles shall range perfectly straight. Unless otherwise specified, interlocking tiles shall be laid to a lap of at least 100 mm and plain tiles to a lap of at least 62 mm.

Half tiles in the case of interlocking tiles, and tile and a half in the case of plain tiles, shall be provided as required at abutments and at verges of roofs. Plain tile roofs shall be provided with double course at eaves.

Unless otherwise specified, each tile in every third course in the case of interlocking tiles, and in every fifth course in the case of plain tiles; all tiles in eaves courses and ridge courses; end tiles in every course at each side of hips and valleys; all tiles adjoining bonnet hip tiles in plain tile roofs; half tiles, full tiles and tile and a half at verges, and all tiles to open eaves and open overhanging verges, shall be fixed to the battens with galvanised nails of such length as will penetrate the battens to a depth of at least 25 mm.

Tiling shall be carefully cut and dressed at hips and valleys and, where necessary at abutments, etc. Mitred portions of tiles at hips and valleys shall be holed and properly secured.

Hip and ridge tiles for interlocking tile roofs shall be socketed V-type, shall match general tiling, and shall be bedded solid in 3:1 cement mortar with strip of approved bituminous sheeting laid under the mortar bedding, of such width as will give a lap of at least 25 mm on to the roof tiling at each side, and lapped not less than 75 mm at end joints. Socketed joints of hip and ridge tiles shall be bedded in mortar as above and pointed with neatly recessed joints, and hip iron of 25 mm x 4,5 mm mild steel 300 mm long, suitably bent, twice holed and securely nailed to hip rafter, shall be provided at foot of each hip. The mortar bedding shall be trowelled smooth at open ends of ridges.

Ridge tiles for plain tile roofs shall be as above but half-round and but jointed and neatly pointed in tinted 3:1 cement mortar, and hip tiles shall be round pattern bonnet type, to course and bond in with general tiling, and with each tile bedded and neatly pointed in mortar as above and nailed to hip rafter with galvanised nail.

Hip and ridge tiles shall be neatly cut and fitted together at junctions between ridges and hips or valleys, and shall be bedded solid and neatly pointed in tinted 3:1 cement mortar with approved bituminous sheeting under the mortar bedding, cut to shape required and with lap of 25 mm on to the roof tiling.

3.57 Covering To Ceilings

(a) **Gypsum plasterboard ceilings with plaster finish**

The ceiling boards shall be in 900 mm or 1 200 m widths, with board at ends of ceilings of widths required to suit length of ceilings. Ceiling board shall be in single lengths to the width of ceilings wherever possible.

The boarding shall be nailed to the brandering, with GREY surface to underside, with 2 mm diameter galvanised or cadmium plated clout headed nails, 38 mm long, spaced at not more than 100 mm apart at edges of boards and 150 mm apart along the intermediate brandering.

The joints between boards shall be loose butt joints and covered with wire gauze strips nailed through the boarding to the brandering at 400 mm centres with 38 mm galvanised clout headed nails.

The bonding plaster shall be applied in two layers by the trowel-float-method to a total thickness of not less than 6 mm, and well pressed into the wire scrim over the joints between the ceiling boards, and finished smooth, even and true.

(b) **Fibre cellulose board ceilings**

The ceiling boards shall be in the same widths, and fixed as specified for gypsum plasterboard ceilings in paragraph (a).

The joints between the boards shall be covered with 25 mm half-round wood cover beads fixed with 38 mm long nails spaced at not exceeding 300 mm.

3.58 Cove Cornices To Ceilings

(a) **Gypsum plasterboard cornices**

Cove gypsum plasterboard cornices shall be nailed through the ceiling boards to the brandering and to wall plugs, at not exceeding 200 mm centres, with 2 mm diameter galvanised or cadmium plated clout headed nails, 38 mm long, or fixed to walls with hardened steel nails driven into the brickwork.

Cornices shall be scribed at internal angles and mitred at external angles and shall be in long lengths with splayed heading joints where necessary.

(b) **Timber cornices**

Scotia's shall be fixed to walls with hardened steel nails driven into the brick-work.

Trapdoors In Ceilings

Openings for trapdoors in ceilings shall be formed with 38 mm x 38 mm brandering all around each opening, spiked together and to bottom edge of the supporting timbers. Size of opening, unless otherwise specified, shall be 650 mm x 650 mm.

Trapdoor shall be formed with skeleton frame of 50 mm x 38 mm brandering, covered on underside with boarding as for ceiling, and hung on a pair of 75 mm steel butts and fitted on underside near closing edge with 100 mm brass bow handle. Soffit of trapdoor shall be flush with soffit of ceiling when closed, and trapdoor shall flap back on to top of the brandering, between tie beams or ceiling joists when open.

When trapdoor is closed it shall rest on 50 mm x 19 mm fillets, fixed on soffit of ceiling all around opening, mitred at angles and securely screwed up to the trimmers. Fillets shall project 12 mm into the opening to carry the trapdoor.

Trapdoors larger than 650 mm x 650 mm shall each be provided with 38 mm x 38 mm brandering across centre, spiked to the skeleton frame.

3.59 Ceiling Insulation

Ceilings shall be insulated, where so specified, with approved resin bonded or stitched fibre glass or mineral wool insulation blanket 38 mm thick, cut to size and laid over brandering between ceiling joists and tie beams, etc.

Where insulation is to be in two thicknesses a total thickness of 76 mm is required and the joints shall be staggered.

3.60 Framed Joinery

Where the word "Framed" is used it is to include for all mortice and tenon joints, dovetail joints, grooves, stop grooves, rebates, stop rebates, housings, notchings, etc., including housing ends of shelves, divisions, etc.

3.61 Joinery

Joinery work shall be put in hand immediately after the order has been given to commence work, or after the receipt of detail, where such are to be supplied, and shall not be wedged or glued up until just before fixing in the building.

No framed joinery for services situated inland shall be manufactured in the humid coastal belt, and no framed joinery for the services situated in the coastal belt shall be manufactured inland. This applies to both purpose made and stock joinery.

All exposed softwood timber in joinery which is not to be painted shall be free from large, loose or dead knots, knot holes, checks, splints, wane or other defects, and in joinery which is to be painted shall be free from all defects other than those which can be filled or otherwise made good in such a way as will not impair the paint finish. All exposed hardwood joinery timber shall be free from all knots, knot holes, checks, splints or other defects and, unless otherwise specified, shall also be free of sapwood.

Purpose made joinery shall be manufactured strictly in accordance with detail drawings.

Stock joinery shall be of approved quality. Joinery shall not be primed until it has been inspected and approved.

Skirting, rails and the like shall be in long lengths. Heading joints where necessary shall be splayed. Counter tops, table tops, drainers, and the like, shall be formed with wide boards, jointed with grooved, cross-tongued and glued joints or with grooved rebated and glued joints of approved type; cross-tongues shall be stopped 25 mm back from ends where ends are exposed to view. The boards shall be in single lengths to top, etc., but where this is not possible the heading joints shall be staggered and jointed as above.

Skirting, rails, angle moulds and beadings of all kinds, shall be close fitted, mitred or scribed at angles, and securely fixed; skirtings, rails and the like shall be fixed with hardened steel or other suitable nails driven into the brickwork or shall be nailed to wall plugs spaced at not more than 700 mm apart. Glazing beads and the like shall be mitred at angles and, unless otherwise specified, shall be fixed with panel pins.

3.62 METALWORK

3.63 Manufactured Steelwork Generally

Welding is to be done electrically in the most up to date manner by skilled workmen and cleaned off on completion.

All welds are to be welded with welding rods of the same chemical composition as the tubes, rods, bars, etc., to be welded and all external welds are to be filed clean and smooth.

Welding to be continuous fillet welding to all exposed edges unless otherwise described.

No scaffolding shall be allowed to rest on or fixed to steel windows, doors, frames, etc., in any way.

3.64 RESILIENT FLOOR FINISHINGS

3.65 Laying And Fixing

Vinyl sheeting and tiles and such like floor finishings shall be laid in strict accordance with the manufacturer's instructions, on a perfectly dry and clean screeded surface, using an adhesive supplied or recommended by the manufacturer of the flooring material, and rolled with a suitable roller to ensure complete adhesion of the material. The flooring shall be cut where required and neatly fitted against adjoining floors, thresholds, etc. Vinyl skirtings shall be close fitted to floors and walls, butted at end joints, neatly mitred at internal angles and dressed round external angles, and fixed with adhesive as for flooring.

Unless otherwise described, sheet flooring shall be in standard widths with cut sheets at sides of floors as necessary.

3.66 GLAZIER

3.67 Fixing Of Glass

Glass fixed with glazing beads in unpainted hardwood doors shall be bedded on strips of rubber, velvet, leather, or felt turned over on to both sides of glass in the rebates to form a soft packing between the glass and the woodwork. In all other cases the glass shall be well bedded in back putty in the rebates.

Glass rebates, other than in unpainted hardwood doors, shall be primed before glazing.

Glass panes exceeding 0,5 m^2 in surface area and fixed with putty only in wood doors, sashes and the like shall be secured in addition with glazing sprigs, and in steel windows and doors with glazing pegs or clips inserted in holes in the steel framing.

Glass panes shall have adequate clearance between the edges of glass and the rebates.

Putty shall be carefully trimmed and cleaned off with front putty worked to within 3 mm of the sight lines.

3.68 PAINTER

3.69 Preparatory Work

(a) **General**

All floors must be swept clean and walls dusted down, and surfaces not being painted such as face brickwork, sills, floors and stained woodwork covered up and protected against spotting, before any painting is commenced.

No sweeping or dusting shall be done whilst painting is in progress or whilst paint is still wet.

(b) **On woodwork**

Woodwork being painted shall be well brushed down, knots treated with knotting, and all surfaces primed, stopped with hard stopping and rubbed down to an even surface ready to receive the paint.

Woodwork being oiled or stained shall have all plaster stains, pencil marks and other surface discolourations and blemishes carefully removed, and stopped with tinted stopping and well rubbed down.

(c) **On metalwork**

All metal surfaces being painted, except steel structures shall be cleaned of all rust, scale and dirt by scraping or by means of steel wire brushes; also all oil and grease shall be removed and a perfectly clean surface obtained. If necessary the surface shall be decreased immediately before applying the priming coat, by the use of a suitable grease-removing solvent; any salt deposits on the metal surfaces as may occur in industrial and marine atmospheres shall be removed by the use of a suitable detergent and the surface then thoroughly rinsed and allowed to dry.

New galvanised metal surfaces and surfaces of all non-ferrous metals, which are to be painted, shall be cleaned down as above and given one coat of wash primer (metal etch primer).

Protective coatings on new galvanised metal surfaces, applied by the manufacturers to prevent storage stain and white rust, shall be completely removed by the use of a suitable cleaning agent and the surfaces thoroughly rinsed and allowed to dry, before the surfaces are primed or painted.

After cleaning off rust on metalwork those portions so affected shall be treated with an approved rust inhibitor.

(d) **On plaster**

All plastered wall, ceiling and such like surfaces being painted or distempered shall be filled where necessary with suitable stopping or patching plaster and the whole rubbed down ready to receive the finishings.

(e) **On ceilings**

Boarded ceilings, cover strips and cornices being painted or distempered, shall be filled where necessary with suitable stopping and all nail heads in ceilings, cover strips and cornices being distempered shall be primed with flat paint.

3.70 Surfaces To Be Dry

All plastered wall, ceiling and similar surfaces shall be perfectly dry and in a fit state to receive the finishings, before the work is put in hand.

3.71 Priming

Wood, metal and other surfaces normally primed before being painted shall be prepared and primed as before described in readiness to receive the specified paint system.

Backs of wood door and similar frames and surfaces of other new or re-fixed joinery in contact with brickwork, etc., and built in as the work proceeds, shall be primed before building in whether the articles are to be painted or not, to prevent moisture seeping into the wood from the mortar bedding.

Wood surfaces shall be knotted, primed and stopped before being coated with emulsion paint or distemper.

Tongued and grooved and rebated edges of boards in batten doors, and other suchlike inaccessible parts of joinery shall, before the joinery is assembled, be primed or where the joinery is to receive a finish other than paint, be given one coat of such other finishing material.

Priming to external structural timbers shall be applied before the timbers are fixed in position and shall include all wrought surfaces, such as backs of fascia and barge boards.

3.72 Application Of Paint

All coats of paint shall be thoroughly dry before subsequent coats are applied and rubbed down where necessary.

All work shall be finished to colour approved by the Engineer. The tints of undercoats shall approximate those of the finishing colour and in order to indicate the number of coats applied and to avoid misses when applying a succeeding coat, a slight difference shall be made in tint of each coat.

Priming on wood surfaces shall be by brush application. Priming on surfaces other than wood shall be by brush application or if in the opinion of the Engineer, the primer and the surfaces are considered suitable for roller application, the primer may be so applied. Priming applied by brush application shall be well brushed in to obtain maximum penetration.

Undercoat and finishing coats may be applied by brush or roller.

The use of spray gun on site for application of paint will not be permitted, except in the case of cellulose and other special cases where spraying is the accepted method of application; in cases where spraying is permitted all surrounding surfaces shall be properly masked.

The finishing coat on woodwork and metalwork, unless otherwise specified, shall be of high gloss paint. All materials shall be used in strict accordance with the manufacturer's instructions.

3.73 PROTECTION AND CLEANING OF WORKS

The Contractor shall provide all necessary dust sheets, covers, etc., and shall exercise all necessary care to prevent marking surfaces of walls, floors, ceilings, glass, electrical fittings, etc., and shall keep all parts of the works perfectly clean and free at all times from spotting, accumulation of rubbish, debris or dirt arising from the operations. Any surface disfigured or otherwise damaged shall be completely renovated or replaced as necessary, to the Engineer's approval, by the Contractor at his own expense.

The Contractor shall test all doors, fanlights and windows and all other fittings for proper operation and effect the required rectification prior to the handing over of the building.

The premises shall be left clean and fit for occupation at the completion of the work.

TOLERANCES

3.74 BASIS OF MEASUREMENT

3.75 General

Permissible deviations will apply in the case of linear dimensions, position, and level. The Contractor shall construct each of the various parts of the works within the limits of the applicable permissible deviations set out in clause 6.2 unless some other degree of accuracy is required in terms of the project specification or is shown on the drawings.

3.76 Methods Of Measurement Of Deviations

Certain deviations will be measured as set out below:

(a) Any deviation from flatness of a plane surface, will be measured as the maximum deviation of the surface from any straight line of length 3 m joining two points on the surface, determined by means of a straight edge the ends of which are supported on identical blocks of suitable thickness placed one over each of the points.

(b) Any abrupt change in a continuous surface, including a local depression or peak in a floor or wall, will be measured as specified in (a) above.

(c) Out-of-squareness of a corner or an opening or an element such as a column will be measured by taking the longer of two adjacent sides as the base line, and determining any departure from the perpendicular of the side at either end of this base line.

3.77 PERMISSIBLE DEVIATIONS

The permissible deviations for elements or components shall be as follows:

(a) Position on plan of any edge or surface measured from the nearest grid line or agreed centre line ± 25 mm

(b) Linear (other than cross-section) dimensions ± 30 mm

(c) Cross-section dimensions -10 + 20 mm

(d) Level (deviation from designed level with reference to the nearest transferred datum (TD) of the upper or lower surface, as may be specified, of any slab or other element or component) ± 10 mm

(e) Out-of-squareness of a corner or an opening or an element such as a column (See clause 6.1.2©) for short side of length:

(i) up to and including 0,5 m ± 5 mm

(ii) over 0,5 m up to and including 2 m ± 15 mm

(iii) over 2 m up to and including 4 m ± 20 mm

(f) Exposed surface (including floor slabs and paving):

(i) Flatness of plane surface…….. ± 5 mm

(ii) Abrupt changes in a continuous surface …… ± 5 mm

(g) Exposed surface to be plastered or receive normal or granolithic screeds:

(i) Flatness of plane surface……..± 10 mm

(ii) Abrupt changes in a continuous surface …… ± 5 mm

(h) Surface of plaster and normal or granolithic screeds …… ± 5 mm

TESTS

3.78 GENERAL

The Engineer shall have free access to the works for taking samples and carrying out tests. The Contractor shall render any assistance necessary. If so required, the Contractor shall provide storage and protection of such samples on site.

MEASUREMENT AND PAYMENT

3.79 GENERAL

All items in this section will be measured by number, square metre or linear metre completed and the tendered rates shall include full compensation for the supply, delivery, handling and installation of all materials, the provision of all necessary labour and supervision, transport, plant, equipment and incidentals necessary to complete, protect and maintain the works as specified or as shown on the drawings.

Where a lump sum is required for a complete structure the tendered rate shall include all items and contingencies, as specified in this section or as shown on the drawings.

3.80 SCHEDULED ITEMS

3.81 Brickwork……..….Unit : m2

Brickwork will be measured on the centre line of the walls. Areas occupied in walls by windows and doors will be excluded from the areas measured, and corners and intersections common to more than one brick wall will be measured once only.

The rate shall cover the cost of the brickwork complete as specified, including test sections where specified, pointing, providing brick lintels, brick reinforcement and ties, etc., the building in of conduits, beams, pipe sleeves, doors and windows, the ranking out of joints and the filling of cavities in cavity walls and walls constructed of hollow concrete masonry units, below floor level and elsewhere where specified,

The test section for faced brickwork as specified in clause 5.1.14 shall only be paid for if approved by the Engineer and, if rejected, shall be removed at the Contractor's expense.

3.82 Air Bricks

(a) External air bricks Unit : No

(b) Internal air bricks Unit : No

The rate shall cover the cost of providing and building in the air bricks as specified.

3.83 Bagged Finish To Brickwork……Unit : m2

The rate shall cover the cost of providing rough sacking, additional cement grout as required and finishing the bagging as specified.

3.84 Window Sills

(a) External (describe) …… Unit : m

(b) Internal (describe) Unit : m

The rate shall cover the cost of providing and building in face bricks, fibre cement sheets or any other material prescribed, as well as all accessories specified.

3.85 Tiling …….. Unit : m2

The rate shall cover the cost of providing all material and the laying and grouting of tiles, complete as specified.

3.86 Plaster Work …….. ……Unit : m2

The rate shall cover the cost of the construction of the plaster work, including the supply of all materials, mixing, applying, finishing, forming reveals, joints, etc., complete as specified.

3.87 Floor Screeds

(a) Normal screeds …….. Unit : m2

(b) Granolithic screeds …… Unit : m2

The rate shall cover the cost of the construction of the floor screeds, including the supply of all materials, mixing, laying, finishing, the forming of nosings, reedings, skirtings, etc. and, where the concrete sub-floor has matured, of the brushing and applying a cement grout, complete as specified.

3.88 Paving……..... Unit : m2

The rate shall cover the cost of providing paving slabs or bricks, sand bedding and joint filling and expansion joint material and of constructing the paving.

3.89 Waterproofing

(a) Damp-proof course in walls …… Unit : m

(b) Damp-proof membrane under floors …… Unit : m^2

The unit shall be the net length or area of waterproofing installed. The length or area of overlaps shall not be measured for payment.

The rate shall cover the cost of providing and laying all material as specified, including the sealing of all laps and joints, complete as specified.

3.90 Expansion Joints ……Unit : m

The rate shall cover the cost of providing and installing all filling and sealing material and of the forming of expansion joints, complete as specified.

3.91 Structural Timber

(a) Wall plates (indicate size) …… Unit : m

(b) Beams (indicate size) ……...Unit : m

(c) Joists (indicate size) …….. Unit : m

(d) Rafters (indicate size) ……..…… Unit : m

(e) Purlins (indicate size) ……...Unit : m

(f) Brandering (indicate size) ……Unit : m

(g) Roof trusses complete (indicate drawing number) …… Unit : No

The rate shall cover the cost of the supply of all materials, manufacture, cutting, waste, laps, joints and fixing of the timber as indicated, including nails, bolts, nuts, washers, hoop irons, ties and other fixtures required, complete as specified.

3.92 Roof Covering……Unit : m2

The rate shall cover the cost of providing and fixing all roof covering material as prescribed, including all flashings, soakers, valleys, ridge coverings, roofing screws and all other fixtures required to complete the work, as specified.

3.93 Fascias And Barge Boards……..Unit : m

The rate shall cover the cost of providing and fixing of all material, fixtures, screws, bolts, nuts, washers and other accessories required to complete the work, as specified.

3.94 Gutters And Rainwater Down pipes

(a) Gutters ……...Unit : m

(b) Rainwater downpipes……... Unit : No

The rate shall cover the cost of supply and building in of all material including angles, stopped ends, outlet nozzles, gutters, gutter brackets, etc. for gutters and swan necks, branch pieces, plinth bends, radius bends, shoes, brackets, etc. for rainwater downpipes, including all bolts and sealants, complete as specified.

3.95 Ceilings

(a) Ceilings …… Unit : m^2

(b) Cornices to ceilings …….. Unit : m

The rate shall cover the cost of supply and installation of all material including cover strips to joints, nails, trapdoors and gypsum plaster where prescribed, complete as specified.

3.96 Ceiling Insulation Unit : m^2

The rate shall cover the cost of supply and installation of all material, as specified.

3.97 Joinery

(a) Doors (type and size indicated) ..... Unit : No

(b) Skirtings (size indicated) ..... Unit : m

(c) Other items (describe or indicate drawing number) ..... Unit : No or m

The rate shall cover the cost of the supply of all material, manufacture, cutting, waste, fixing and installation of the joinery items, complete as specified.

The rate for doors shall also cover the cost of the door frames and all accessories, such as hinges, hooks, bolts, locks, latches, etc., and of damp-proof course on both sides and above door frames in cavity walls, as specified.

3.98 Metalwork.....Unit : No

The rate shall cover the cost of supplying all material, manufacture, applying priming coat of paint or galvanising, as specified, delivery and building in of units, including burglar proofing where specified, locks, catches, glazing, etc., and of damp-proof course under all windows and on both sides and above frames in cavity walls, as specified.

3.99 Resilient Floor Finishings

(a) Vinyl-fibre, PVC, or thermoplastic floor tiles (specify) ..... Unit : m^2

(b) Vinyl cove skirting ..... Unit : m

The rate shall cover the cost of supplying all material and adhesives required and the laying of the floor finishings.

3.100 Painting.....Unit : m2 or Sum

Only the surface covered by the final finishing coat shall be measured.

The rate shall cover the cost of surface preparation, supplying and applying all the coats of paint, repairing any damaged surfaces, and all materials necessary for completing the work.

3.101 Electrical Installation..... Unit : Sum

The rate shall cover the cost of supplying and building in of all equipment such as switchboards, conduits, wires, cables, sockets, light fittings, etc., cutting recesses, chases and holes in walls as required and repairing any damaged surfaces after installation, including testing of the installation.

3.102 Miscellaneous..... Unit : No, Sum or m

The rate shall cover the cost of all workshop detail drawings, where prescribed, material, plant, tools and labour to complete the scheduled items complete, as detailed, including corrosion protection and/or painting, as specified, and building in.

SECTION 4: MECHANICAL

4. WORKS SPECIFICATIONS (Mechanical)

4.1 GENERAL SCOPE

The mechanical scope of works consists of the detail design (where specifically mentioned or not), supply, transport to site, erection and installation, commissioning and performance testing of the following main - and sub-components:

- Installation for all Mechanical related items for a fully functional Inlet works
- Process equipment for the new biological reactor, including vertical line shaft mixers, slow-speed shaft aerators, recirculation pump sets, sluice gates and pipework including all ancillary equipment.
- New rotating bridge and thickener equipment for new secondary settling tank as well as sluice gates for the new division box, including all ancillary equipment;
- New Mechancical Dewatering Equipment (Beltpress, Polly-Pumps, ect.) including all ancillary equipment;
- New inclined dried sludge, inclined screw conveyer and screw conveyers for a new sludge holding tower.
- New pumping equipment, including pipework and valves for the new return activated sludge pump station, new waste activated sludge pump station including all ancillary equipment;
- The removal of the existing equipment, including transporting it to the Municipal Store;

4.2 REFERENCE TO STANDARD SPECIFICATIONS

The Mechanical Project Specification shall be read in conjunction with the Langeberg Municipality Standard Mechanical Specifications:

The Mechanical Project Specification shall take preference over the Mechanical Standard Specifications should there be contradictions. The Mechanical Specification shall also be read in conjunction with the Electrical Project Specification and Electrical Standard Specification(s) to ensure integration and allowance made for interfaces that may be required for instrumentation and other electrical equipment.

4.3 APPLICABLE STANDARDS

All work carried out, including design of plants and equipment supplied, must fully meet and be in compliance with the requirements of the Occupational Health and Safety Act (Act 85 of 1993) and the Construction Regulations (2014) issued in terms of Section 43 of the Act.

In addition, the latest revisions of the following statutory regulations, laws and obligations as pertaining specifically to any and all electrical work applicable to this specific project are applicable:

- The regulations of the Client, being either Governmental, Municipal, Parastatal or Private
- Local fire regulations

- SANS 10400-A: 2010 – The application of the national building regulations, Part A: General principles and requirements

All references to “SABS” specifications shall be read as “SANS” in light of the recent changes by the South African Bureau of Standards. Any reference made to a standards, shall refer to the latest available revision, or sub sequent standard that replaces the referred standard. Where a SANS Standard does not exist or if not applicable, the relevant IEC or BS Standard shall be applicable.

Additionally, the following specifications, whether specifically mentioned, or not, within this document, shall also apply:

SANS 1084-1/2 : 2014	Electric Motor Standards
SANS 1804:2007	Induction Motors
SANS 62: 2013	Steel pipes
SANS 719: 2011	Electric welded low carbon steel pipes for aqueous fluids (large bore)
SANS 10044: 2004	Welding
SANS 2001 (collection)	Construction works
ISO 12944: 2017	Paints and Varnishes: Corrosion protection of steel structures by protective paint systems
ISO 8501:2007	Preparation of steel substrates before application of paints and related products -- Visual assessment of surface cleanliness
SANS 121:2011	Hot dip galvanized coatings on fabricated iron and steel articles – Specifications and test methods
SANS 32: 1997	Internal and/or external protective coatings for steel tubes - Specification for hot dip galvanized coatings applied in automatic plants
SANS 1123: 2015	Pipe flanges
ISO 4014: 2011	Hexagon head bolts – Product grades A and B
ISO 4032: 2012	Hexagon regular nuts (style 1) – Product grade A and B
ISO 7089: 2012	Plain washers – normal series – Product grade A
SANS 1200 (collection)	Standardized specification for civil engineering construction
SANS 664: 2011	Wedge gate and resilient seal valves for waterworks
BS EN 593: 2017	Industrial Valves. Metallic butterfly valves for general purposes
SANS 1551:2008	Check valves (flanged and wafer types)
ISO 9906: 2012	Rotodynamic pumps -- Hydraulic performance acceptance tests - Grades 1, 2 and 3
ISO 9905: 1994	Technical specifications for centrifugal pumps -- Class I
ISO 5199: 2002	Technical specifications for centrifugal pumps -- Class II
ISO 9908: 1993	Technical specifications for centrifugal pumps -- Class III
ISO 2585: 1975	End-suction centrifugal pumps (rating 16 bar) — Designation, nominal duty point and dimensions
ISO 3661: 1977	End-suction centrifugal pumps -- Baseplate and installation dimensions
BS EN 12756: 2001	Mechanical seals. Principal dimensions, designation and material codes

4.4 DESIGN DOCUMENTATION AND DRAWINGS

Within the period as stipulated per the contract conditions, after the commencement date, the Contractor must supply the following information for approval before commencing manufacturing:

a) Working or “Shop” drawings of the proposed plant, including all main items of equipment to be installed, as well as all cable and wiring diagrams.

b) Functional Design Specification (FDS) and system specific control philosophy

NOTE:

Drawings and documentation must be neat and clearly legible. Circuit diagrams must be done on a grid system with elements of control equipment referred to applicable (grid) line numbers in a schedule directly below the relevant control device.

4.5 CONTRACT IMPLEMENTATION

All contract and construction implementation requirements are set out in the general section. This would relate to items such as factory and witness testing, site commissioning, trial and operational period, As-Built documentation and training.

All electrical components must comply in full to these specifications and priced accordingly in the allocated BOQs.

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”

CONTENTS **PAGE NUMBER**

PS.M1. SCOPE **343**
PS.M2. CONTACT PERSON **343**
PS.M3. GENERAL REQUIREMENTS **343**
PS.M4. OPERATION AND CONTROL PHILOSOPHY **350**
PS.M5. SLUICE GATES, CHANNEL GATES AND STOP LOGS **356**
PS.M6. WEIR PLATES **358**
PS.M7. MANUAL FRONT RAKE SCREENS **359**
PS.M8. MECHANICAL FRONT RAKE SCREENS **360**
PS.M9. PERFORATED PLATE SCREEN **366**
PS.M10. WASHER COMPACTOR **372**
PS.M11. GRIT REMOVAL EQUIPMENT **376**
PS.M12. SPIRAL CONVEYOR **381**
PS.M13. PARSHALL FLUME **383**
PS.M14. SKIP DOLLY SYSTEM **383**
PS.M15. SECONDARY SEDIMENTATION **385**
PS.M16. BIOLOGICAL REACTOR MIXING EQUIPMENT **393**
PS.M17. AXIAL PUMP EQUIPMENT **397**
PS.M18. BIOLOGICAL REACTOR AERATION EQUIPMENT **404**
PS.M19. SLUDGE DEWATERING SYSTEM **408**
PS.M20. LIFTING EQUIPMENT **435**
PS.M21. DIESEL TANKS **445**
PS.M22. TESTING AND COMMISSIONING **446**
PS.M23. TRAINING OF EMPLOYERS STAFF **453**
PS.E4. ELECTRICITY SUPPLY Error! Bookmark not defined.
PS.E5. DRAWINGS Error! Bookmark not defined.
PS.E6. LV SWITCHBOARDS Error! Bookmark not defined.

PS.M1. SCOPE

Scope of works included in this Contract pertain to the following areas of work:

a. Inlet works
b. Biological reactor
c. Secondary Settling
d. Disinfection
e. Sludge dewatering facility
f. Reuse pump systems (on and off site)
g. Refurbishment of existing equipment
h. Control, SCADA, communications and security systems
i. Power supply

PS.M2. CONTACT PERSON

Any queries regarding the mechanical scope of works can be directed to the Employer's Agent whose details are stipulated under Tender Data.

PS.M3. GENERAL REQUIREMENTS

PS.M3.1 Design and drawings

The Contractor shall be responsible for the design, execution and completion of the Works in accordance with Clause 4.1 of the GCC. This shall include, inter alia, the compilation of the following:

a. Design calculations and review of operational philosophy,

b. Advice on the impact of mechanical design on the proposed civil infrastructure depicted on the drawings in the Contract Document.

c. General arrangement (GA) drawings for pipework, pump installations, mechanical equipment installation, structural steel structures, and civil layouts as required;

d. Process and Instrumentation Diagrams (P&IDs) for all systems pertaining to the Scope of Works (SoW).

e. Technical and dimensional drawings of mechanical equipment.

f. Performance documents for mechanical equipment such as dewatering equipment, pump curves for proposed pumps etc.

The Contractor may use the specified performance criteria as a guide for tender purposes. However, all equipment specifications and duties are to be checked and confirmed as correct. The Contractor shall be responsible for the design, supply, installation and commission of a **fit for purpose** system capable of adhering to the minimum design requirements stipulated throughout these specifications.

PS.M3.2 Testing

For all equipment provided, the correct operation of the equipment and the achievement of the specified performance requirements shall be demonstrated to the Engineer before the commissioning of the Works. Specific testing requirements are specified under each equipment specification (if required or applicable), however, these specifications shall not limit the obligation of the Contractor to prove to the Engineer that the installed equipment adheres to the requirements considered applicable for labelling the equipment fit for purpose.

PS.M3.3 Design, drawings and general

This rate shall cover all the services related to the design drawings and design information as specified, inclusive of General Arrangement (GA) drawings and Process and Instrumentation Diagrams (P&IDs). These pay items shall be priced as a “Sum” (unless specified otherwise).

PS.M3.4 Manufacturing, supply and delivery to site

The rate tendered shall include for all material, equipment, plant, testing apparatus, labour, manufacturing, factory applied corrosion protection, factory acceptance testing if applicable, transport, import duties, handling and possibly double handling, delivery to and off-loading at Site as well as temporary storage prior to installation. These pay items shall generally be priced per system or as a “Sum” (unless specified otherwise).

PS.M3.5 Installation work

The rate tendered to include for all plant, tools, labour, rigging, handling, placing into position, aligning, fixing, grouting (where necessary), repair to damaged corrosion protection and getting ready for testing and commissioning. These pay items shall generally be priced per system or as a “Sum” (unless specified otherwise).

PS.M3.6 Testing and commissioning

Rate tendered to include for the drafting of the necessary testing and commissioning plans, attendance of required local and/or overseas specialists, testing apparatus, instruments and equipment, any/all chemicals and consumables required for testing purposes and to prove performance, any/all temporary works, any/all sampling and analysis and compilation of final commissioning report. These pay items shall generally be priced per system or as a “Sum” (unless specified otherwise).

PS.M3.7 Spare parts and servicing

Provision for general pay items has been included in the Schedule of Quantities to allow the Contractor to price the provision of spare parts and to service all equipment.

The spare parts shall be supplied with the equipment and shall be for the use of the Employer only. These spare parts shall be selected based on the recommendation from the relevant manufacturer/supplier. The spare part selection criteria shall be based on the following criteria:

- Spares for any component that will have to be replaced or be worn out within a period of two (2) years after the issuing of the Performance Certificate in terms of Clause 11.9 of GCC.
- It should be noted that these spare parts do not in any way apply in terms of the Contractors responsibility to maintain and uphold equipment supplied with this tender during the defects and liability period.

Where provision is made for the servicing of the equipment at the end of the defects and liability period the Contractor shall ensure allowance is made to not only service the equipment in terms of the manufacturer's and/or supplier's requirements, but also the replenish any consumable items associated with the equipment (i.e. lubrication, fuel, etc.).

PS.M3.8 Other

The Contractor shall be responsible to ensure that the rates provided allow for all costs associated with delivering a Plant operating as per its intended use and fit for purpose. Where the Contractor wishes to specify specific items, not listed in the payment schedules he/she may do so in the open spaces allowed for under the heading “other”. These pay items shall generally be priced per system or as a “Sum” (unless specified otherwise), or as the Contractor deems fit.

It should be noted that whether or not additional items are priced under this section of the Schedules does not remove any responsibility from the Contractor to supply a fully operational Plant operating at a fit for purpose level. If a specific pay item is not allowed for the relevant payment scheduled it shall be accepted that any additional costs required have been distributed throughout the other rates listed in the payment schedules.

PS.M3.9 Reputable suppliers

Any equipment supplied without established local representation and servicing capability in the Republic of South Africa will not be accepted unless agreed upon in writing by the Employer.

Equipment of all manufacturers must be in accordance with these specifications and plans. Being named as a manufacturer does not eliminate their responsibility of providing equipment in compliance with the specifications forming part of this Contract. Any deviations without sufficient evidence that the equipment/system is of equal or superior quality shall be rejected without further review or comment.

PS.M3.10 High-efficiency selection criteria

Except where specifically stated otherwise here, all electrical motors shall conform to the relevant requirements stipulated under **Section D35** of the Langeberg Municipality standard Specifications for Mechanical works. All motors offered with this Contract shall have an International Efficiency (IE) rating of at least 3 (i.e. IE3-Premium efficiency).

PS.M3.11 Compatibility

Any electrical and electronic equipment that may be supplied with mechanical equipment and components shall comply with Langeberg Municipality Standard Specifications and the Electrical Particular Specifications.

PS.M3.12 Pump Monitoring Devices

Unless specifically stated in the Project Specification, one or more of the following monitoring items shall be required:

Full details of the sensing equipment (thermocouples, etc.), and of the associated control and monitoring or indicating equipment shall be submitted with the tender offer. Evidence shall also be submitted that adequate spares and services are readily available in this country.

PS.M3.13 Temperature Sensors

Either thermocouples or resistance temperature detectors shall be installed, depending on which is more suitable for the duty and application.

Location of temperature probes:

a) Separate temperature probes shall be installed at the sleeve and/or rolling bearings of each pump and motor and at the gland housings of the pump to monitor the temperatures at these points.

b) The probes shall be spring-loaded to ensure positive contact with the bearing shells, mechanical seals or gland stuffing boxes.

c) Each probe shall be clearly identified by means of an engraved marking on the sheath and shall be individually calibrated. Test certificates covering the calibration results of all temperature probes shall be submitted to the Engineer.

d) Temperature detectors offered, shall be suitable for operation in conjunction with temperature indicating, monitoring, alarm and trip equipment of Conlog or equivalent design.

e) If grease-lubricated bearings are offered, the Contractor shall indicate if temperature detectors can in fact be used. If temperature detectors are not feasible, the Contractor shall indicate alternative means of monitoring bearings at the time of tender.

f) Pockets for standard mercury-filled glass thermometers shall be provided adjacent to all pockets serving temperature indicating instruments. Pockets for standard thermometers shall have chained covers to prevent the ingress of dirt when not in use and shall be so arranged as to permit the accurate measurement of the bearing temperature. The pockets shall contain a small amount of oil and shall therefore be orientated within 30° of the vertical, horizontal pockets are not acceptable.

g) Each pump casing shall be fitted with a Thermo switch, Fenwall, or equal approved make to safeguard the pump in the event of inadvertent sustained operation against a closed discharge valve. The Thermo switches shall be calibrated to close when the temperature of the water in the pump casing exceeds 40°C.

PS.M3.14 Pressure gauges

a) Each pump set shall be equipped with two 150 mm dial diameter flush mounting pressure gauges. The gauges shall be calibrated in kilopascal and the angle shall suit the particular application. The gauge shall be filled with glycerine, and the bubble shall be out of the range of the usual reading. The gauges shall be of a type that is possible to recalibrate (deadweight method) and reset on Site.

b) These meters shall indicate water pressure in kilopascal and shall have a range at least 50% higher than the normal duty point. However, in all cases, the gauges must have a range at least 30% higher than the shutoff, or maximum, head which the pump is capable of generating with the system conditions taking into consideration the maximum static suction pressure possible.

c) The meters for the suction side of pumps shall be compound gauges and shall be capable of indicating a negative pressure of up to 100 kPa. However, in all cases, the gauges must have a range at least 30% higher than the maximum static suction pressure possible.

d) All pressure gauges shall be supplied and installed complete with isolating Steel cocks, copper or stainless steel piping, etc. and fitted with a pulsation snubber in stainless steel.

Due to the quality of the water, the Contractor shall ensure reliable operation of the gauges. Where solids or chemicals are present in the liquid (which can be expected for all liquids associated with this project) the pressure gauges shall be fitted with diaphragms (fit for purpose). Pipes to pressure gauges shall be neatly supported between the tapping point and pressure gauge. Where the pressure gauges are to be installed in pedestals, details of such systems shall be submitted to the Engineer for approval.

For further details not covered (or amended) here refer to **Section D67** of the Standard Specifications for Mechanical Works.

PS.M3.15 Automatic air vents

If an automatic air vent is specified for the pump casing, it shall be fitted with an indicator to show the open and closed positions of the air vent. The air vent shall be suitable for remote operation and the control of the air vent shall be mounted on the control panel inside the pump house.

PS.M3.16 Wear limit switch

Multistage pumps shall be fitted with a wear limit switch to protect the pumps against damage after normal wear of the wearing rings have taken place after a period of operation.

PS.M3.17 Pipework

The Engineer has provided detail related to the pipework (i.e. spool pieces, flanges, valves and fittings) associated with the overall Scope of Works in the form of Specifications (standards and detailed), Drawings, Mechanical Flow Diagrams (MFD) and Process and Instrumentation Diagrams (P&ID). However, this does not limit the Contractor's responsibility to offer and supply a fully functional treatment system operating as per the intended use and fit for purpose.

To avoid confusion the Contractor shall accept that all pipework within one (1) meter of any new structure or building, or existing civil structure identified for refurbishment, shall form part of this Contract and the Contractor shall ensure that his/her Offer allows for all such pipework. This includes valve chambers.

By submitting a Tender Offer, the Contractor shall acknowledge that he/she has evaluated all the requirements related to the pipework arrangements and supporting equipment such as air release systems, puddle flanges, drainage and flushing requirements, to ensure a fully operational fit for purpose and based on sound engineering principles. It shall also be accepted that any additional requirements in this regard has been allowed for in the Tender Offer or, where the Contractor wishes to do so, has been indicated and price under the appropriate section in the BoQ.

For discharge pipework the Contractor shall consider the relevant origin of flow (i.e. pump station) and sized the discharge pipework accordingly. All cast in pipes shall be made from 316 stainless steel or better and be equipped with a puddle flange with minimum dimensions of 10mm thick and 80mm wide (difference between inside and outside diameter of flange).

Local high points in the pipework will only be finalised once the Contractor finalises his/her General Arrangement (GA) drawings. Therefore, the number and position of air release valves are not known at this stage. It is expected that the Contractor will review all systems and allow for additional air valves where he/she determines it might be required to ensure pipework can function as per its intended use.

The Contractor shall take special care to ensure his/her proposal allows for flushing and cleaning of pipework which will be used to convey sludge or solids.

PS.M3.18 Performance penalties

Penalties as a result of measured efficiencies lower than the guaranteed duty point efficiencies by more than that allowed in the test standard shall be calculated in relation to the potential additional cost of energy and consumables (i.e. chemicals) over a period of thirty years (discounted to present value) due to the lower than guaranteed efficiency.

Deductions shall apply to the Main Contractor only; the Engineer will not recognize any division of responsibility between the separate suppliers of plant and/or equipment.

Rejections

The Engineer reserves the right to reject any plant/equipment during manufacture, at the time of the works tests, the Acceptance Test on Site or after, during the Period of Maintenance in the following cases:

- defects appear that are considered irreparable;
- efficiencies at Duty Points defined, or average efficiency lower than the guaranteed efficiency(s) by more than five percentage points;
- discharge rate, at any Duty Points defined, lower than those guaranteed;
- peak displacements and vibration velocities higher than specified at any point of measurement;
- any sign of obvious cavitation; and
- total penalty on the plant/equipment higher than 15% of the unit price of the plant/equipment.

The Engineer reserves the right to reject any part of the equipment if the abovementioned corrections are not performed in the time allowed for that.

Should any component part of any main or ancillary equipment fail to perform in accordance with its intended function during the Defects and Notification Period, the Engineer shall have the right to reject the component part and order its replacement with a more reliable part at the Contractor's expense.

The replacement part shall be guaranteed for the period equivalent to the period provided for in the Contract from acceptance date.

Rejection implies the recovery, by the Engineer, of all monies paid to the Contractor who shall remove at his own expense all the plant supplied by him when ordered to do so.

PS.M3.19 Electrical and electronic servicing of mechanical equipment

Although the Engineer has taken precautions to ensure that all mechanical equipment is serviced in terms of the required electrical and electronic systems the nature of the Contract will require the Contractor to familiarise himself with the specifications and ensure that these allowances are sufficient to provide a complete, fit for purpose treatment system. Should any mechanical equipment come complete with additional electrical and electronic systems or equipment, or if the Contractor intends to provide additional equipment, it shall be accepted that his tender offer has made provision for this. The Contract will take full responsibility to ensure that all equipment offered or required for operation *as per the intended use* shall be serviced in full with the required electrical and electronic equipment in accordance with the Langeberg Municipality Specifications. If there is no specific allowance made in the Detailed Specifications the Contractor shall use an equivalent specification

contained in this document, or where no such equivalent is available, inform the Engineer in writing and request that such a specifications be made available.

PS.M3.20 General material

Materials have been specified throughout these specifications (i.e. standard and detailed) and the Contractor shall ensure that his/her offer allows for such requirements accordingly. Where not specific reference is made to Contractor shall ensure that his/her offer general conforms to the requirements provided here. However, the Contractor shall ensure that all material (including corrosion protection) offered conforms to the specific application intended for the use. The Contractor will not be allowed to offer inferior material unless he obtains formal approval by the Engineer.

Description	Material
Walkways and grating	Mild Steel (HDG with Duplex coating)
Structural steel (dry)	Mild Steel (HDG with Duplex coating)
Structural steel (wet)	GRP or EN 1.4401 (316) stainless steel or better
Hand railing	EN 1.4401 (316) stainless steel or better (no poprivet allowable for fixing)
Steel Pipework	EN 1.4401 (316) stainless steel or better
Cast in pipework	EN 1.4401 (316) stainless steel or better
Lifting equipment	Mild Steel (HDG with Duplex coating)
Weirs and baffles	EN 1.4362 (2304) duplex stainless steel
Penstocks, channel gates and weir gates	EN 1.4401 (316) stainless steel or better
Mechanical equipment	EN 1.4401 (316) stainless steel or better

PS.M3.21 Actuators

In addition to the requirements stipulated in Clause **D32** of the Standard Specifications for Mechanical Works to following shall apply for actuators:

i) All electrical, mechanical and pneumatic actuators shall have open/close limits built into the units.
ii) Proximity switches shall be manufactured from 316 stainless steel.
iii) The proximity switches shall be compatible with all electrical and electronic equipment offered with this project.

PS.M4. OPERATION AND CONTROL PHILOSOPHY

A general Operation and Control Philosophy (O&CP) is presented in this section to allow the Contract to ensure his/her offer makes provision for the necessary equipment and instrumentation to provide a product that adheres to the Employers objectives. The Contractor shall be responsible for design, supply and commissioning of a fit for purpose system capable of delivering, as a minimum, to the performance requirements stipulated throughout the Contract specifications. The final O&CP shall be drafted by the Contractor for approval by the Engineer. However, this approval shall in no way limit the Contractors responsibility to commissioning a fully functional Plant.

PS.M4.1 Inlet Works Flow Control

The pumping main and the gravity feed main line from the town of Robertson will be diverted directly to the inlet works. The inlet works will have a design capacity of 10 Ml/d (115l/s ADWF) and 25Ml/d (290 l/s PWWF), respectively.

PS.M4.1.1 Screens

An influent of up to 25 Ml/d shall enter the inlet works via open channel flow and split between two (2) screening channels (one (1) duty and one (1) standby). Each of the screening channels shall have a maximum design capacity of 25 Ml/d and equipped with two (2) sets of screens (i.e., one (1) duty configuration).

During normal operation the up-and downstream channel gates associated with the standby screening channel shall be closed.

The first and second sets of screens installed in the inlet works shall be referred to as medium and fine screens, respectively.

The screening sequence will be controlled by any of the following methods:

a) Manually, or;
b) By Timers, or;

c) By ultra-sonic level sensors located up- and downstream of each screen. A pre-determined differential water level will indicate that a screen has undergone blinding which automatically activates the raking sequence.
d) If the inflow rate reaches an operator set value (i.e. peak design flow), all available screens will operate (e.g. rake or brush) continuously until the flow subsides below the pre-set flow rate.

Each screen shall be installed with up-and downstream channel gates and screening channels shall be interlinked with openings in the internal dividing channel walls to accommodate independent operation of each screen set (refer to relevant drawings for detail). The internal channel gates shall be normally closed.

To control flow velocity in the channels the number of operational screens/channels shall be based on the flowrate measurement from the Parshall Flume Station. At least one channel shall be open during low flow conditions where after an increase in the flowrate through the flumes shall trigger the opening of the second channel via the opening of channel gates.

PS.M4.1.2 Spiral conveyors and washer compactors

Each set of screens shall have a common Spiral conveyor (e.g., all medium screenings discharge in a single Spiral conveyor). The Spiral conveyor will be independently interlocked with the operation of the respective screen set. Whenever the screen field cleaning cycle is initiated, the corresponding Spiral conveyor shall be active, and the upstream solenoid valve shall be activated to let water into the launder. If no screen field cleaning cycle has been initiated, the solenoid valves shall close.

The medium screenings shall discharge into a washer compactor. Similarly, the fine screenings shall discharge into washer compactor.

The washer compactors shall be filled with the motive water and screenings from the relevant Spiral conveyor(s) and once a compactor is full (as measured by the pressure transmitters), the washing cycle of the compactor shall start.

The duration of the washing cycle for each compactor shall be adjustable. Both the motive water and washer compactor units will run for a fixed period after the raking sequence ends to ensure the Spiral conveyors are clear before the sequence ends.

PS.M4.1.3 Grit removal

Flow from the screening channels shall converge into a common channel via open channel flow and split between two (2) vortex degritter channels. Each of the degritting channels shall have a maximum design capacity of 25 Ml/d (i.e. one (1) duty, one (1) standby channel configuration).

Degritters shall consist of paddle stirrers/mixers to create a mild vortex that promotes settling of heavier inorganic materials while the de-gritted effluent flows through. Self-Priming pump shall be used to remove accumulated grit from the degritter.

The following sequence shall be run to suspend and wash organics in the degritter hopper prior to the airlift pump sequence commencing:

1. The valve in the washwater supply line will open resulting in the discharge of effluent into the grit layer which will tend to wash out any organics trapped in the grit layer and further suspend the grit.
2. After a further, adjustable pre-set period, the valve in the washwater line will be closed and the valve in the airlift pump delivery line will open. This shall activate the operation of the self-priming pump. The loose, suspended grit will be pumped into the hopper of the grit classifier.
3. After the pre-set, adjustable period the valve on the air delivery line of the self priming pump will be closed and the blower will switch off.

The degritting sequence will be activated by any one of the following operating philosophies:

a) The sequence can be activated by a timer which will result in the grit being removed at a regular, adjustable pre-set interval.
b) It can be activated after an adjustable, pre-set flow has passed through the head of works.
c) Each sequence can be activated manually for individual degritters.

One (1) grit classifiers will be provided to serve two (2) degritters. The grit classifier operation will be interlocked with the grit removal pumps to ensure they are activated when the degritting sequence starts. The classifier shall operate for a set length of time after the degritting sequence has stopped to ensure that all the grit removed undergoes classification.

PS.M4.1.4 Parshall Flume Station

Flow from the degritting channels shall converge into a common channel via open channel flow. The Parshall Flume shall have a maximum design capacity of 10 Ml/d (115l/s ADWF) and 25Ml/d (290 l/s PWWF)

The flow through the flume shall be measured by using ultrasonic level sensor and which will be converted to flow rates by using the associated Parshall flume formulae.

PS.M4.2 Bioreactor system

PS.M4.2.1 Inlet control

The flow from the inlet works will be split into 3 biological treatment lanes (Old plant, MLE1 and MLE 2) flow is split with the use of wall mounted weir plates. Each lane can also separately be closed off by the use of the manual sluice gate.

PS.M4.2.2 Anoxic zones

Anoxic zones shall be equipped with four (4) vertical shaft mixers to keep the mixed liquor in suspension. These units shall run continuously. However, the Operator shall have the option to schedule the start/stop cycle of each individual mixer.

Process performance shall be monitored via tracking the Dissolved Oxygen (DO) concentration, Mixed Liquor Suspended Solids (MLSS) and temperature in each anoxic zone (i.e four (4) anoxic zones). A DO reading shall trigger an alarm on the SCADA system to prompt immediate intervention/investigation from the Operator.

PS.M4.2.3 The Aerobic zones

The new aeration basin has been designed for surface aerators.

The Aerobic zone shall be equipped with four (4) surface aerators to provide the required oxygen to the basins. These units shall run continuously. However, the Operator shall have the option to schedule the start/stop cycle of each individual surface aerator. The Surface aerators also require having three running modes (low, medium and high) for the different oxygen requirements. The modes will be auto selected by the SCADA system based on the DO reading received

The four (4) surface aerators shall respond to dissolved oxygen (DO) measurement taken in the aerobic basin against a user-defined set-point. In the event that the actual DO is lower than the set-point, the surface aeration to the zone must be increased by increasing aerators speed to ensure that the DO set-point is maintained with the least amount of energy i.e. lowest possible surface aerators speed and thus electricity usage. The aerobic tank shall be fitted with DO, pH and temperature meters.

It is envisaged that four (4) Surface mechanical aerators will be installed under this Contract. The aerators must be adequately sized to meet the oxygen requirement under minimum flow conditions with two - three units operational as well as maximum conditions with multiple units operational. The main airflow header(s) shall be equipped with airflow and pressure meters.

PS.M4.2.4 Aerobic to Anoxic recycle (A-recycle) pump stations

The bioreactor has an A-recycle pump station to recycle mixed liquor from the aerobic zone back to the anoxic zone. The pumps shall have VFDs to track the diurnal flow pattern of the influent. The operator shall have the option to activate all the pumps (i.e., one (1) duty, one (1) standby). A maximum recycle ratio of 8 shall therefore be achievable.

The pump chamber shall be fitted with an ultra-sonic level sensor to measure the discharge height over the weir of the pump chamber. This signal shall be converted to a flow rate based on the relevant weir flow formula. The level sensors shall be incorporated into the pump protection setup (i.e. dry run protection and alarms).

In addition, the following operational requirements shall be provided:

a) Protections shall be active during all operation settings.
b) The pump installation shall be designed to shut down safely and without damage upon tripping of the electrical supply.
c) Duty cycle shall be implemented.
d) An hour meter which cannot be reset shall be provided.

PS.M4.3 WAS pump stations

The biological reactors have been designed to operate as two independent systems (i.e. two (2) modules). Therefore, one (1) new WAS pump stations shall be installed as part of this Contract with the existing one (1) also be in operation. The WAS pumps shall draw off mixed liquor from last aerobic zones of the reactor. The pump station shall be located inside the reactor structure. The WAS Pumps shall be submersible pumps. (i.e. one (1) duty, one (1) standby).

The waste rate shall be calculated based on the systems sludge age as selected by the Operator. To ensure the WAS pumps run efficiently, while reducing impacts of non-continuous wasting on the biological system, sludge will be waste in short batchers several times a day. The operator shall be able to set the number of start cycles on the SCADA and local controller. The pump station(s) shall automatically calculate the running time required to waste the required sludge volume associated with the selected sludge age. This shall be achieved via a magnetic flow meter and solids density meter installed on the discharge of the WAS pump stations.

In addition, the following operational requirements shall be provided:

a) Protections, which shall be active during all operation settings.
b) The pump installation shall be designed to shut down safely and without damage upon tripping of the electrical supply.
c) Duty cycle shall be implemented.
d) An hour meter which cannot be reset shall be provided.

PS.M4.4 Dewatering system

PS.M4.4.1 Dewatering train operational system

Sludge feed pumps shall transfer sludge from the sludge storage tank to the dewatering units. Each sludge feed pipe shall be equipped with an inline poly dosing point situated upstream of an inline mixer. The sludge feed to the dewatering units shall be controlled via either of the following to control systems:

1. Solids loading control philosophy
2. Hydraulic loading control philosophy

PS.M4.4.2 Solids loading control philosophy

When the dewatering control system is selected as “solids loading control” the sludge feed shall be regulated with the solids density meter situated on the sludge ring main and the flow meters on the dewatering sludge feed pipes (progressive cavity discharge pipe). The density meter and flow rated shall automatically calculate the solids loading (i.e. kgDS/hr) which shall also be used to regulated the poly dosage.

Sludge feed shall be regulated by increasing or decreasing the respective progressive cavity sludge feed pump up or down, respectively. Such an adjustment shall coincide with the poly dosing pump in order to maintain a fixed poly dosage rate (i.e. kgPoly/tonDS) which shall be Operator selected.

PS.M4.4.3 Hydraulic loading control philosophy

When the dewatering control system is selected as “hydraulic loading control” the sludge feed to the dewatering units shall be regulated by the flow meter on the dewatering sludge feed pipe (progressive cavity discharge pipe) exclusively.

Sludge feed shall be regulated by increasing or decreasing the respective progressive cavity sludge feed pump up or down, respectively. Such an adjustment shall coincide with the poly dosing pump in order to maintain a fixed poly dosage rate (i.e. kgPoly/tonDS) which shall be Operator selected.

PS.M4.4.4 Poly make-up and dosing

Two continues poly make-up units installed per dewatering unit (i.e. WAS and Primary sludge) shall be operated in a duty standby configuration. The integrated control system of the continuous poly-make up units shall be linked to the operating system. Dry poly shall be loaded to the poly-make-up unit dry feeder hopper via the traveling beam crane. The poly make-up concentration shall be Operator set. The dry feeder and washwater jet shall then adjust the feed rates accordingly to make up the poly solution.

A dedicated poly dosing pump per dewatering unit (i.e. belt press or linear screen) shall dose the required poly based on the Operator selected poly consumption (kgPoly/ton DS).

The poly dosing system shall be equipped with a service water connection to wash out excess poly from the system after every shift.

PS.M4.4.5 Sludge cake handling

Dewatered WAS sludge cake shall exit the respective dewatering units and discharge into horizontal conveyors which shall transfer the sludge cake to the inclined sludge conveyor, centreless screw. The sludge conveyor, centreless screw shall convey sludge from dewatering units to respective silo or skips.

The sludge cake silo shall be monitored for high or low level by the respective level sensors. If a high level is reached, all equipment feeding the silo shall be stopped and an alarm shall be raised.

The silo shall be fitted with a live bottom that shall be started and stopped locally by an Operator if the silo needs to be emptied. If a live bottom is started by an Operator all screws for the live bottom shall start and similarly when it is stopped. Each screw shall be fitted with an actuated sluice gate that shall open first when an emptying sequence is initiated. After the sluice has opened, the screw shall start. The actuated sluice gates shall indicate when they are open or closed.

All screw conveyors used for conveying sludge shall be equipped with a mechanical torque limiting device that shall activate a limit switch that shall shut down the conveyor, close the corresponding sluice gates and raise an alarm.

PS.M4.4.6 Filtrate handling

The filtrate from the respective sludge streams shall gravitate towards the gravity feed line to the biological reactor.

PS.M5. SLUICE GATES, CHANNEL GATES AND STOP LOGS

Unless specifically stated otherwise here, all sluice/channel gates shall conform to the requirements stipulated in **Section D31** of the Standard Specification for Mechanical Works.

All parts shall be designed for the duty required, but the minimum factor of safety against structural failure shall not be less than 3, based on the working stress of the material. In the design, due consideration shall be given to the thickness of materials with regard to corrosion and operating conditions. The force required at a hand wheel or crank to raise a gate or open a valve shall be in the order of 100 Newton, and the design parameters must be submitted in the Technical Schedule.

PS.M5.1 Design requirements and process parameters

Dimensional requirement of the sluice gates shall be as per the relevant drawings. These details (i.e. number and dimensions) are subject to change based on final design by the Contractor. Allowance for the following shall be made in the tender price as minimum:

Location	Qty	Type	Width (mm)	Height (mm)
Inlet Works (Screen channels)	2	Channel gate	800	1000
	2	Channel gate	800	1100
	2	Channel gate	800	1200
	2	Channel gate	800	1355
Inlet Division Box	3	Wall mounted	750	2,200
SST's Division Box:	3	Wall mounted (Upwards Closing)	600	900

PS.M5.2 Sluice, overflow and channel gates

The sliding frames, floor seats and gates of wall mounted as well as channel type gates with headframe shall be made of EN 1.4401 (316) stainless steel or EN 1.4362 (2304) duplex stainless steel.

All gates shall be well guided with no possibility of jamming. The gates shall be held uniformly against the side facings of the frames by the action of adjustable wedges and shall provide drop-tight closure under the conditions shown on the relevant drawings. Sluice gates shall be of the standard or flush invert type fitted with renewable seals of a non-biodegradable material on the invert.

Channel gates shall be dimensioned such that their installation in the channels and openings shown on the drawings is facilitated. The channel gates shall be standard items and shall be installed so that headframes shall be flush with vertical channel walls and do not project horizontally into the channel. Vertical sliding frames and floor seat to be cast into concrete so as to leave an unobstructed waterway to dimensions indicated in the schedule. Pre-formed recess details for casting in of frames to be submitted by supplier. Headframe bridge for a channel gate to allow indicated water level to pass under the gate when in UP-position. Some gates to check indicated water level when in DOWN-position. All nuts, bolts, washers and other components, shall be manufactured from same grade stainless steel specified for gate.

Gates shall be robustly designed and constructed, having vertical and horizontal ribs to withstand pressures from both directions. The matching headframe for channel gates shall be adequately designed to resist distortion, and both the gate and the frame shall have machined seating faces to ensure perfect sealing. The headframe shall extend above the concrete channel, to support the gate in the fully open position.

Seating pressure as well as unseating pressure may act on any channel or circular sluice gate and the sluice gate shall be able to resist these pressures.

Holding down bolts of penstocks fixed against concrete walls shall be made of Grade 316 Stainless Steel.

Channel gates shall be provided with rising spindles as well as approved position indicators.

PS.M5.3 Materials

Sluice gates/channel gates shall be of construction of the following materials or superior, subject to the acceptance of the Engineer:

Description	Material
Frame	EN 1.4401 (316) stainless steel or better
Gate	EN 1.4401 (316) stainless steel or better
Fasteners	EN 1.4401 (316) stainless steel or better
Seals	Neoprene or better
Spindles and couplings	EN 1.4401 (316) stainless steel or better
Spindle covers	EN 1.4401 (316) stainless steel or better
Handwheel	Cast aluminium or better

On wastewater applications, copper alloys shall not be used unless completely encapsulated; i.e. thrust nuts for sluice gates shall not be of brass of bronze unless completely encapsulated in a gearbox or equivalent. All stainless steel shall be pickled and passivated.

PS.M5.4 Installation and Testing

The Contractor shall verify all dimensions in the field to ensure compliance of equipment dimensions with the drawings. Contractor shall notify the Engineer of significant deviations.

Installation of the equipment shall be in strict accordance with the contract documents and the manufacturer's instructions and shop drawings. Manufacturer shall supply equipment, including anchor bolts for the equipment. Contractors shall install the equipment in accordance with the manufacturer's recommendations.

The installation of sluice / channel gates and overflow weirs shall include all jointing materials and labour required for the proper installation and sealing of the frames to the channel or walls, including but not limited to grouting, gaskets, etc.

Supplier shall furnish the services of a factory-trained Service Engineer for one (1) trip including a total of one (1) day to inspect the installation, observe start up, and provide operator training.

The Service Engineer shall make all necessary adjustments.

The Service Engineer shall demonstrate proper and sequential operation of the equipment and demonstrate that the equipment achieved the requirements set out in the Specifications.

PS.M5.5 Spare Parts

The following Spare Parts shall be included and supplied together with the equipment:

- A set of special tools (if required)
- Any other parts deemed critical by the manufacturer.

Spare parts shall be packaged with labels indicating the contents of each package and shall be delivered to Owner as directed.

PS.M6. WEIR PLATES

Weir plates shall have a minimum thickness of 3 mm and be fixed with a 5 mm neoprene packing glued to the back of the plate (i.e. side that faces the surface upon which it connects. Fastener slots shall be provided to allow for an adjustment of 37.5 mm up or down from the middle of the slot (i.e. 75 mm slots). Weir plates shall be fastened in accordance with the requirements stipulated in **Section D16** of the Standard Specification for Mechanical Works. Fasteners shall not be spaced further that 200 mm apart.

PS.M6.1 Design requirements and process parameters

Dimensional requirement of the weirs shall be as per the relevant drawings. These details (i.e. number and dimensions) are subject to change based on final design by the Contractor. Allowance for the following shall be made in the tender price as a minimum requirement. These specifications serve as guidelines only – responsibility for the final design basis rests with the Contractor:

Location	Qty.	Height (mm)	Width (mm)[@]
Inlet Division Structure	3	750	750
Bioreactor (A-recycle pump station)	1	750	800
Note: [a] Weir with serrated cut outs.			

PS.M6.2 Adjustable Weir Plates

The sliding frames, floor seats and gates of wall mounted as well as channel type gates with head frame shall be made of material grade as specified above. All gates shall be well guided with no possibility of jamming. The gates shall be held uniformly against the side facings of the frames by the action of adjustable wedges and shall provide drop-tight closure under the operating conditions. Weirs shall be of the standard or flush invert type fitted with renewable seals of a non-biodegradable material on the invert.

Adjustable weirs shall be of the downward opening type, with suitable guides of sufficient lengths to allow the weir to open completely underneath the wall opening. Head frame bridge for a wall mounted weir to allow indicated water level to pass over the gate when in down-position.

All nuts, bolts, washers and other components shall be manufactured from same grade stainless steel specified for gate.

Gates shall be robustly designed and constructed, having vertical and horizontal ribs to withstand pressures from both directions. The matching head frame for channel gates shall be adequately designed to resist distortion, and both the gate and the frame shall have machined seating faces to ensure perfect sealing. The head frame shall extend above the concrete channel, to support the spindle and handwheel assembly.

Seating pressure as well as unseating pressure may act on any channel or circular sluice gate and the sluice gate shall be able to resist these pressures.

Holding down bolts of penstocks fixed against concrete walls shall be made of Grade 316 Stainless Steel.

Gates shall be fitted with position indicators. Fully closed, fully open and intermediate positions shall be indicated in corrosive proof and robust design indicators

All gates shall be equipped with suitable spindles and handwheels to open / close the valves. The direction of opening and closing must be indicated on the hand wheel.

PS.M6.3 Overflow Weir

The contractor shall allow for the supply and installation of two overflow weirs to be installed in the chlorine contact channel.

One weir shall be of the V-notch type with the overflow properties as per the applicable drawings.

The weir plates shall be manufactured from 316L Stainless Steel and mounted to the channel walls by means of anchor bolts and shall be properly sealed to prevent any effluent to pass between the plate and wall(s).

PS.M6.4 Materials

Weir plates shall be of construction of the following materials or superior, subject to the acceptance of the Engineer:

Description	Material
Plate	EN 1.4362 (2304) duplex stainless steel
Fasteners	EN 1.4401 (316) stainless steel
Packing / seals	Neoprene or better

PS.M7. MANUAL FRONT RAKE SCREENS

The new emergency overflow system located directly in front of the coarse screen units will be equipped with a 50 mm aperture manual screen. The screen shall be supplied with drips trays to allow drying of screenings captured and removed from the unit.

PS.M7.1 Design requirements

Design parameters and minimum design requirements of the manual screen units shall be as follows:

Screen type: Manual front rake

Screen aperture: 50 mm

Screen inclination angel: 60 degree to the horizontal plane

No. of units: 1 No.

Channel width: 800 mm

Channel depth: 1100 mm

PWWF: 25 Ml/d or 290 l/s

General

Two custom-built rakes shall be provided of suitable length to facilitate manual raking when standing on the walkway next to the installed screen.

The Fasteners shall comply with the **Section D15** of the Standard Specification for Mechanical Works.

The bars forming the screen field shall be robust and accurately aligned. The screen bar thickness shall not be less than 8 mm and the screen bar depth shall not be less than 40 mm. Fabrication of the screens shall be in accordance with the requirements stipulated in **Section D9** of the Standard Specification for Mechanical Works.

PS.M7.2 Material

The manual screens shall be of construction of the following materials (or superior), subject to the acceptance of the Engineer:

Description	Material
Screen	EN 1.4401 (316) stainless steel or EN 1.4362 (2304) duplex stainless steel.
Fasteners	EN 1.4401 (316) stainless steel or better

PS.M8. MECHANICAL FRONT RAKE SCREENS



One (1) 6mm aperture screen at the inlet works.

Screen(s) shall be furnished complete with all accessories and appurtenances specified or otherwise required for a complete and properly operating installation.

PS.M8.1 Design requirements

It is not possible to accurately quantify the nature, volume and mass of screenings that will be processed by this system. It must be assumed that the screens will deal with rags, hard solids, stingy solids, plastics and any other solids that can be expected from a mixture of low-cost housing, typical domestic sewage and industrial wastewater.

Design parameters and minimum design requirements of the mechanical front rake screens shall be as follow:

The performance requirements associated with the screens are as follow:

Description	Process stream	Max hydraulic load	Allowable head loss
6 mm aperture screens	Raw sewage	1050 m^3/hr	200 mm

Channel width: 800 mm

Channel height: 1100 mm

Minimum free board: 300 mm

Maximum reduction in screen free open area: 75%

Motor protection: IP 65

Chloride resistance: 400 mg/l (minimum)

Key items identified for chloride attack include the chain, guides and sprockets.

PS.M8.2 Frame

The rectangular frame shall be formed entirely from stainless steel plate with a minimum thickness of 4.5 mm and shall be recessed to accommodate the chain guides and idler sprockets.

The frame shall be fully welded to the sole plate, the debris plate and the discharge chute. At the upstream face of the unit, box-section cross-members shall be securely welded to the side members of the frame at regular intervals between a point above the maximum water level and the head of the screen. These cross-members shall form the supports for removable EN 1.4401 (316) stainless steel or EN 1.4362 (2304) duplex stainless steel cover panels.

The screen shall be set in the channel at an angle of approximately 55 - 75° to the horizontal. The frame shall be grouted into position in recesses in the channel walls and invert or, for screens of the removable variety, either braced at coping level on a spindle bar permitting the unit to be swivelled or rested against brace-plates affixed to the channel walls, permitting the unit to be hoisted from above.

The frame shall be fully welded to the sole plate, the debris plate and the discharge chute. At the upstream face of the unit, box-section cross-members shall be securely welded to the side members of the frame at regular intervals between a point above the maximum water level and the head of the screen. These cross-members shall form the supports for removable EN 1.4401 (316) stainless steel or EN 1.4362 (2304) duplex stainless steel cover panels.

The screen shall be enclosed above the top level of the channel for safety and odour reasons. Doors for inspection, cleaning and maintenance of the working parts shall be provided in front. A door shall also be provided at the rear in a position to allow inspection of the wiper mechanism. The front doors at the Operator's working level shall be provided with stainless steel hinges and shall open safely. Designs which place stress on the hinge when open are not acceptable. The doors shall remain open and closed under their own weight or other positive retention arrangement.

Each side frame shall include separate roller tracks to guide the rakes. The roller tracks shall be bolted to the frame so that they can easily be replaced. The roller tracks shall be made of 4 mm thick L-profiles.

The spray wash system shall be enclosed such that spray water, aerosols or leakage do not contaminate the operating floor surrounding the screen unit.

4 mm thick neoprene strips shall be fastened to the side frames to seal the lateral gaps between the side frames and the channel walls.

PS.M8.3 Screenfield

The screenfield bars shall be accurately set at the required spacing and solidly secured to the brace plates for bolting onto the screen frame, for easy removal of the screenfield. The bars shall be approximately 40 mm deep and accurately aligned with a minimum thickness of 8 mm. The bars shall extend from the sole plate, to which they shall be individually held in position by a removable fixing plate, and at the top of the screen field held in position by a laser-cut slotted retention plate for simple removal when damaged.

PS.M8.4 Sole plate

The sole plate shall be profiled to induce screenings and debris in the lower level of the flow to be directed onto the lower portion of the screen bars and not to accumulate at the foot of the screen. The leading edge of the sole plate shall be level with the channel invert.

PS.M8.5 Raking mechanism

The bar screen shall remove debris (screenings) from the incoming wastewater by means of a positively cleaned bar rack that is installed in a concrete channel. The screen shall retain debris at the bar rack. A multitude of rake blades shall remove and lift the debris to a discharge mechanism. The bar rack shall be cleaned by a series of rakes engaging the bar rack from the upstream side (front) at the bottom of the channel and then moving up along the bar rack. The debris shall be lifted above the channel and dropped on a discharge chute at the downstream side (back) of the screen. Screens with single rakes shall not be approved. Screens employing brushes and spray water for screenings removal shall not be approved.

The bar rack shall consist of equally spaced, straight bars that are inclined from the horizontal with the inclination angle specified above. The lower ends of the bars shall be provided with a minimum 4 mm thick curved base plate such that the rakes positively remove all screenings from the bottom of the bar rack. Bars shall have a tear drop shaped cross section of 50 mm x 6 mm x 4 mm to reduce hydraulic losses and clogging in-between the bars. The bar rack shall be securely fastened to the frame of the screen and be readily removable.

The raking bars shall be attached to the drive chains within the side members of the screen frame utilising suitably fabricated links. The raking bars shall be accurately aligned to ensure that, for the full width of each bar, the tines penetrate the screen bars to the necessary amount for the full extent of travel of the tines whilst engaged within the screen bars.

The raking mechanism shall consist of multiple raking bars which shall restrict the head loss to a maximum specified head loss during peak flow events. Rakes shall be bolted to chain members at a maximum distance of 2,000 mm. Rakes shall include rake bars made of 6 mm thick channel profile having a cross section of 105 x 60 mm. Rake blades with a thickness of 8 mm and a depth of minimum 170 mm shall be bolted on the rake bars. The rake blades shall have teeth matching and engaging the bars of the bar rack. The rake blades shall each consist of several segments with teeth such that only one of the pieces needs to be replaced in case that a tooth should be damaged.

The travel speed of the rakes shall be between 8 to 12 m/min.

PS.M8.6 Chains, guides and sprockets

Drive chains for the rakes shall be roller type solid pin chains according to DIN 8167 M56 (or M112). Chain links shall have a minimum thickness of 8 mm to allow for accelerated chloride attack. The bush and pins shall be made from solid duplex stainless steel 1.4462 and AISI 316L stainless steel, respectively. Each chain shall have a minimum strength of 106 kN and a pitch of 160 mm. Drive chains, chain guides, sprockets and their bearings shall be replaceable without removing the screen from the channel.

The chains shall be of the roller-ball type made from polyamide and shall have a diameter of 60 mm and shall be a minimum of 24 mm wide. Links shall be of a minimum length of 100 mm, unless approved otherwise by the Engineer. The chain guides shall be securely fixed to the side members of the screen frame for the full length of travel of the chains.

Idler sprockets shall be located at the lower end of each side member of the screen frame and shall have a minimum thickness of 20 mm. A bush housing shall be continuously welded on both faces to the sprocket. The sprocket shall be mounted on stub axles utilising self-lubricating bush-bearings. The sprockets shall be retained on their stub axles by a suitable, easily removable, mechanism to ensure ease of replacement of the bearing should this be necessary.

The drive shaft at the head of the screen frame shall have two chain sprockets mounted thereon and shall be securely keyed to the shaft. The bearing for the shaft within the screen frame shall be self-lubricating.

Lower sprocket bearings shall have a stainless steel casing including a shaft made of a very abrasion resistant chromated chilled cast iron and a ceramic (zirconium oxide) friction bushing.

Upper sprocket bearings shall have a paint coated cast iron casing and include ball bearings that are double-sealed with Nilos rings.

PS.M8.7 Drive unit

Unless stated otherwise here, the drive units shall conform to the requirements stipulated under item **Section D35** and **D36** of the Standard Specification for Mechanical Works. Reference shall be made to Clause 3.6 of the Detailed Mechanical Specifications regarding motor efficiency.

The drive unit shall be suitably rated for continuous operation and shall be selected to match the duty of the particular screen. The drive unit shall be directly coupled to the screen drive shaft through the gearbox.

A facility shall be incorporated within the drive mechanism mounting arrangement to enable the scraping mechanism drive chains to be correctly tensioned and the raking bars to be accurately positioned across the screen face. Such adjustments shall be possible without the dismantling of any part of the screen frame and without the necessity for any special tools.

The drive shaft shall have a diameter of minimum 89 mm and a wall thickness of minimum 5 mm.

A current sensing overload device with a built-in intelligent control facility shall be incorporated within the screen starter compartment in the motor control centre. The device shall have the facility to be able to reverse the direction of travel of the scraping mechanism, should a blockage occur on the screen and cause the overload device to trip the normal operation of the screen. This device shall have the additional facility to enable this reversing action to be affected twice for any one occurrence, before tripping the alarm. Further, the device shall either re-set automatically if the blockage causing the initial overload conditions is cleared, or should the blockage remain upon the completion of the second attempt at automatic clearance, an alarm shall be generated.

The gear reducer shall be a totally enclosed unit. Gear reducer shall have ball or roller bearings throughout with all moving parts immersed in oil. Gear reducers which require periodic disassembly of the unit and manual re-greasing of bearings are not acceptable. The nominal input power rating of the gear reducer shall be at least equal to the nominal horsepower of the drive motor. Gear reducer shall be designed and manufactured in compliance with applicable DIN and ISO or equivalent standards. During continuous operation the oil temperature shall not exceed 95 degrees C.

If multiple lubrication points are required, this shall be done via a local greasing point from where all points can be lubricated.

PS.M8.8 Cleaning mechanism

The cleaning mechanism shall comprise a single bar, which shall engage each raking bar as it raises above the upper edge of the screening retention plate.

The scraper bar shall be fabricated and mounted so that it efficiently cleans the full width of each raking bar. The bearing for the scraper bar shall be self-lubricating.

The bar screen shall be provided with a dead plate extending from the bar rack to the discharge chute. The dead plate shall be made of a minimum 4 mm thick stainless steel plate and shall be stiffened by structural members so that it is flat without undulation so that the tips of the rake's teeth ride at a distance between 1 to 2 mm over the dead plate. The dead plate shall be securely fastened to the side frames.

A pivoting scraper mechanism shall be positioned at the point of discharge and shall be attached to the side frames. The scraper shall clean the rake on each pass and return to its rest position with minimal shock. The scraper shall be designed such that screenings do not wrap around the rake or scraper. The scraper shall be provided with a scraper bar made 4 mm thick channel profile with a minimum cross section of 39 x 68 mm and an adjustable 50 mm thick wiper made of Polyethylene. The scraper shall be connected with the frame through a pair of minimum 500 mm long scraper arms that shall be made of 4 mm thick channel profile with a minimum cross section of 68 x 59 mm. A pair of shock absorber elements made of neoprene shall be provided.

PS.M8.9 Discharge chute

The discharge chute shall be set to guide all the screenings removed by the screen as efficiently as possible onto the screenings handling system. The chute shall form an integral part of the screen. The discharge point of the screenings outlet shall be at least 1,5 m above the top of the platform of the structure housing the screen to allow for a screenings conveyor to be installed on the platform next to the screen.

The discharge chute shall be made of a minimum 4 mm thick stainless steel plate.

PS.M8.10 Fabrication

Refer to item **Section D9** of the Standard Specification for Mechanical Works..

PS.M8.11 Fasteners

Refer to **Section D15** and **D16** of the Standard Specification for Mechanical Works.

PS.M8.12 Corrosion protection

Refer to **Section D11** and **D14** of the Standard Specification for Mechanical Works.

PS.M8.13 Installation

Refer to item **Section D5** of the Standard Specification for Mechanical Works.

The Contractor shall be responsible for all installation work and including any concrete grouting required (this includes surface preparation). The screen shall be mounted firm and level. Screen frames which are mounted within the flat surfaces of channel walls and floor shall either be directly anchored to the concrete or shall be provided with cradle brackets which securely position the screen.

The spaces between the frame and the concrete shall be provided with a sealing arrangement which prevents flow through any clearance.

PS.M8.14 Safety

Gaps at floor level shall be closed so that a person's foot cannot pass through. Such closure plates shall not visibly deflect under a person's weight and shall be of 3 mm thick EN 1.4401

(316) stainless steel or EN 1.4362 (2304) duplex stainless steel with suitable stiffening ribs or shall be of another construction acceptable to the Engineer.

The Contractor shall provide adequate safeguards to prevent a person intruding any part of their body into any area where the rake mechanism might cause an injury.

Each motor shall be provided with an emergency stop station in an appropriate position.

PS.M8.15 Material

The mechanical front rake screens shall be of construction of the following materials (or superior), subject to the acceptance of the Engineer:

Description	Material
Frame	EN 1.4401 (316) stainless steel or EN 1.4362 (2304) duplex stainless steel
Screen field	EN 1.4401 (316) stainless steel or EN 1.4362 (2304) duplex stainless steel
Raking mechanism	EN 1.4401 (316) stainless steel or EN 1.4362 (2304) duplex stainless steel
Chain rollers	Polymide
Chain link	EN 1.4401 (316) stainless steel or EN 1.4362 (2304) duplex stainless steel (8 mm minimum thickness).
Chain link bushes	EN 1.4362 (2304) duplex stainless steel
Bush pin	EN 1.4401 (316) stainless steel
Screens	EN 1.4401 (316) stainless steel or EN 1.4362 (2304) duplex stainless steel.
Fasteners	EN 1.4401 (316) stainless steel or better
Cradle bracket	EN 1.4401 (316) stainless steel or EN 1.4362 (2304) duplex stainless steel.

PS.M8.16 Inspection

The screens shall be inspected by the Client and the Engineer prior to being released for delivery to Site. The Contract shall be responsible for all arrangement in this regard.

PS.M8.17 Testing and commissioning

The correct operation of the equipment and achievement of the specified performance requirements shall be demonstrated to the Engineer prior to the commissioning of the Works. All safety measures (e.g. over-torque cut-out) shall also be successful tested prior to acceptance and commissioning.

PS.M8.18 Spare parts

Provision for spare parts shall be included in the Schedule of Quantities. The Contractor will price this item in terms of the recommendation from the equipment manufacture. The spare parts / consumables offered shall be listed on a letter, which will be signed by an authorised representative from the manufacture in order to substantiate this allowance and shall be included in the tender offer as part of the evaluation file. Spare parts and consumables for an operational period of two (2) years shall be allowed for.

PS.M9. PERFORATED PLATE SCREEN

One (1) vertical, perforated band screens with 2 mm aperture screens installed at the inlet works shall for part of the Sow. Screen(s) shall be furnished complete with all accessories and appurtenances specified or otherwise required for a complete and properly operating installation.

PS.M9.1 Design requirements

It is not possible to accurately quantify the nature, volume and mass of screenings that will be processed by this system. It must be assumed that the screens will deal with rags, hard solids, stingy solids, plastics and any other solids that can be expected from a mixture of low cost housing, typical domestic sewage and industrial wastewater.

Design parameters and minimum design requirements of the perforated screens shall be as follow:

The performance requirements associated with the screens are as follow:

Description	Process stream	Max hydraulic load	Allowable head loss
2 mm aperture screen	Raw sewage	1050 m^3/hr	350 mm

Channel width: 800 mm

Channel height: 1355 mm

Minimum free board: 500 mm

Perforation details: 2 mm with minimum open area for water flow of 51% (minimum)

Motor protection: IP 65

The screen width shall be selected by the mechanical contractor to comply with the specified allowable head loss. The benching indicated on the drawings can be modified to suit the selected screen width if required.

Machine components such as motors, gearboxes and bearings shall have ingress protection which is suitable for washing by hose.

PS.M9.2 Screenfield

The screen shall be provided with perforated screen elements. Each screen element shall be made of a single piece of 3 mm thick perforated plate that is convexly curved with a radius of minimum 170 mm to provide for sufficient structural stability. The height of each screen element shall be 224 mm. The screening elements shall be designed as such that the gaps between the screen elements shall never exceed 1 mm throughout their entire lengths and traveling way. Each screen element shall be bolted with two bolts on each side to a link of the drive chain. Lateral plastic seal plates, made of 6 mm thick glass fibre reinforced polypropylene, and shall be attached to both ends of each screen element. The seal plates provide slip sealing between the moving screen elements and the frame of the screen. Each screening element shall be removable from the operating floor.

Every fourth screen element shall be provided with a lifting rake with tines that are specifically designed to be able to lift rocks, cans, bottles, rags, etc from the bottom of the channel. The distance between subsequent lifting rakes shall not exceed 0.5m. The tines shall be a minimum of 5 mm thick, 55 mm long, and 10 mm wide. The gaps between the tines shall not exceed 20 mm. Screen elements with ledges instead of lifting rakes are not acceptable.

The perforations in the screen elements shall have a diameter of 6 mm. Effective screen area shall have a free open area for water flow of minimum of 51%. The screen shall be capable of processing the peak flow without exceeding the maximum upstream water level based on a 40% reduction of the screen's free open area.

The travel speed of the screen shall be 6 - 7 m/min with a single speed motor.

The perforated band screen shall retain debris (screenings) from the incoming wastewater by means of traveling screen elements. The screenings shall be positively lifted and prevented from rolling back by means of lifting rakes with tines. Such lifting rakes shall be attached to every fourth screen element at distances not exceeding 0.5 m. The screen elements shall be cleaned at the downstream side (back) of the screen by means of a rotating brush and a spray bar. Removed screenings shall be dropped through a discharge chute.

PS.M9.3 Screenfield cleaning

Each screen shall have one (1) spray bar followed by one (1) counter-rotating brush assembly on the back of the screen as the only means of cleaning the perforated panels. Screens that incorporate brushes before the spray bar or multiple rotating/stationary brushed for cleaning the panels shall not be accepted. Screens with pressurized rotating brushes against the screen elements will not be accepted.

The brush body shall be divided into 4" wide segments for easy replacement using the existing drive shaft. The distance between the axis of the brush and the screen elements shall be adjustable to allow for wear of the brush. The brush bristles shall be made of polyamide 6.10 with a polypropylene body and shall have a diameter of 340 mm and a bristle diameter of 1.5 mm. The brush shall be driven by a motor suitable sized to insure effective operation of the brush system. Screen designs utilizing a third motor or brush to deflect screenings or clean panels shall not be accepted.

A spray pipe shall be located prior to the rotating cleaning brush for washing of the screen elements. The spray pipe shall have a diameter of minimum 1" and shall have stainless steel nozzles at distances not exceeding 100 mm. The wash water flow per nozzle shall be a minimum of 0.1 l/s at a minimum water pressure of 5 bar. The water flow shall be controlled with a minimum 1 ¼" diameter solenoid valve made of brass. Contractor shall provide 1 ¼" wash water piping to the solenoid valve. Screens that do not include the specified spray pipe or spray subsequent the cleaning brush shall not be accepted.

PS.M9.4 Drive unit

All components shall be so balanced that jamming at any point will not result in structural failure but will cause the drive motor to stall. All components, including the gear reducer, shall be designed to withstand, without damage or permanent distortion, the full stalling torque of the drive motor and/or the maximum differential head at any channel water depth.

The bearings for the drive shaft shall be ball bearings in a paint coated cast iron casing. The lower sprocket bearings shall be slide bearings in a stainless-steel casing with shafts made of white cast iron and slide bushing made of silicon carbide. All ball or roller bearings shall be double-sealed and provided with Nilos seal rings.

The drive shaft shall be made of a stainless steel tube with a minimum diameter of 89 mm and a wall thickness of 5 mm. The drive shaft shall be driven by a 1.5 kW gear motor with a minimum speed of 6.4 rpm.

A current sensing overload device with a built-in intelligent control facility shall be incorporated within the screen starter compartment in the motor control centre. The device shall have the facility to be able to reverse the direction of travel of the belt, should a blockage occur and cause the overload device to trip the normal operation of the screen. This device shall have the additional facility to enable this reversing action to be affected twice for any one occurrence, before tripping the alarm. Further, the device shall either re-set automatically if the blockage causing the initial overload conditions is cleared, or should the blockage remain upon the completion of the second attempt at automatic clearance, an alarm shall be generated.

If multiple lubrication points are required, this shall be done via a local greasing point from where all points can be lubricated.

PS.M9.5 Frame

The side frames of the screen shall be fabricated from 5 mm thick stainless steel plates and shall have a minimum of four 90 degree edges. The side frames shall be a minimum of 570 mm wide and 93 mm deep. The top plate shall also be fabricated from a 5 mm thick stainless steel plate. The side frames shall also be connected with each other through lateral tubing having a diameter of minimum 168 mm and a wall thickness of minimum 5 mm. The contractor shall securely anchor the support frames onto the operating floor. 4 mm thick EPDM strips shall be fastened to the side frames to seal the lateral gaps between the side frames and the channel walls.

A lateral bottom seal element shall be attached to and between the side frames. The element shall include a minimum 4 mm thick and 179 mm wide EPDM flap for sealing the gap between the element and the channel floor. The element shall also include a twin row of brushes made of polypropylene 6.6, each row having a height of 120 mm and a width of 10 mm and a bristle diameter of 1 mm. The brushes shall be secured with a holder made of stainless steel that permits easy replacement of the brushes. The brushes seal the gap between the element and the screen elements preventing passage of debris while permitting passage of the tines of the lifting rakes. Screen designs not utilizing a twin row of brushes shall not be accepted.

The screen shall be provided with easily removable covers made of 1.5 mm thick stainless steel plates with edges on all sides. The covers shall be provided with turn locks and handles.

The side frames shall be provided with roller tracks. The roller tracks shall be bolted to the side frames and shall be made of corner profiles that are a minimum of 5 mm thick and have a cross section of minimum 80 x 45 mm.

The spray wash system shall be enclosed such that spray water, aerosols or leakage do not contaminate the operating floor surrounding the screen unit.

PS.M9.6 Discharge chute

Discharge chutes shall be provided that fully encloses the discharge section of the screen. An access hatch with hinges and handle shall be provided in the chute permitting easy access to the rotating brush and spray bar.

PS.M9.7 Inspection

Manufacturer shall deliver the screen factory assembled (with the exception of motors and gears, discharge chute and support frames) and shall be tested for a minimum of 30 minutes prior to shipment. It shall be made such that the contractor can install the screen with minimal field assembly.

PS.M9.8 Chain, guides and sprockets

Two endless drive chains shall be provided to move the screen elements. The drive chains shall have links made of EN 1.4401 (316) stainless steel or EN 1.4362 (2304) duplex stainless steel, with connecting bushes and pins made from EN 1.4362 (2304) duplex stainless steel and EN 1.4404 (316L), respectively. Chain links shall have a minimum thickness of 8 mm to allow for accelerated chloride attack. The chain shall have a minimum strength of 107,000N and a pitch of 200 mm. Chain rollers shall be made of polyamide and shall have a minimum diameter of 60 mm and a width of 32 mm. Stainless steel rollers shall not be accepted.

A pair of lower and upper sprockets (four total) shall be provided. The lower sprockets shall be solid.
The upper sprockets shall be split to facilitate maintenance. Sprockets shall be made of EN 1.4404 (316L) stainless steel or EN 1.4362 (2304) duplex stainless steel. The sprockets shall be a minimum of 28.5 mm thick and shall have a reference diameter of 340 mm.

The lower sprocket bearings shall be slide bearings with a slide bushing made of silicon carbide and with a shaft of white cast iron. The slide bushing shall have an interior diameter of 59 mm and a length of 50 mm. Ball or roller bearings, or slide bushings made of metal or plastic material shall not be accepted as lower sprocket bearings.

The upper drive shaft bearings shall be ball bearing type provided with nipples for grease lubrication. Their interior diameter shall be a minimum of 60 mm. Their casing shall be made of painted coated cast iron.

PS.M9.9 Fabrication

Refer to item **Section D9** of the Standard Specification for Mechanical Works..

PS.M9.10 Fasteners

Refer to **Section D15** and **D16** of the Standard Specification for Mechanical Works.

PS.M9.11 Corrosion protection

Refer to **Section D11** and **D14** of the Standard Specification for Mechanical Works.

PS.M9.12 Installation

Contractor shall verify all dimensions in the field to ensure compliance of equipment dimensions with the drawings. Contractor shall notify the Engineer of significant deviations.

Contractor shall furnish the services of a factory-trained service engineer for two (2) trips including a total of five (5) days to inspect the installation, observe start up, and provide Operator training.

1. Equipment shall not be energized, or "bumped" to check the electrical connection for motor rotation without the service engineer present.
2. The service engineer shall make all necessary adjustments and settings to the controls.
3. The service engineer shall demonstrate proper and sequential operation of the screen. The screen shall operate automatically based on the water level differential.

PS.M9.13 Material

The vertical perforated plate screens shall be of construction of the following materials (or superior), subject to the acceptance of the Engineer:

Description	Material
Frame	EN 1.4401 (316) stainless steel or EN 1.4362 (2304) duplex stainless steel
Screen field	EN 1.4401 (316) stainless steel or EN 1.4362 (2304) duplex stainless steel
Raking mechanism	EN 1.4401 (316) stainless steel or EN 1.4362 (2304) duplex stainless steel
Chain link	EN 1.4401 (316) stainless steel or EN 1.4362 (2304) duplex stainless steel (8 mm minimum thickness).
Chain link bushes	EN 1.4362 (2304) duplex stainless steel
Bush pin	EN 1.4401 (316) stainless steel
Screens	EN 1.4401 (316) stainless steel or EN 1.4362 (2304) duplex stainless steel.
Fasteners	EN 1.4401 (316) stainless steel or better
Cradle bracket	EN 1.4401 (316) stainless steel or EN 1.4362 (2304) duplex stainless steel.
Lateral seal plates of screen elements	Glass fiber reinforced polypropylene
Brushes	Polyamide 6.6 or 6.10
Bottom seal flap	EPDM (4 mm thick)

PS.M9.14 Spare parts

Provision for spare parts shall be included in the Schedule of Quantities. The Contractor will prices this item in terms of the recommendation from the equipment manufacture. The spare parts / consumables offered shall be listed on a letter, which will be signed by an authorised representative from the manufacture in order to substantiate this allowance and shall be included in the tender offer as part of the evaluation file. Spare parts and consumables for an operational period of two (2) years shall be allowed for.

As a minimum requirement the Contractor shall allow for the following Spare Parts:

a. Two (2) screen elements
b. Brush segments for two (2) rotating brush assembly
c. Two (2) EPDM strips for bottom seal element
d. Two (2) sets of twin brushes for bottom seal element
e. Six (6) lateral plastic seal plates including fasteners
f. Two (2) lower bearings
g. Two (2) upper bearings
h. Two (2) solenoid valve rebuild kit

Spare parts shall be packaged with labels indicating the contents of each package and shall be delivered to owner as directed.

PS.M9.15 Testing and commissioning

The correct operation of the equipment and achievement of the specified performance requirements shall be demonstrated to the Engineer prior to the commissioning of the Works. All safety measures (e.g. over-torque cut-out) shall also be successful tested prior to acceptance and commissioning.

PS.M10. WASHER COMPACTOR

There will be multiple wash compactor installations forming part of this Contract. The relevant systems are listed below for reference purposes:

1. The coarse screenings wash compactor system
2. The fine screenings wash compactor system

The wash and press unit shall consist of a transition chute between the screen and the wash and press body, a screenings feed hopper, an agitator, a washing chamber, a preliminary compaction zone, a main compaction zone, a drive unit, a discharge conveyance pipe, and controls. The screenings shall be conveyed into the units feed hopper to the mechanical agitation zone. Within the agitation zone, the faecal material shall be batch washed in a water bath. At completion of the mechanical wash cycle water shall be drained from the screenings through a motor operated valve.

Screenings will then pass through a preliminary compaction zone where remaining matter will be crushed and compacted into the main compaction zone where dewatering and compaction of the screenings shall take place. From this zone the screenings shall then be conveyed to the discharge conveyance pipe. The discharge conveyance pipe shall transport the washed and compacted screenings vertically and horizontally into a dumpster.

PS.M10.1 Design requirements

The design parameters and minimum design requirements that has to be allowed for in the tender submission shall be as follow:

Coarse screenings washer compactor (Captured on 6 mm aperture screens)

Wet screenings washing capacity: 3 m^3/hr max

Minimum dry solids content of compacted screenings: 60% dry solids content

Maximum allowable BOD in washed screenings: 20 mgBOD/gDS

Fine screenings washer compactor (Captured on the 2 mm aperture screens)

Wet screenings washing capacity: 3m^3/hr

Minimum dry solids content of compacted screenings: 60% dry solids content

Maximum allowable BOD in washed screenings: 20 mgBOD/gDS

PS.M10.2 Inlet hopper with agitator

The inlet hopper shall be mounted above the washer compactor body. An agitator shall be mounted in a 45 degree angle to the horizontal. At the same height there shall be an opening to provide access to the impeller of the agitator for maintenance purposes.

PS.M10.3 Washer compactor body

The washpress body shall accommodate the shafted screw, trough, ball bearing, drive unit including shaft, gear and motor as well as the torque support. The tube shall be EN 1.4401 (316) stainless steel or EN 1.4362 (2304) duplex stainless steel with a perforation in the area where the hopper is located as well as in the washing zone. At the end of the tube, the washpress body shall be equipped with not less than six (6) guide bars made of Hartox 400. The guide bars shall be bolted from the outside of the tube for easy access and removal. The guide bars shall be at least 160 mm long and the thickness shall be not less than 10 mm. Welded guide bars shall be not allowed.

PS.M10.4 Shafted screw

The shafted screw shall be completely made of be EN 1.4401 (316) stainless steel or EN 1.4362 (2304) duplex stainless steel and shall transport the screenings from the hopper area into the discharge pipe, by washing and pre-pressing it. The screw shall have an outer diameter of not less than 324 mm, the diameter of the shaft shall be not less than 88,9 mm and the thickness of the material 3 mm. The flights shall have the thickness of 10 mm, the pitch in the hopper area shall be 150 mm, the pitch in the washing area shall be 100 mm. The flights shall end 160 mm prior to the discharge into the discharge pipe. The discharge pipe shall be flanged to the washpress body. Any other material than stainless steel or shaftless screws shall be not be accepted.

PS.M10.5 Trough

The washpress body shall be equipped with a trough beneath it, attached with hinges and hatches for easy remove. There shall be a wash water connection of ¾ inches to flush the trough for cleaning purposes. A NB 100 drain with an automatic operated ball valve shall be provided to discharge the drained water into the downstream side of the screen.

PS.M10.6 Discharge pipe

The discharge pipe shall be made of stainless steel, the pipe shall be tapered to prevent those screenings get clogged. The pipe shall be flanged to the washpress body. All bend fittings in the unit's conveyance tube shall be long radius design. All necessary flanges shall be provided on the tube to allow installation. All field connections on the unit shall be flanged.

PS.M10.7 Washwater connection

The washpress shall be equipped with a manifold to provide plant water on the different washing locations. The washwater supply shall be integrated into the operation of the

PS.M10.8 Installation

The chute shall have a funnel like top extending to a height specified in the Project Specifications above the screw compartment to ensure clean operation and final discharge. The exit chute shall be manufactured from EN 1.4404 stainless steel of sturdy construction to allow for some rough handling. A water discharge trough shall be provided along the bottom of the press to collect any liquid oozing from the press and shall be manufactured in EN 1.4401 (316) stainless steel or EN 1.4362 (2304) duplex stainless steel. The operation of the wash compactor shall be clean and hygienic. Access to parts that need maintenance and cleaning must be provided, the covers being corrosion free and sturdy to prevent damage during maintenance or cleaning operations.

The wash zone impeller and screw must be easily removable for maintenance.

The press unit shall be mounted on a concrete platform which will be constructed by others in accordance with the requirements of the Contractor. The entire unit must be designed for easy cleaning and spraying down to reduce fly nuisance.

PS.M10.9 Drive units

The drive unit for the screw shall be suitably sized with an output speed selected to facilitate the load transported and with a minimum service factor of 2,0 on installed power. The drive

unit shall be a flanged mounted inline helical bevelled geared hollow shaft type to accommodate the drive shaft. The drive unit shall be bolted to a drive a/end flange, machined with spigots and tapped holes for accurate alignment.
The protection rating of the drive unit (motor and gearbox) shall be IP 65 or higher and 400 V or higher. The protection rating for the wash zone impeller drive shall be IP 65 as well.

The drive unit for the screw shall match the requirements of the press without overloading and shall be situated to allow unimpeded access to the press.

The drive units for the screw and wash impeller shall be isolated from the press area so as to prevent any water leakage into the drive unit.

In the case of overloading, the press must be automatically reversed for a few seconds before commencing a forward motion again. This sequence of reverse and forward operation shall only be allowed to occur three times, after which the press must trip and sound an alarm.

Reference shall be made to Clause 3.6 of the Detailed Mechanical Specifications regarding motor efficiency.

PS.M10.10 Auger assembly

The auger assembly includes a perforated screen segment, transport segment, discharge segment, internal rotating spiral, drive speed reducer and motor.

The auger screen segment trough with a rotating centreless spiral captures the particles and transports them to the discharge segment outlet. A wiper/brush is fixed to the outer edge of the spiral in the screen segment trough to provide cleaning and particle transport. The wastewater passes through the screen segment and flows downstream. Particles are washed by the highly agitated wastewater and by the spray wash system. Dewatering occurs as the rotating spiral conveys the washed screenings.

The spiral has a groove machined into the outside diameter for mounting the brush. The groove secures and locates the brush so that constant contact is maintained with the screen segment for the purpose of cleaning the perforations and the free passage of soft organics and liquids.

PS.M10.11 Fabrication

Refer to item **Section D9** of the Standard Specification for Mechanical Works..

PS.M10.12 Fasteners

Refer to **Section D15** and **D16** of the Standard Specification for Mechanical Works.

PS.M10.13 Corrosion protection

Refer to **Section D11** and **D14** of the Standard Specification for Mechanical Works.

PS.M10.14 Material

The wash-press units shall be of construction of the following materials (or superior), subject to the acceptance of the Engineer:

Description	Material
Body / frame	EN 1.4404 (316L) stainless steel or EN 1.4362 (2304) duplex stainless steel
Shafted screw	EN 1.4404 (316L) stainless steel or EN 1.4362 (2304) duplex stainless steel
Inlet hoppers	EN 1.4404 (316L) stainless steel or EN 1.4362 (2304) duplex stainless steel
Fasteners and anchors	EN 1.4401 (316) stainless steel or better

PS.M10.15 Testing and commissioning

All fabrications shall be inspected prior to acceptance and delivery to site. The correct operation of the unit shall be demonstrated to the Engineer by using water-laden rags before screenings from wastewater is fed into the unit. The mass of the water-laden rags shall be measured before it is fed into the compactor and after it has been dewatered in the compactor. This test shall be run three times on separate sets of rags and the average water removal shall be calculated. The washer compactor shall be deemed appropriate and cleared for release to site based on the findings of this test.

PS.M10.16 Spare parts

Provision for spare parts shall be included in the Schedule of Quantities. The Contractor will prices this item in terms of the recommendation from the equipment manufacture. The spare parts / consumables offered shall be listed on a letter, which will be signed by an authorised representative from the manufacture in order to substantiate this allowance and shall be included in the tender offer as part of the evaluation file. Spare parts and consumables for an operational period of two (2) years shall be allowed for.

PS.M11. GRIT REMOVAL EQUIPMENT

Two (2) vortex degritters shall be installed at the new inlet works.

The tender offer shall make provision for the supply and installation of complete, functional systems fully equipped for functional and automated use. This specification, together with the relevant drawings shall be used to define the scope of this system. This includes, but shall not be limited to, items such as:

- Paddle mixers
- Grit Extraction Pumps
- Pipework and valves
- Grit classifiers

The general civil arrangement has been indicated in the specification. However, the Contractor shall confirm the final arrangement.

PS.M11.1 General

Channels will converge downstream of the fine screens, into a single chamber that will feed the vortex degritter system. The flow entering this system will be split between two (2) vortex degritters. This split allows for operational flexibility and assists in the maintenance procedure of this system (i.e. taking a unit out of commission).

The degritting sequence will be activated by any one of the following PLC controlled operating philosophies:

a) The sequence can be activated by a timer which will result in the grit being removed at a regular, adjustable pre-set interval.
b) It can be activated after an adjustable, pre-set flow has passed through the head of works.
c) Each sequence can be activated manually for individual degritters.

An overriding control will activate all the degritters at once if the incoming flow rate exceeds the adjustable pre-set upper limit. This protects the system from excess grit loading and storage due to high flow velocities. Under these circumstances the degritters will operate continuously until the flow rate subsides.

The vortex velocity in the degritters will be mechanically controlled via a paddle mixer fitted with VFD. The rotational speed of the paddles will be adjusted to maintain an optimum vortex velocity for grit removal, typically ranging between 13 to 21 RPM.

The grit that collects in the hopper will be pumped out by an self-priming pumps which will discharge directly into a grit classifier (one (1) duty, one (1) standby). Most of the organics which have been trapped in the grit will be washed out and returned to the mainstream.

PS.M11.2 Design requirements

The design parameters and minimum design requirements that has to be allowed for in the tender submission shall be as follow:

Vortex degritters

No. of vortex degritters:	Two (2 off)
Diameter of degritters:	3 meters (subject to final design)
Configuration:	Two (2) duty, zero (0) standby

Grit removal efficiency based on Specific Gravity of 2.65 @ peak flow:

Greater than 50 mesh (0.300 mm) in size:	95%
Greater than 70 mesh (0.212 mm) in size:	85%

Greater than 100 mesh (0.150 mm) in size: 65%

Average flow per unit: 450 m^3/hr

Peak flow per unit: 1 050 m^3/hr

Grit classifier

No. of: One (1 off)

Grit processing capacity per unit: 1 ton/hr

Maximum water content in washed grit product: 10 %

Maximum volatile solids content in dried grit product: 3 %

Minimum capture rate of 200 micron quartz sand at design flow: 95 %

PS.M11.3 Vortex degritter

Wastewater containing grit shall be introduced concrete separation chamber as shown on the relevant drawings, creating a tangential rotational flow pattern. The waste water shall flow in a circular motion around the upper separation chamber and out through an outlet 270 degrees around the chamber from the inlet. There shall be a steel reinforced concrete walkway spanning the chamber to support a bull gear drive.

Grit particles shall be directed in a radial flow towards the center drive tube with paddle. In the center of the separating chamber there shall be an opening which shall allow settling grit to drop down into the grit collection chamber.

The grit collection chamber shall be as shown on the relevant drawings and shall have a covering floor plate manufactured of EN 1.4404 (ASTM 316L) or EN 1.4362 (ASTM 2304) duplex stainless steel. The floor plate shall be a two piece system to allow removal without dismantling the drive system and stirrer tube. There shall be 80 mm clearance around the drive tube to allow grit to drop into the lower collection chamber.

A four bladed paddle manufactured from EN 1.4404 (ASTM 316L) or EN 1.4362 (ASTM 2304) duplex stainless steel shall be connected to the center drive tube to direct grit to the collection chamber.

a. Drive unit

The grit collector shall have a bull gear drive system connected to the drive tube. Provision for a 1.1 kW, Class 1, Divison 2, 400VAC, 50Hz, 3ph, motor shall be made in the tender offer.

The bull gear drive system shall consist of a helical gearbox with a totally enclosed spur gear and turntable bearing. A pinion on the motor shall drive the large spur tooth bull gear which shall be contained within a heavy duty cast iron casing. The drive system shall be rated for continuous duty.

Enclose bull gear in a heavy cast iron casing, confirming DIN/ISO standards. Unit with at least 5.0 service factor at standard operating speed and power demand. Maximum output speed of the drive is 18.75 rpm.

Drive unit and motor bearings have a minimum bearing life of 100,000 hours. Turntable bearings supporting the paddles assembly have a minimum bearing life of 20 years.

Reference shall be made to Clause 3.6 of the Detailed Mechanical Specifications regarding motor efficiency.

PS.M11.4 Self-Priming Pumps

Pumps

Extraction pump sets shall be supplied and installed for the extraction of the settled grit from the hoppers. Each hopper will have a dedicated extraction pump. And additional pump set shall be supplied as a standby unit, connected to the suction pipework. The extraction pumps shall pump via a dedicated delivery pipe to the grit washer / clarifier.

Pump shall be of the self-priming type, driven by an electrical motor, mounted on a base plate, complete with belt drive coupling or directly coupling (if suitable) and coupling guard. Pump sets shall be in accordance with the applicable Standard Specification and shall be similar or equally approved to Gorman Rupp.

The pump sets shall be installed on the operational level, in a position where it does not interfere with the operation and access to other equipment. It shall be bolted to plinth / concrete floor in accordance with the applicable Standard Specification.

Pipework, valves and supports

Unless stated otherwise here, pipe work, valves and support shall conform to the specification under Section **D20** and **D27-D32** of the Standard Specifications for Mechanical Works.

Each pump shall be equipped with a suitably sized, dedicated suction pipe installed into the grit collecting hopper with an inlet position of 300 mm above the hopper floor. The sizing of the pipe shall be in accordance with the manufacturer's requirements, and it shall be a single piece of pipe, connecting pipework in the hopper shall not be allowed.

The two pumps shall be connected via a common suitably sized, delivery pipe installed above ground to the grit classifier. It shall be sized so that the flow velocity does not exceed 1.8 m/s.

Each pump shall be equipped with a suitably sized and pressure rated flanged gate valve and flanged, single door swing type non-return valve on the delivery. The non-return valves shall have a lever and counterweight and shall be suitable to have a limit switch installed. The gate valves shall be of the rising spindle type, equipped with a hand wheel. All valves shall be in accordance with the applicable Standard Specifications and suitable for abrasive slurries. Supports shall be allowed for in accordance with Section **D20.4.3** of the Standard Specifications of Mechanical Works with the through being designed for as if it were a pipe.

All pipework at each degritter shall be manufactured from EN 1.4401 (316) stainless steel or EN 1.4362 (2304) duplex stainless steel and shall be flanged in accordance with the requirements of the Specification. Pipework from the air bypass system to the connection to the slurry discharge pipe shall be manufactured from EN 1.4401 (ASTM 316) stainless steel or EN 1.4362 (ASTM 2304) duplex stainless steel. A nozzle shall be provided on the discharge line from each compressor to accommodate a pressure switch.

PS.M11.5 Washwater pipework, valves and supports

Unless stated otherwise here, pipe work, valves and support shall conform to the specification under Section **D20** of the Standard Specifications for Mechanical Works.

Washwater pipework shall be manufactured from EN 1.4401 (ASTM 316) stainless steel or EN 1.4362 (ASTM 2304) duplex stainless steel. Washwater control valves shall be of the electrically actuated 'Burkett' solenoid type with flanged connections designed to fail in the closed position. The valve bore shall be of the same diameter as the washwater pipe. Actuators shall be of the direct acting type complying with the requirements of Section **D32** of the Standard Specifications for Mechanical Works.

PS.M11.6 Grit slurry pipework, valves and supports

Unless stated otherwise here, pipe work, valves and support shall conform to the specification under Section **D20** of the Standard Specifications for Mechanical Works.

The vertical slurry discharge pipe from the bottom of the vortex separator and manifolds discharging to the classifier shall be manufactured from EN 1.4401 (ASTM 316) stainless steel or EN 1.4362 (ASTM 2304) duplex stainless steel. Pipe lengths shall not exceed 3,0 m and be provided with flanged connections to permit rapid dismantling of sections. All bends shall be of the long radius type fitted with a flanged rodding tee. A fixed high pressure air connection of 25 mm diameter with isolating ball valve shall be provided between each slurry discharge valve and the vertical slurry discharge pipe for clearance of blockages.

Slurry discharge valves shall be of the electrically actuated resilient seal gate valves. The body shall be manufactured from spheroidal graphite iron with a soft natural or synthetic rubber lining specifically selected for extended abrasion resistant duties on the material specified. The valve bore shall be the same diameter as the slurry pipe. Actuators shall be of the direct acting type, complying with the requirements of Section **D32** of the Standard Specifications for Mechanical Works.

PS.M11.7 Grit classifiers

Water, grit and air will be discharged into one of two new grit classifiers. The grit classifiers shall operate on the “Coanda” principle, or similar approved. The grit shall be separated from the inflow and then washed. The washing shall take place in the bottom of the classifier on top of a fluidized bed where grit particles shall rub against one another due to the fluidizing action. Wash water is fed into a bottom chamber that is separated from the grit washer tank by a perforate plate and a perforated rubber diaphragm. The wash water flows upwards through the diaphragm and is evenly distributed over the bottom of the tank which generates the fluidised grit bed. The central stirrer keeping the particles in motion supports this process.

The Contractor shall install the classifier complete with all pipe connections, drain pipes, etc.

All components shall be manufactured form EN 1.4401 (ASTM 316) stainless steel or EN 1.4362 (ASTM 2304) duplex stainless steel (or material with greater strength and pitting corrosion values).

PS.M11.8 Classified grit screw conveyor

The classifier shall be of robust construction. The screw trough, the steel pipe with the steel flight and the access chute shall be constructed of 4,5 mm thick, EN 1.4401 (316) stainless steel or EN 1.4362 (ASTM 2304) duplex stainless steel. The screw flight shall be manufactured from 4,5 mm thick EN 1.4401 (316) stainless steel or EN 1.4362 (ASTM 2304) duplex stainless steel.

The helix of the screw classifier shall be welded to the tubular shaft to form a smooth and continuous flight with its outer edges grounded to an accurately cylindrical shape. The flights shall be accurately positioned and shall be at right angles to the tube axis at all points.

The tube shaft shall be manufactured from a single piece of tubing having a longitudinal seam. The tube must be straight and cylindrical over its entire length and shall be free of irregularities. End plates shall be firmly welded to the tube to form a water and airtight container. The end plates shall be machined to provide a surface perpendicular to the longitudinal axis of the screw. Axes of the stub axles attached to the endplates must be exactly concentric to the axis of the screw.

The finished screw shall be tested for shaft alignment and centricity before being dispatched to Site. The entire drive assembly including reducer must be enclosed and the enclosure shall be of EN 1.4401 (ASTM 316) stainless steel or EN 1.4362 (ASTM 2304) duplex stainless steel sheeting 3 mm thick and shall be equipped with inspection facilities to provide access to moving parts for maintenance.

The Contractor shall submit full details regarding the plant offered by him and shall submit full details of the requirements for fitting the units into the civil structure. He/she must

demonstrate the operation of the screw and the way in which water will be drained to facilitate drying of the grit.

Discharge chutes shall be fitted at the drive end of the classifier trough.

Grit will discharge into skips located next to the grit classifiers. The discharge position of the chute / auger shall be in accordance with the relevant drawings.

PS.M11.9 Material

The grit removal equipment shall be of construction of the following materials (or superior), subject to the acceptance of the Engineer:

Description	Material
Pipework	EN 1.4401 (ASTM 316) stainless steel or EN 1.4362 (ASTM 2304) duplex stainless steel
Stirrer and plates	EN 1.4404 (ASTM 316L) stainless steel or EN 1.4362 (ASTM 2304) duplex stainless steel
Blower base plates	HDG mild steel
Classifier body	EN 1.4401 (ASTM 316) stainless steel or EN 1.4362 (ASTM 2304) duplex stainless steel
Screw conveyor / auger with through	EN 1.4401 (ASTM 316) stainless steel or EN 1.4362 (ASTM 2304) duplex stainless steel
Fasteners	EN 1.4401 (ASTM 316)

PS.M11.10 Spare parts

Provision for spare parts shall be included in the Schedule of Quantities. The Contractor will prices this item in terms of the recommendation from the equipment manufacture. The spare parts / consumables offered shall be listed on a letter, which will be signed by an authorised representative from the manufacture in order to substantiate this allowance and shall be included in the tender offer as part of the evaluation file. Spare parts and consumables for an operational period of two (2) years shall be allowed for.

PS.M11.11 Testing and commissioning

The following performance testing shall be required for the grit removal system:

The tests shall consist of the following:

Vortex degritter

a) Efficient and effective operation of mixers, valves, actuators, pressure relief valves and ancillary equipment under automatic and manual control.
b) Measurement of rate of discharge of slurry from each degritter.

The system will be considered acceptable when:

1) The correct operation of the equipment and achievement of the specified performance requirements has been demonstrated to the Engineer prior to the commissioning of the Works.
2) All safety measures (e.g. over-torque cut-out) shall also be successful tested prior to acceptance and commissioning.
3) The tests defined above prove the acceptable operation of the equipment.
4) Where a power test is required, the power absorbed by each motor at duty point does not exceed the values stated in the Technical Data Sheets.
5) Where a vibration test is required, the vibration measured at each point does not exceed the level prescribed in BS 4675 Part 1 – 1976 for the appropriate class of machine.
6) Where a noise test is required, the noise generated by the equipment does not exceed the values stated in the Technical Data Sheet.
7) The tests will be performed on the equipment over a single 8 hours shift.

PS.M12. SPIRAL CONVEYOR

There will be multiple Spiral conveyor installations forming part of this Contract. The relevant systems are listed below for reference purposes:

1. The coarse and medium screening Spiral conveyors
2. The fine screen Spiral conveyors

The tender offer shall make provision the supply and installation of complete, functional systems fully equipped for fit for purpose and automated use. This includes, but shall not be limited to, items such as:

- Stainless steel launders
- Support brackets and anchors
- Anchor fasteners
- Launder supports
- Washwater supply (pipe work and valves)
- Pipe supports and anchors
- Actuated/solenoid valves
- Diverter gates with electric actuator and proximity switches

PS.M12.1 General

Each Spiral conveyor shall have a fall to ensure that the screenings are directed to the relevant wash compactor without the assistance of a process controller. The screenings and wash water from each launder system shall be deposited into one of two wash compactors at a time (i.e. duty and standby). This shall be achieved by the use of an electrically actuated diverter gate or a valve(s) on the inlet to the wash compactors.

Treated effluent shall be utilised for transporting the screenings in the Spiral conveyor. The ware supply shall be regulated by electrically actuated valves and pressure reduction valves as necessary.

PS.M12.2 Performance requirements

The amount of water used to clear the screenings shall not exceed the amount of water required to initiate a wash cycle. It is preferred that the launder is cleared several times before a wash cycle is started.

No screened material shall remain in the lauder of any Spiral conveyor after a flush cycle has been finalised.

No screenings can be caught or accumulate in the diverter/valve chute at the wash compactor systems. This system shall be water tight.

For short conveyor lengths, typically less than 10 m, the slope of the conveyor shall be 1.6% as a minimum. For conveyors longer than 10 m, the slope shall be 1% as a minimum.

PS.M12.3 Trough

The Spiral conveyor shall be manufactured in a U-shape with a stiffening lip on both sides. The trough shall be bent and not rolled for optimum lateral strength. The troughs shall be supplied in maximum 3 metre sections and shall be supported at 3 metres maximum spacing between supports. The support legs shall be manufactured from H-shape channel sections and bolted with stainless steel bolts to the concrete floor.

The inclusion of bends in the conveyor alignment must be minimised as far as possible. Where such changes in flow direction are required, long-radius bends shall be used.

PS.M12.4 Supports

Supports shall be allowed for in accordance with Section **D20.4.3** of the Standard Specifications of Mechanical Works with the through being designed for as if it were a pipe.

PS.M12.5 Washwater system

A dedicated wash water supply and control system shall be provided for the Spiral-conveyor and the wash water pumps shall be adequately sized to effectively remove the screenings to the downstream screenings handling system.

Water for the launders shall be piped to the launders with EN 1.4401 (ASTM 316) stainless steel or EN 1.4362 (ASTM 2304) duplex stainless steel piping and EN 1.4401 (ASTM 316) ball valves of at least 40 mm in diameter. Each of the flushing points (minimum of two) shall consist of an electrically actuated valve (designed for use with final effluent) with manual bypass valve and an isolation valve upstream of the actuated valve. The bypass valve shall be connected to the launder so that it can be used to flush the launder and this connection should be independent of the actuated valve connection. A pressure reduction valve shall be provided to limit the wash water pressure supplied to the launders.

Washwater shall be supplied via a dedicated site washwater supply ring main operating at a minimum pressure of 6 bar.

The operation of the washwater system shall be linked to the operation of the screens and downstream screenings treatment system to ensure that screenings are removed at regular intervals to negate the creation of nuisance odour conditions.

PS.M12.6 Installation

The Contractor shall verify all dimensions in the field to ensure compliance of equipment dimensions with the drawings and relevant mechanical equipment. The Contractor shall notify the Engineer of significant deviations.

PS.M12.7 Material

The perforated drum screens shall be of construction of the following materials (or superior), subject to the acceptance of the Engineer:

Description	Material
Through	EN 1.4401 (ASTM 316) stainless steel or EN 1.4362 (ASTM 2304) duplex stainless steel
Fasteners	EN 1.4401 (ASTM 316) stainless steel or better

PS.M12.8 Testing and commissioning

The Spiral conveyor shall be considered as commissioned after the completion of the following:

1) The correct operation of the equipment and achievement of the specified performance requirements has been demonstrated to the Engineer prior to the commissioning of the Works.

PS.M12.9 Spare parts

Provision for spare parts shall be included in the Schedule of Quantities. The Contractor will prices this item in terms of the recommendation from the equipment manufacture. The spare parts / consumables offered shall be listed on a letter, which will be signed by an authorised representative from the manufacture in order to substantiate this allowance and shall be included in the tender offer as part of the evaluation file. Spare parts and consumables for an operational period of two (2) years shall be allowed for.

PS.M13. PARSHALL FLUME

One Parshall Flume shall be provided with this contract.

PS.M13.1 Design requirements and process parameters

Design parameters and minimum design requirements of the flume measurement station shall be as follow:

Flume type: Parshall Flume No.12” size to be allowed for

Minimum design flow per flume: 3.32l/s @ 30m

Maximum design flow per flume: 473.42/s @ 780m

PS.M13.2 Flume

The Parshall Flume shall be designed according to the standard dimensional guidelines stipulated in terms of the requirements stated in ISO 9826:1992. The flumes will be fitted with an ultrasonic level transducer that will relay the water depth back to the SCADA for conversion and logging of instantaneous flow rates.

Any flume installed under this Contract shall be fabricated form GRP material, and the material shall comply with the requirements stipulated in the SANS 141:2006.

PS.M14. SKIP DOLLY SYSTEM

The Contractor shall design, supply and install dolly systems for handling skips, including drive motor and gear box, with all associated electrical and electronic equipment at the following areas:

PS.M14.1 Design requirements and process parameters

Design parameters and minimum design requirements of the skip dolly station shall be as follow:

No of dolly stations: One (1) no.'s of

No of skips per dolly station: Three (3) no.'s of

Design size for skip: 6 m^3

Operation: Automated / motorised

Travel speed: 6 m/min, irrespective of loading

Motor ingress protection: IP55

PS.M14.2 Control

A local push button station shall be provided at each dolly for moving the dolly forward or in reverse. The push buttons shall be non-latching and marked with directional arrows.

PS.M14.3 Design and construction

The units shall be supplied complete as shown on the relevant drawings, with appropriate rails, dolly, motors, cables, skip, etc. The traveling range of the dollies shall be as shown on the relevant drawings. The dollies shall be installed on suitably sized rail systems.

The dolly system shall be of rigid construction and shall be designed for a life before major repair of not less than 10 000 hours. The unit shall operate quietly and smoothly. Protection shall be provided against damage resulting from jamming of the wheels on the rails.

Grease points which are not easily accessible shall be piped individually to accessible positing for manual greasing.

Removable guards shall be provided to ensure that it is not possible for a hand to come into contact with the wheels.

The dolly frame structure shall be of a hot dip galvanized steel.

The cable system shall be long enough to ensure that either skip can be placed or removed from the dolly without double handling of skips

The dollies shall be provided with locating lugs to ensure that the skips are properly positioned and cannot slide off the rails. The lugs shall not impede the easy removal or placement of the skips on the dolly.

Ingress protection shall be to IP55 or higher and shall be suitable for washing by hose.

Bearings shall comply with Section **D40** of the Standard Specifications for Mechanical Works.

The installation shall not impede access to the inlet works or access to the skips by the collecting vehicles.

The motor shall be located on the dolly system and power shall be supplied via a cable drum system, suitable protective insulation and corrosion protection for the application and site environment.

PS.M14.4 Dolly rails

The Contractor shall supply the rails on which the dolly systems will be located and the fasteners associated with these systems. The Contractor shall ensure that the length of the rails are sufficient for the operational requirements associated with the dolly systems described above. The Contractor shall ensure that the trolley wheels and the rails are compatible. The rail size shall be at least 22 kg/m.

PS.M14.5 Materials

The perforated drum screens shall be of construction of the following materials (or superior), subject to the acceptance of the Engineer:

Description	Material
Rails	Grade 700 steel
Trolley frame	Mild steel (HMSC)
Fasteners	EN 1.4401 (ASTM 316) stainless steel or better

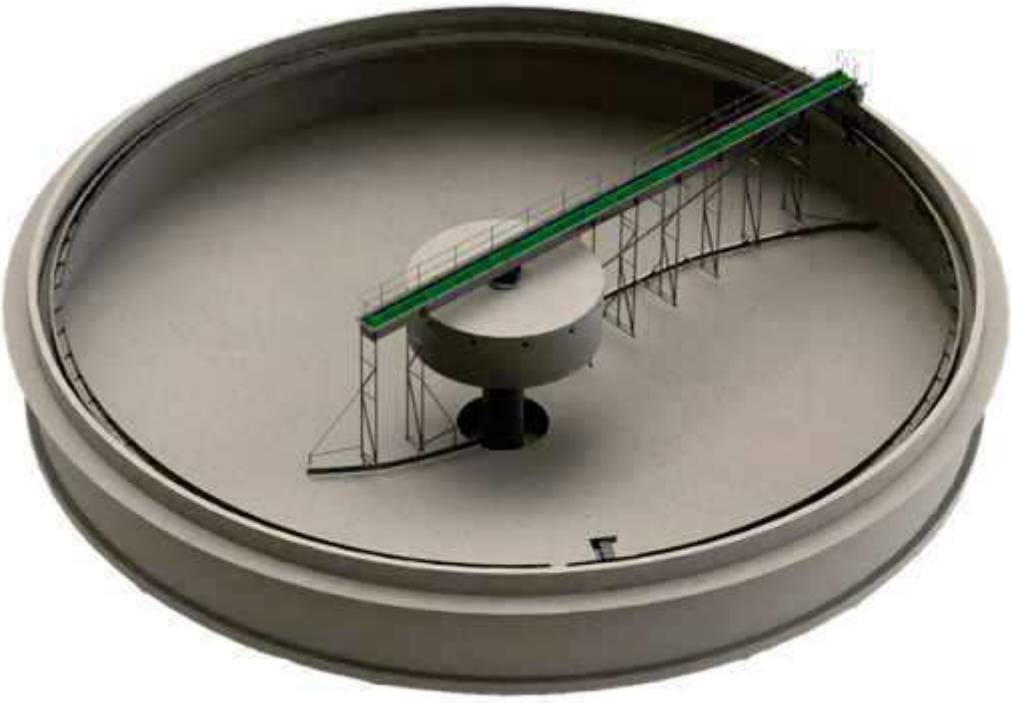
PS.M14.6 Corrosion protection

Corrosion protection of trolley shall be in accordance with System 2 of the **Section D13.3** of the Standard Specifications for Mechanical Works.

PS.M14.7 Testing and commissioning

The correct operation of the equipment and achievement of the specified design and performance requirements shall be demonstrated to the Engineer prior to the commissioning of the Works. All safety measures (e.g. over-torque cut-out, etc.) shall also be successful tested prior to acceptance and commissioning.

PS.M15. SECONDARY SEDIMENTATION



The mechanical equipment associated with one (1) new 24 m diameter circular primary sedimentation tanks shall form part of the scope of work specified under this Contract.

The tender offer shall make provision the supply and installation of complete, functional systems fully equipped for fit for purpose and automated use. This includes, but shall not be limited to, items such as:

- Inlet diffuser
- Cast in pipe items
- Stilling chamber
- Full rotation bridge with end carriages, walkway and access ladder

- Bridge drive
- Centre pivot
- Sludge scrapper with supporting assembly
- Screed to tank floor
- Weir, skimmers and scum baffle
- Scum removal unit

PS.M15.1 Design requirements and process parameters

Design parameters and minimum design requirements of the primary sedimentation tank are as follow:

Secondary sedimentation tanks

No.'s of SSTs: One (1)

Bridge: Full bridge

Tank diameter: 24 m (inside face to inside face)

Floor slope: 5˚ degree

Typical diameter or stilling well: 6 m

Typical height of stilling well: 1.7 m

PS.M15.2 General

This part of the specifications covers the design, supply, delivery to site, installation and commissioning of a secondary settling tank complete with rotating bridge, scum removal, stilling well and sludge mechanism. The concrete tank shall be of the sloped bottom scraping, single span type. The Average Dry Weather Flow (ADWF) and Peak Wet Weather Flow (PWWF) to the clarifier is 225m^3/h and 525m^3/h respectively. The sludge return rate will be 225 to 525 m^3/h based on 1 to 2 x the ADWF

The circular tank has a diameter of 24m based on a surface loading rate of 0.8 m/h at the above mentioned PWWF. The side wall depth is 3250m.

The tank information is provided on the civil structure drawing provided.

The estimate resistance imped on the scraper blades will be approximately 80 N/m based on an activated sludge with a dry solids concentration of 3 % maximum.

The stilling chamber shall have a diameter of 25% of the clarifier diameter and total depth of 50% wall depth.Stiliing well must protrude 100 mm above the maximum water level.

An automatic scum removal system must be provided and activate for a set time on each full rotation of the rotating bridge.

The equipment must be fabricated / assembled in a dedicated manufacturing factory, within the South African border.

The secondary settling equipment shall comprise of the following basic components:

- Rotating bridge complete with centre bearing, slip rings, walkway and hand railing.
- Complete bridge drive system complete with motor, gearbox, safety guards, bearings, drive and trail wheels.
- Scum removal system with automated scum box, scum skimmer system, baffles and baffle brackets.
- Weir plates complete with sealer between weir plate and overflow launder.
- Complete sludge scraper system with adjustable down pipes, cross bracing and scraper blades.
- Stilling well chamber with centre cross structure.

PS.M15.3 Tank shape

The sedimentation tanks will be built in concrete (by civil contractor) and will have an internal diameter and water depth as specified in the relevant drawings. The floor of the tank will have a slope towards the centre of the tank. The sludge will be scraped towards a central sludge collection hopper from where it will be withdrawn through a sludge draw off pipe.

The effluent launder will be built in concrete (by civil contractor) on the outer tank wall.

The flow into the tank will be by an inlet pipe passing under the tank floor turning upwards at the centre to discharge and disperse the sewage water within a deflector drum inducing even radial flow into the body of the tank.

i. Access bridge and walkway

A pivot bearing assembly on the central support and the drive assembly at the outer ends shall support the rotating full bridge. It shall incorporate an access walkway not less than 750 mm in width between internal faces and designed to support a uniformity distributed live load of 2,5 kN/m^2. Guard railing (refer to Section **D18** in Standards Specifications for Mechanical Works), adequately supported, and a 100 mm x 3 mm thick kicker plate made of stainless steel shall be provided on both sides of the walkway. The walkway flooring shall be open grid Fibre-grate 38mm GRP, and shall be capable of supporting the above loading with a maximum deflection of 2,5 mm. The bridge shall be designed with a camber sufficient to completely cancel the deflection which will be produced by the dead load of the complete bridge with scraper mechanism attached, the latter un-submerged.

The underside of the bridge and the underside of the backing plates for the squeegees shall have sufficient clearance to prevent any touching between metal and concrete when the tyres are worn down.

A loading notice shall be fixed to the bridge in accordance with applicable safety regulations.

A ladder with the necessary handrails shall be rigidly fixed to the outer ends of the bridge to provide access thereto.

The handrails and ladder shall be manufactured from EN 1.4404 (ASTM 316L) stainless steel. The rotating bridge and scraper mechanism shall be manufactured from EN 1.4401 (ASTM 316) stainless steel or EN 1.4362 (2304) duplex stainless steel.

The access bridge and scraper mechanism (sludge and surface scum) shall be single unit and shall include the electric drive unit, speed reducer, wheels, scraper arm and blades and surface scum skimmer.

PS.M15.4 End carriage and drive unit

Two polyurethane tired wheels shall carry the outer ends of the bridge, with one on each end equipped with drive unit. The wheels shall run on the peripheral wall. The driving and supporting wheels shall have wearing surfaces consisting of tyres of an approved synthetic material with good wearing properties. The wheels must be accurately aligned so that the

plane of rotation is normal to a line drawn through the pivot of the wheel and the centre point about which the bridge rotates, so as to minimise wear of the tyres.

No special track will be provided and the Mechanical Contractor must give tolerances of the finished concrete wall.

The drive wheel shall be driven by a flanged mounted weather proof electric motor directly coupled to an oil filled reduction gear box. Full details of the wheel axle support and its fixing must be given in the tender documents.

A deflector must be incorporated in front of the leading and trailing wheels to deflect any foreign objects and prevent accidents. A thermal overload device or shear pins shall be incorporated in the drive unit to stop the bridge immediately should it becomes jammed.

The rotating bridge brush gear shall be supplied and installed under this portion of the Contract. The brush gear to be installed on the kingpost of the bridge at the centre of the tank to facilitate connections between the incoming supply cable and the cable from the kingpost to the motor starter installed on the rotating arm, shall consist of the following:

a) A set of four (4No) 20mm wide and three (3No) 8mm wide brass slip rings on an ebonite or equivalent insulating sleeve (i.e. three slip rings or phase connections, one for the earth connection, three slip rings for the control circuit, namely, start, common and stop connections). Connections to these slip rings shall be effected via an approved heavy duty terminal block with stud type brass terminals onto which the lugs on the cable tails shall be bolted. This terminal arrangement shall be completely independent of fixing screws for the slip rings.
b) A set of four main circuits and three control circuit “Morganite” carbon brushes, or equivalent. Each of these brushes shall be spring-loaded to ensure high contact pressure and the springs shall be rust-proofed.

The above-mentioned brush gear shall be installed in a weatherproof IP55 grade UV protected and impact proof synthetic housing with removable cover situated on the kingpost of the bridge. This brush gear housing shall be suitably sized to accommodate the relevant equipment without cramping and shall be insect proofed.

The brush gear housing shall be designed and constructed to prevent the accumulation of gas and the condensation of moisture inside the housing and the pressure of the brushes on the slip rings shall be high enough to obtain a self-cleaning effect during operation.

The driving motor (drive unit) shall be provided under this contract and shall comply with the requirements of Section **D35** in the Standard Specifications for Mechanical Works. The motors will be provided with a weatherproof emergency stop push button stations, mounted on the bridge near the bridge access ladder. The supply and installation of the cabling between the motor, emergency push button station, brush gear and kingpost, however, shall form part of this contract. The cable shall be installed in a grade 304 stainless steel conduit mounted on the underside of the bridge and secured to the bridge by means of stainless-steel conduit saddles. The bridge shall have a peripheral speed between 1.5 and 2 m/min such to remove all sludge effectively.

Reference shall be made to Clause 3.6 of the Detailed Mechanical Specifications regarding motor efficiency.

PS.M15.5 Centre pivot

The bridge shall be supported at the centre of the tank by means of a totally enclosed weatherproof pivot bearing assembly, designed to carry the bridge with super imposed loading. An arrangement must be incorporated in the pivot assembly to allow small vertical movements of the bridge at the outer end without imposing undue twisting of the bearing assembly. The assembly must be provided with grease nipples to allow easy lubrication. A weatherproof 7 ring slipring assembly must be provided, generously rated for the electrical

power required to drive the bridge. All electrical connections and covers at the centre pivot shall be protected from the ingress of moisture.

PS.M15.6 Scraper and sludge removal equipment

The scraper mechanism shall scrape the entire floor area and shall be arranged in an echelon formation. The scrapper system shall be designed to remove all sludge at a sufficient rate.

The scrapers shall be fitted to an underwater support system suspended from the overhead rotating bridge. The scraper mechanism and bridge shall form one rigid unit but there shall be at least 30 mm adjustment in the level of the floor scrapers. Supporting arms from the bridge shall be of EN 1.4404 (ASTM 316L) stainless steel or EN 1.4362 (2304) duplex stainless steel sections.

The scraper blades (spiral blade type) shall be manufactured of EN 1.4404 (ASTM 316L) stainless steel, of 150 mm minimum overall depth, and fitted with abrasion resistant rubber or other approved material wearing edges (neoprene, HDPE or similar approved).

The structural members suspending the scrapers from the bridge shall be sufficiently sturdy to keep the scrapers in their relative positions without the metal back plates meeting the floor.

Sludge is conveyed by the scrapers along a sloping floor to a central well. A sludge draws off pipe (by others) extends from the central well under the tank to an external chamber, the flow, which is under Spiralstatic head being controlled by an actuated valve draw off system.

PS.M15.7 Scum removal

The scum baffle shall be supplied and fixed by the Mechanical Contractor, under this Contract. The proposed position is shown on the drawings.

Scum removal is required in each tank and consists of a scum skimmer, to skim the entire water surface area within the scum baffle and a scum receiving hopper. The apparatus shall be of a design suitable for continuous operation activated by the movement of the bridge past it and shall withdraw from the tank sufficient liquid to ensure an efficient flushing of the scum through the scum pipe. During the remainder of the bridges cycle the outlet shall shut tight so as to prevent leakage. This system shall be fitted with an resilient seal isolation valve downstream of the apparatus.

The scum baffle shall be 400 mm wide with 300 mm immersion and be fixed along the full length of the overflow weir with brackets adjustable in a horizontal direction.

The scum skimmer shall be 300 mm wide.

The scum removal system completes including the baffle, brackets, skimmer and hopper shall all be manufactured of (at least) 4 mm thick EN 1.4404 (ASTM 316L) stainless steel or EN 1.4362 (2304) duplex stainless steel.

The scum removal mechanism must be complete with scum baffle, scum receiving hopper, scum discharge pipe (200 mm NB), control valve, all necessary stays etc. The termination point of the mechanical Contract with regards to scum discharge pipework shall be shown of the drawings.

PS.M15.8 Overflow weir

Serrated overflow weirs must be provided and installed by the Contractor as shown on the drawings. The weir plate shall be 250 mm wide with 75 mm deep slots, fixed 125 mm above the concrete sill of the overflow launder with Stainless Steel bolts and nuts (refer to Section **D15** in the Standard Specifications for Mechanical Works). The weir shall be adjustable to ensure an even effluent discharge around the whole circumference of the tank, without

leakage through joints. No leakage either between concrete and or weir sections shall be allowed. Contractors shall allow in their prices for sealing and levelling of the plates.

The weir plates shall be manufactured from EN 1.4362 (2304) duplex stainless steel.

PS.M15.9 Screed to tank floor

The floor screed shall be laid by the civil contractor once the bridge scrapers are in position. The civil contractor shall provide all required materials, tools, labour etc. to lay the screed. All preparation work shall be done by the Contractor to ensure that the screen is accurately levelled in relation to the scrapper mechanisms. The bridge, with scrapers in place, shall be rotated by hand in order that the screed can be positioned accurately with respect to the scraper rotation. The Contractor shall be responsible for setting up the scrapers accurately prior to applying the screed. The scrapers shall not be used to trowel the screed. The Contractor shall co-ordinate with the civil contractor to complete this activity.

PS.M15.10 Pipe work and valves

Unless it is specifically stated otherwise here, all pipe work shall conform to the relevant specifications under Sections **D20, D21, D23, D24, D28, D29** and **D30** of the Standard Specifications for Mechanical Works.

The extent of the pipe work that shall be supplied under this section of the scope or work shall be:

- Centre column Pipework (including bends, eccentric reducer, couplings and flange adaptors)
- Valves
- Flange fasteners

PS.M15.11 Design aspects

The wall thickness and pipe material of the steel pipes associated with this section of the scope of work shall be manufactured based on the following design criteria:

Nominal diameter range	Pipe wall thickness	Flange specification (SANS 1123)	Material (ASTM)
0 to 200 mm	1.24 to 3.76 mm	1000/3	316 stainless steel
200 mm to 400 mm	3.76 to 4.78 mm		
400 mm to 600 mm	4.78 to 6.35 mm		
600 mm and above	1/100 of pipe diameter		

PS.M15.12 Fasteners

Fasteners shall conform to the requirements stipulated under item **D15** of the Standards Specifications for Mechanical Works.

PS.M15.13 Ancillary equipment

The Mechanical Contractor will be responsible for the supply, delivery to site and erection of all ancillary equipment, in the form of holding down bolts, rawlbolts, pipe clips, small pipes, grease piping etc. to complete the Mechanical Contract.

The Mechanical Contractor will also be responsible to compile a manual in which all the relevant mechanical equipment is described together with the routine maintenance, lubrication schedules etc. for proper running of the plant.

PS.M15.14 Materials

The PST mechanical equipment shall be of construction of the following materials or superior, subject to the acceptance of the Engineer:

Description	Material
Deflector drum	EN 1.4404 (ASTM 316L) stainless steel or EN 1.4362 (2304) duplex stainless steel
Walkway kicker plates	EN 1.4401 (ASTM 316) stainless steel or EN 1.4362 (2304) duplex stainless steel
Walkway	Fiber-grate 38mm Material: GRP

Handrail	EN 1.4401 (ASTM 316) stainless steel
Scrapper support and scrapper sections	EN 1.4404 (ASTM 316L) stainless steel or EN 1.4362 (2304) duplex stainless steel
Abrasion resistant strip	HDPE
Scum baffle	EN 1.4404 (ASTM 316L) stainless steel or EN 1.4362 (2304) duplex stainless steel
Weir plate	EN 1.4362 (2304) duplex stainless steel
Fasteners	EN 1.4401 (ASTM 316)

The walkway bridge shall be Hot Dip Galvanised in accordance with Section **D13.2** of the Standards Specifications for Mechanical Works).

PS.M15.15 Testing requirements

The correct operation of the equipment and achievement of specified performance requirements shall be demonstrated to the Engineer prior to the commissioning of the Plant, including:

1. Over-torque trip protection shall be demonstrated.
2. The power demand for the motor shall be measured in order to confirm that the specified power margin has been obtained.
3. Alignment of bridge drive on outer wall shall be demonstrated.
4. Functionality of emergency push buttons shall be demonstrated.

PS.M15.16 Inspections

The Contractor shall make all necessary arrangements for the Engineer to inspect the equipment for compliance prior to payment being made in this regard.

The Contractor shall make all arrangements and carry all costs for an Engineer approved inspection authority to inspect the equipment in the workshop prior to dispatch (regardless of the location of the workshop). The inspection shall include a full report on compliance of the equipment with this specification and this report shall be submitted to the Engineer prior to dispatch of the unit from the workshop.

PS.M15.17 Spare parts

Provision for spare parts shall be included in the Schedule of Quantities. The Contractor will price this item in terms of the recommendation from the equipment manufacture. The spare parts / consumables offered shall be listed on a letter, which will be signed by an authorised representative from the manufacture in order to substantiate this allowance and shall be included in the tender offer as part of the evaluation file. Spare parts and consumables for an operational period of two (2) years shall be allowed for.

PS.M16. BIOLOGICAL REACTOR MIXING EQUIPMENT

Four (4) new vertical shaft stirrers shall be installed in the anoxic zones as shown on the relevant drawings. The Contractor shall provide top (platform) mounted, vertical shat type mixing units suitable for mixing the sludge liquor in the respective zones of the bioreactor. The Contractor shall provide all the equipment complying with all the requirements specified herein, including the following main components as shown on the process and instrumentation diagram as well as associated layout drawings. The supply shall include, but not be limited to, the following components:

- Mixer complete with impeller and shaft.
- Drive train (gearbox and motor) and guarding.
- Base frame
- Fasteners and holding down bolts

Unless it is stated otherwise here, all vertical stirrers shall conform to the relevant requirements stipulated under Section **D49** of the Standards Specifications for Mechanical Works.

PS.M16.1 Design requirements and process requirements

Design parameters and minimum design requirements of the bioreactor stirrers are as follow:

Stirrer type Platform mounted vertical shaft, axial - downward flow propeller type.

Total No. of anoxic mixers: 4 no.'s off

Volume per anoxic tank: 1725.75 m^3 (17.7m x 26m x 3.75m)

No of mixers per anoxic tank: 2 no.'s off

Minimum mixing intensity: 7.5 Watt/m^3 (subject to CFD analysis results for effective mixing)

Mixing media (An & Ax): 0.4% to 1% DS (mixed liquor)

PS.M16.2 Vertical shaft mixers

Each stirrer shall be installed on a suspended platform. The size of the compartments shall be as shown on the relevant drawings. The power input of the stirrers shall be at least 7.5 Watt/m^3 and should tenderers wish to deviate from this value, this shall be motivated.

The mixers shall ensure a degree of homogeneity of 95% in less than three times the hourly peak flow. The mixers shall also ensure a degree of homogeneity of at least 90% with one mixer out of operation in any of the mixing zones (i.e. where more than one mixer is installed in a tank).

No visible sludge build-up in any section of the tanks will be allowed.

The mixers shall be selected to conform to the requirements shown on the relevant drawings.
The rotational direction of each mixer shall different to the direction of rotation of the mixer preceding or following it. All mixers shall have non-clog impellers. Al impellers shall be of the same design.

The Contractor shall standardize the design of the mixing equipment in each zone to be the same, such that all anaerobic mixing units are similar. The same principle shall apply to the anoxic zone mixers. The complete mixing unit (impeller, shaft and gearbox) shall be procured from the same manufacturer.

The mixing equipment shall be of the axial, downward flow, propeller type.

If it is required that a baffle be installed in order to achieve proper mixing and prevent vortices, then these shall be provided and installed by the Contractor, and shall be manufactured from EN 1.4401 (ASTM 316) stainless steel or EN 1.4362 (ASTM 2304) duplex stainless steel.

A computational fluid dynamic analysis of the proposed mixer design is required prior to procurement of the mixers. The Contractor shall provide the computational fluid dynamic analysis of the predicted mixing performance, which shall take scenarios into account where only one mixer is operation per sub-zone as well as both for each zone. The analysis shall be a steady state, three-dimensional model. The computational fluid dynamic Analyst shall have experience in using the proposed software package in comparable mixing applications. A design report shall provide the analytical and graphical results of this design study after steady state conditions have been reached. The design shall not be acceptable unless

complete mixing is predicted. The time to achieve complete mixing shall also be provided by the Contractor, but shall be less than three times the mean hydraulic retention period of each zone at hourly peak flow conditions.

The stirrers shall operate continuously once started from the relevant motor control panel and shall be linked to a standby generator to remain operational during periods of power failure.

The introduction of oxygen through surface agitation shall be minimised while gently mixing the contents of the tanks. Should any baffles or other apparatuses be required other than that included in the civil works, tendered prices shall make provision for this. The horizontal zones of maximum turbulence should preferably be as close to the floor of the tank as possible.

PS.M16.3 Gearboxes and bearings

Gearboxes shall be selected for continuous operation with a power service factor of not less than 2,5 based on installed power. Contractors shall provide a catalogue of the make of gearbox offered and provide calculations to indicate how the selection of gearbox was made.

Worm gears will not be considered.

Gearboxes shall be of a type specifically designed to accommodate bending caused by long overhang of the shaft of the stirrer. Bending of the shaft shall not damage the driving gears or the bearings.

All bearings shall be designed for a life of 100 000 hours at a B_{10} rating. Proof of such rating shall accompany the tender. In addition, the bearings on the output shaft shall be capable of withstanding the resultant forces caused by the combination of radial and axial loads (imposed by the stirrer) acting simultaneously, and shall be selected such that the following condition is complied with:

$$\frac{\text{Actual radial load}}{\text{permissible radial load}} \text{ plus } \frac{\text{Actual axial load}}{\text{permissible axial}}$$

load is equal or less than 1 (where the "permissible" loads are the manufacturer's figures for 5000 hours at a B10 rating). Contractors shall indicate what these forces are and how they are accommodated.

The gearbox casings shall be designed to prevent moisture from entering. A dry well for the output shaft lower bearing shall be provided to avoid complete drainage of oil in the box in the event of an oil seal failure. The gearbox casings shall be made of close grained cast iron.

Installed motor sizes shall make allowance for gearbox efficiencies and a 10% margin on motor power. Impellers shall be selected to operate preferably in the range of 20 - 25 rpm with a tip speed not exceeding 2 m/s.

PS.M16.4 Materials

The vertical shaft mixers shall be of construction of the following materials or superior, subject to the acceptance of the Engineer:

Description	Material
Pipe work	EN 1.4401 (ASTM 316) stainless steel or EN 1.4362 (2304) duplex stainless steel
Impeller	EN 1.4401 (ASTM 316) stainless steel or EN 1.4362 (2304) duplex stainless steel
Shaft	EN 1.4401 (ASTM 316) stainless steel or EN 1.4362

	(2304) duplex stainless steel
Base plate / frame	Mild steel (HMSC)
Baffle plate	EN 1.4401 (ASTM 316) stainless steel or EN 1.4362 (2304) duplex stainless steel
Fasteners	EN 1.4401 (ASTM 316)

The base plate / frame shall be Hot Metal Sprayed Coatings (refer to System 2 of Section **D13.3** in the Standards Specifications for Mechanical Works).

PS.M16.5 Testing

On completion of installation, the stirrers shall be thoroughly tested at minimum and maximum water level for speed of rotation, energy input, resistance to bending of shaft and overall efficient operation of the complete mechanical and electrical system. The Contractor shall provide free of charge for testing purposes a kW meter to measure the energy absorbed by each mixer.

Six randomly placed samples shall be taken by others in one or more mixing zones and analysed for solids content. These measurements shall be compared against the performance criteria and should the mixers not comply to this requirement or another requirement stated earlier, the contractor shall modify or add to his installation at his own expense until all the relevant performance criteria has been met.

If the mixers are unable to satisfy the above mentioned criteria, the Contractor shall alter the mixers or add more mixers to satisfy the criteria at his own expense.

PS.M16.6 Spare parts

Provision for spare parts shall be included in the Schedule of Quantities. The Contractor will prices this item in terms of the recommendation from the equipment manufacture. The spare parts / consumables offered shall be listed on a letter, which will be signed by an authorised representative from the manufacture in order to substantiate this allowance and shall be included in the tender offer as part of the evaluation file. Spare parts and consumables for an operational period of two (2) years shall be allowed for.

PS.M17. AXIAL PUMP EQUIPMENT

Biological reactor mixed liquor recycle pumps

Two (2) new A-recycle pumps shall be installed in the activated sludge basin's aerobic zone, as shown on the relevant drawings. The Contractor shall provide all the equipment complying with all the requirements specified herein, including the following main components:

- Pump and draft tube
- Puddle pipe
- Drive train (gearbox and motor)
- Vortex protection shield
- Anchors and fasteners
- Guiderails
- Lifting equipment
- Plug valves for discharge

PS.M18.1 Design requirements and process parameters

Design parameters and minimum design requirements of the A are as follow:

A recycle pumps

Pump type: Axial flow

Pumping media / liquid: Activated sludge (1.5% dry solids content)

Operating efficiency: 40%

Pump starting: VFD

Number of units (per pump station): Two (2) no.'s

Configuration (per pump station): One (1) duty, One (1) standby

The recycle pumps shall ensure that the specified recycle process rates are met as per the process design. The pump shall not operate outside of its operating envelope and shall be as close as possible to its best efficiency point. Pump curves marked with the duty point are to be submitted and approved prior to ordering any recirculation pump. The duty range for each mixed liquor recycle pump are specified in the following table:

Description	Flow rate (l/s)	Head (m)
A-recycle pump	270-405	0.8 to 1.1
Note: Minimum flows are based on 60% turn down ratio via VFD		

PS.M18.2 General

Unless it is stated otherwise here, all immersible pumps shall conform to the relevant requirements stipulated under Section **D44** of the Standards Specifications for Mechanical Works.

The civil layout of the A recycle pump stations can be seen on the relevant drawings. The Contractor shall provide submersible axial flow pumps in the biological reactor for the purpose of inter-zone mixed liquor recycle via open channel flow. The Contractor shall install the pump and any accessories required to ensure optimal performance of said pump.

The pump station shall be designed to:

a) Deliver high flow rates at low heads (typically below 2 m);
b) Be of the submerged propeller type pumps that are installed within a shroud in the wall of the specific chamber it is pumping from;
c) Have a minimum number of surfaces prone to accumulating rags, and to incorporate swept back propeller blades;

a. Pump

The pumps shall be lifted and lowered into position by a lifting chain and guiderails.

The propeller shaft shall be designed to transmit the required torque to the propeller and be able to withstand all cantilevered loads imposed under any condition during operation.
The motor shall be close coupled to the pump and separated from the pump casing by a chamber which is provided with a water ingress sensor. Mechanical seals shall isolate this chamber from the pumped fluid. The seal between the chamber and the liquid to be pumped shall have silicon carbide faces. Preference shall be given to pumps which do not exceed a rotational speed of 900 rpm.

The cable providing power to the pump shall be firmly held in heavy duty, stainless steel (EN Grade 1.4401) supports but the cable itself shall be protected against contact with metal by a polymer collar of at least 8 mm wall thickness. The cable shall not visibly move during pump operation.

Reference shall be made to Clause 3.6 of the Detailed Mechanical Specifications regarding motor efficiency.

PS.M18.3 Impellers

Impellers design specifically for the application are preferred. Any axial flow pump installation must be considered as abrasive.

PS.M18.4 Guide rails

The Contractor shall provide guide rails onto which the pump can be mounted for lowering into position by the lifting gear. The rails shall also secure the pump in place during operation as well as during installation or removal.

PS.M18.5 Bearings

Bearings shall be designed for an L_{10} life exceeding 100,000 hours.

PS.M18.6 Draft tube

The pumps shall make use of proprietary connection equipment to improve efficiency. The pump and draft tube assembly shall mount onto the discharge flange. The pump assembly shall seal around discharge pipe to ensure that minimal leakage occurs. The puddle pipe shall be flanged and any fitting required for mounting the pump to the puddle pipe shall be bolted to the puddle pipe. The Contractor shall be responsible for securing and grouting the tube and/or puddle pipe in position.

PS.M18.7 Control and operation

Each pump shall be equipped with variable frequency drives which shall regulate the pump rate based on a pre-set ratio (selected by the operator) in terms of the influent flow rate. The Operator shall also have to option to fix the flow rate and/or control the pumps via a timer.

In addition, the following operational requirements shall be provided:

a) Protections shall be active during manual operation.
b) The pump installation shall be designed to shut down safely and without damage upon tripping of the electrical supply.
c) Duty and standby status will be alternated.
d) An hour meter which cannot be reset shall be provided.

PS.M18.8 Materials

The axial flow pumps shall be of construction of the following materials or superior, subject to the acceptance of the Engineer:

Description	Material
Impeller	EN Grade 1.4401 stainless steel (or better)
Pump shaft	Martensitic stainless steel (or better)
Pump and motor casing	EN Grade 1.4401 stainless steel (or better)
Draft tube/pipework	EN Grade 1.4401 stainless steel (or better)
Lifting chain and lifting equipment	EN Grade 1.4401 stainless steel (or better)
Fasteners and other external components	EN Grade 1.4401 stainless steel (or better)

PS.M18.9 Testing and commissioning

This section shall be read in conjunction with the requirements stipulated in Section **D48** of the Standard Mechanical Specifications. It shall be the responsibility of the Contractor to ensure the performance testing and commission of pumps satisfy all the requirements stipulated under these Specification (i.e. Detailed Specifications) and the Standard Specifications.

Any factory tests shall be performed with the pump set on sound foundations, similar to those expected at Site. Test shall be done at full speed unless agreed otherwise by the Engineer.

If these tests are impractical or impossible at the pump manufacturer's works, the Contractor must state this in their Tender and explain the reasons why it is so. The Engineer may be prepared to consider alternative proposals for testing provided these proposals are submitted with the Tender and are clearly described and defined. If this is not done, the Contractor will arrange to have the tests performed in another workshop at his cost.

The following tests will be conducted at the commissioning stage. There shall be no limit as to how many times the following tests are repeated. Tests shall continue until operation is deemed trouble-free by the Engineer. Results of all testing will be complied in a report for approval by the Engineer.

Specifically, the pump shall undergo the following tests:

i) Measure pressure differential across pump ii) Measure pump drive motor current. iii) Confirm that the pump meets the duty requirements as defined in this section of the specification based on the pump curve, the pump differential pressure and the pump motor current.
iv) Operation of start/stop controls.
v) Operation of interlocks.
vi) Operation of emergency stop

Non-conforming pumps, as deemed by the discretion of the Engineer, shall be modified or replaced by other pumps in order to achieve the performance requirements.

PS.M18. WASTE AND RAS PUMPSTATION

PS.M18.1 Design requirements and process parameters

Design parameters and minimum design requirements of the <u>WASTE pumpstation</u> be as follow:

Pump type: Submersible (Heavy duty solids handling)

Number of units: 2 (1 duty + 1 standby)

Pump capacity: 81.72 m^3/hour (22.7 l/s)

Total delivery head: 10 m

Solids handling capacity: 80 mm

Hydraulic efficiency: 80%

Pump stating: VSD

Design parameters and minimum design requirements of the RAS pumpstation (1) be as follow:

Pump type: Submersible (Heavy duty solids handling)

Number of units: 2 (1 duty + 1 standby)

Pump capacity: 234 m^3/hour (65 l/s)

Total delivery head: 10 m

Solids handling capacity: 80 mm

Hydraulic efficiency: 80%

Pump stating: VSD

Design parameters and minimum design requirements of the RAS pumpstation (2) be as follow:

Pump type: Submersible (Heavy duty solids handling)

Number of units: 2 (1 duty + 1 standby)

Pump capacity: 144 m^3/hour (40 l/s)

Total delivery head: 10 m

Solids handling capacity: 80 mm

Hydraulic efficiency: 80%

Pump stating: VSD

Pump

Unless otherwise stated here the pumps shall conform to the requirements stipulated in **Section D44** of the Standard Specifications for Mechanical Works.

Motor

Unless otherwise stated here the pumps shall conform to the requirements stipulated in **Section D35** of the Standard Specifications for Mechanical Works.

Reference shall be made to Clause 3.6 of the Detailed Mechanical Specifications regarding motor efficiency.

Monitoring devices

Full details of the sensing equipment (thermocouples, etc.), and of the associated control and monitoring or indicating equipment shall be submitted with the tender offer. Evidence shall also be submitted that adequate spares and services are readily available in this country.

Pressure gauges

Each pump set shall be equipped with two 150 mm dial diameter flush mounting pressure gauges. The gauges shall be calibrated in kilopascal and the angle shall suit the particular application. The gauge shall be filled with glycerine, and the bubble shall be out of the

range of usual reading. The gauges shall be of a type that is possible to recalibrate (dead weight method) and reset on Site.

These meters shall indicate water pressure in kilopascal and shall have a range at least 50% higher than the normal duty point. However, in all cases the gauges must have a range at least 30% higher than the shut off, or maximum, head which the pump is capable of generating with the system conditions taking into consideration the maximum static suction pressure possible.

The meters for the suction side of pumps shall be compound gauges and shall be capable of indicating a negative pressure of up to 100 kPa. However, in all cases the gauges must have a range at least 30% higher than the maximum static suction pressure possible.

All pressure gauges shall be supplied and installed complete with isolating Steel cocks, copper or stainless steel piping, etc. and fitted with a pulsation snubber in stainless steel.

Due to the quality of the water, the Contractor shall ensure reliable operation of the gauges. Where necessary they must include for the pressure gauges to be fitted with diaphragms. Pipes to pressure gauges neatly supported between tapping point and pressure gauge. Pedestals to the Engineer's approval shall be supplied at a suitable position to house the pressure gauges.

Pipe work and valves

Unless it is specifically stated otherwise here, all pipe work shall conform to the relevant specifications under Sections **D20, D21, D23, D24, D28, D29** and **D30** of the Standard Specifications for Mechanical Works.
The extent of the pipe work that shall be supplied under this section of the scope or work shall be:

- Discharge pipework (including bends, eccentric reducer, couplings and flange adaptors)
- Flange fasteners
- Valves
- Pipe and valve supports

Design aspects

The wall thickness and pipe material of the steel pipes associated with this section of the scope of work shall be manufactured based on the following design criteria:

Nominal diameter range	Pipe wall thickness	Flange specification (SANS 1123)	Material (ASTM)
0 to 200 mm	1.24 to 3.76 mm	1000/3	316 stainless steel
200 mm to 400 mm	3.76 to 4.78 mm		

Allowance for a minimum of one (1) coupling per pump shall be made. Couplings shall conform to the requirements stipulated in Section **D24** of the Standard Specifications for Mechanical Works.

Fasteners

Fasteners shall conform to the requirements stipulated under Section **D15** of Standard Specifications for Mechanical Works.

Isolation valves

Unless it stated otherwise here, all pipe works shall conform to the relevant specifications under item **D28** of Standard Specifications for Mechanical Works. Isolation valves shall be provided for the following purposes:

An isolating valve must be able to check the system water pressure from both sides.

All gate valves shall be double flanged with bolt holes drilled off-centre all in accordance with the requirements of SANS 1123 (Class 1000/3).

The design pressure of the valves shall not be less than 1000 kPA.

All valves shall be supplied complete including bolts, nuts, washers and gaskets in accordance with the class of valve. Bolts shall be of sufficient length to allow not more than three screw threads to protrude outside units after complete tightening of the assembly. Gaskets for flanged joints shall be of compressed synthetic fibre to BS 2815 Grade A and full faced with a minimum thickness of 3 mm for pressures up to and including 1 600 kPa cloth-inserted rubber may be used.

Check valves

The Contractor shall provide two (2) swing check valves (one per pump) for operation and maintenance requirements.

All swing gate valves shall be double flanged with bolt holes drilled off-centre all in accordance with the requirements of SANS 1123 (Class 1000/3).

The swing check valves shall comply with the relevant requirements stipulated under Section **D29** of Standards Specifications for Mechanical Works.

Flow meter

Flow meters shall be in accordance with Section **D66** of the Standard Specification of Mechanical Works.

A total of one (1) flow meter shall be installed with this system.

The Contractor shall install the flow meter at least 3 x DN downstream of any item that causes turbulence (i.e. pump, bends, reducer, etc.), and allow for a straight section of pipe downstream of the flow meter. The straight section downstream of the flow meter shall be at least 2 x ND. For other installation guidelines, the Contractor shall consult the manufactures installation manual.

Cast iron components shall be protected with System – “Fusion Bonded Epoxy” or System – “Hot-Applied Thermoplastic”.

Materials

The membrane drain pump shall be of construction of the following materials or superior, subject to the acceptance of the Engineer:

Description	Material
Pump casing	Cast iron Grade 250 with epoxy coating
Pump impeller	Cast iron Grade 250
Drive shaft	Martensitic stainless steel
Seals	Mechanical seals of tungsten carbide or silicon carbide
Fasteners	Stainless steel grade 316 or better
Pipework	Stainless steel grade 316 or better

Groundwater drainage pump

A submersible pump with integrated float switch shall be installed in drain collection sump next to the storage dam. The pump shall be selected for a flow of 5 l/s @ 10 m discharge pressure. The pump shall connect to a 100 NB stainless steel (Grade 316) piping arrangement equipped with a brass swing type check valve and isolation valve (ball valve). The drainage pump shall discharge in the storage dam located next to the pit where the pump is to be installed.

Testing and commissioning

This section shall be read in conjunction with the requirements stipulated in Section **D48** of the Standard Mechanical Specifications. It shall be the responsibility of the Contractor to ensure the performance testing and commission of pumps satisfy all the requirements stipulated under these Specification (i.e. Detailed Specifications) and the Standard Specifications.

Any factory tests shall be performed with the pump set on sound foundations, similar to those expected at Site. Test shall be done at full speed unless agreed otherwise by the Engineer.

If these tests are impractical or impossible at the pump manufacturer's works, the Contractor must state this in their Tender and explain the reasons why it is so. The Engineer may be prepared to consider alternative proposals for testing provided these proposals are submitted with the Tender and are clearly described and defined. If this is not done, the Contractor will arrange to have the tests performed in another workshop at his cost.

The following tests will be conducted at the commissioning stage. There shall be no limit as to how many times the following tests are repeated. Tests shall continue until operation is deemed trouble-free by the Engineer. Results of all testing will be complied in a report for approval by the Engineer.

Specifically, the pump shall undergo the following tests:

i) Measure pressure differential across pump ii) Measure pump drive motor current.

iii) Confirm that the pump meets the duty requirements as defined in this section of the specification based on the pump curve, the pump differential pressure and the pump motor current.

iv) Operation of start/stop controls. v) Operation of interlocks.

vi) Operation of emergency stop

Non-conforming pumps, as deemed by the discretion of the Engineer, shall be modified or replaced by other pumps in order to achieve the performance requirements.

PS.M19. BIOLOGICAL REACTOR AERATION EQUIPMENT

Unless it is stated otherwise here, all vertical stirrers shall conform to the relevant requirements stipulated under Section **D66** of the Standards Specifications for Mechanical Works.

Four (4) new low-speed vertical shaft aerators shall be installed in the Aerobic zones as shown on the relevant drawings. The Contractor shall provide top (platform) mounted, low-speed vertical shaft aerators units suitable for supply sufficient oxygen for a peak oxygen demand in the respective zones of the bioreactor. The Contractor shall provide all the equipment complying with all the requirements specified herein, including the following main components as shown on the process and instrumentation diagram as well as associated layout drawings. The supply shall include, but not be limited to, the following components:

- Aerator impeller/turbine with shaft.
- Drive train (gearbox and motor) and guarding.
- Base frame
- Fasteners and holding down bolts

Unless it is stated otherwise here, all vertical stirrers shall conform to the relevant requirements stipulated under Section **D49** of the Standards Specifications for Mechanical Works.

PS.M19.1 Design requirements and process requirements

Design parameters and minimum design requirements of the bioreactor low-speed vertical shaft aerators are as follow:

Stirrer type Platform mounted vertical shaft, axial - downward flow propeller type.

Total No. of aeration slow-speed shaft aerators mixers: 4 no.'s off

Volume per aeration tank: 2290 m^3 (17.7m x 34.5 x 3.75m)

No of Aerators per aeration tank: 2 no.'s off

The Actual Oxygen Transfer Rate 5 200 kgO2/day.

MLSS 4500 mg/l

PS.M19.2 Low-Speed Vertical Shaft Aerators

Each Aerator shall be installed on a suspended platform. The size of the compartments shall be as shown on the relevant drawings. The aerators shall be able to dissolve 1.8 kg O2/kWh at STP and should tenderers wish to deviate from this value, this shall be motivated.

The low-speed vertical shaft aerators shall be selected to conform to the requirements shown on the relevant drawings.

The rotational direction of each low-speed vertical shaft aerators shall different to the direction of rotation of the low-speed vertical shaft aerators preceding or following it. The impeller shall be designed to shed floating rags which come into contact with it. The maximum tip speed of the impeller shall be 5,2 m/s. Height adjustment of the impeller over a vertical distance of at least 50 mm shall be provided. The unit shall be balanced prior to installation.

The Contractor shall standardize the design of the low-speed vertical shaft aerators equipment in each zone to be the same. The complete low-speed vertical shaft aerator unit (impeller, shaft and gearbox) shall be procured from the same manufacturer.

The aerators shall be vertical shaft, surface aerators suitable for aerating the aerobic zone of reactor basins in wastewater treatment works..

The aerators shall be able to dissolve 1.8 kg O2/kWh at STP. This performance shall be guaranteed. Tenderers shall include in their tender prices for steady state tests to be conducted by an approved laboratory. Failure to pass steady state tests shall lead to the conducting of unsteady state tests by an approved laboratory and the cost of such tests, as well as the cost of remedial action required to conform to the specifications, shall be for the Contractor’s account..

PS.M19.3 Gearboxes and bearings

Gearboxes shall be selected for continuous operation with a power service factor of not less than 2,5 based on installed power. Contractors shall provide a catalogue of the make of gearbox offered and provide calculations to indicate how the selection of gearbox was made.

Worm gears will not be considered.

Gearboxes shall be of a type specifically designed to accommodate bending caused by long overhang of the shaft of the stirrer. Bending of the shaft shall not damage the driving gears or the bearings.

All bearings shall be designed for a life of 100 000 hours at a B_{10} rating. Proof of such rating shall accompany the tender. In addition, the bearings on the output shaft shall be capable of withstanding the resultant forces caused by the combination of radial and axial loads (imposed by the stirrer) acting simultaneously, and shall be selected such that the following condition is complied with:

Actual radial load plus Actual axial load permissible radial load permissible axial load is equal or less than 1 (where the "permissible" loads are the manufacturer's figures for 5000 hours at a B10 rating). Contractors shall indicate what these forces are and how they are accommodated.

The gearbox casings shall be designed to prevent moisture from entering. A dry well for the output shaft lower bearing shall be provided to avoid complete drainage of oil in the box in the event of an oil seal failure. The gearbox casings shall be made of close grained cast iron.

Installed motor sizes shall make allowance for gearbox efficiencies and a 10% margin on motor power. Impellers shall be selected to operate preferably in the range of 20 - 25 rpm with a tip speed not exceeding 5.0 m/s. Refer to **Section D37.2**

PS.M19.4 Materials

The vertical shaft mixers shall be of construction of the following materials or superior, subject to the acceptance of the Engineer:

Description	Material
Pipe work	EN 1.4401 (ASTM 316) stainless steel or EN 1.4362 (2304) duplex stainless steel
Impeller	EN 1.4401 (ASTM 316) stainless steel or EN 1.4362 (2304) duplex stainless steel
Shaft	EN 1.4401 (ASTM 316) stainless steel or EN 1.4362 (2304) duplex stainless steel
Base plate / frame	Mild steel (HMSC)
Baffle plate	EN 1.4401 (ASTM 316) stainless steel or EN 1.4362 (2304) duplex stainless steel
Fasteners	EN 1.4401 (ASTM 316)

The base plate / frame shall be Hot Metal Sprayed Coatings (refer to System 2 of Section **D13.3** in the Standards Specifications for Mechanical Works).

PS.M19.5 Testing

On completion of installation, the stirrers shall be thoroughly tested at minimum and maximum water level for speed of rotation, energy input, resistance to bending of shaft and overall efficient operation of the complete mechanical and electrical system. The Contractor shall provide free of charge for testing purposes a kW meter to measure the energy absorbed by each mixer.

Six randomly placed samples shall be taken by others in one or more mixing zones and analysed for solids content. These measurements shall be compared against the performance criteria and should the mixers not comply to this requirement or another requirement stated earlier, the contractor shall modify or add to his installation at his own expense until all the relevant performance criteria has been met.

If the mixers are unable to satisfy the above mentioned criteria, the Contractor shall alter the mixers or add more mixers to satisfy the criteria at his own expense.

PS.M19.6 Spare parts

Provision for spare parts shall be included in the Schedule of Quantities. The Contractor will prices this item in terms of the recommendation from the equipment manufacture. The spare parts / consumables offered shall be listed on a letter, which will be signed by an authorised representative from the manufacture in order to substantiate this allowance and shall be included in the tender offer as part of the evaluation file. Spare parts and consumables for an operational period of two (2) years shall be allowed for.

PS.M20. SLUDGE DEWATERING SYSTEM

The dewatering units comprising the dewatering feed pumps, poly make-up system, poly dosing system, linear screen/belt presses, horizontal screw conveyor, sludge cake pumps, cake silo live bottoms, pipework, instrumentation, structural steel, etc. shall be supplied as an integrated system.

The Contractor shall note that the design parameters of the dewatering system specified in this specification are of minimum requirements. The Contractor's design shall not only meet the relevant requirements of the specification but shall include provisions from recommendations from the dewatering unit manufacturer, consideration on overall operation and maintenance etc., such that to provide a complete, functional, safe and easy to operate and maintain dewatering system as intended. Technical details, design calculations and drawings shall be submitted to the Engineer's satisfaction and for his acceptance. Any deviations from the specification requirements shall be clearly stated and full substantiated to the Engineer's acceptance prior to equipment ordering and manufacturing.

PS.M20.1 Poly make-up equipment

The poly-electrolyte make-up system shall be able to utilise both powdered or emulsion (liquid) polymer in a continuous batching system offering sufficient Spirallysis and maturing time prior to being dosed.

The make-up system and poly make-up pumps (for emulsion) shall be suitably sized for batching sufficient poly to cater for the maximum dose at the minimum concentration of the dewatering units.

PS.M20.2 Design requirements and process parameters

Design parameters and minimum design requirements of the poly make-up unit shall be as follows:

Waste activated sludge train

Type: Continues preparation system

Dry poly feeder capacity: 20 kg/hr

Dry poly hopper loading capacity: 175 kg

Design poly make-up concentration: 0.44% (v/v)

Diluted poly dosing rate: 4 m^3/hr

Design maturation time: 45 min

Design poly dose: 7 kg/tonneDS

Number of units: Two (2) (1 duty + 1 standby)

Ingress protection of electrical components: IP55

PS.M20.3 Polly make-up equipment

The poly make-up system shall be designed to supply sufficient poly (flow and concertation) recommended by the Gravity Belt Thickener (GBT) / Belt Filter Press (BFP) manufacturer for continuous operation of the dewatering system at the design sludge flow and load conditions.

The poly dosing equipment shall be designed for high efficiency, quiet operation and maximum reliability. Details to substantiate the aforesaid requirements shall be submitted for the Engineers acceptance.

The poly make-up system shall be automatically controlled and work in tandem with the dewatering facility, according to the process requirements. Poly make-up equipment shall be equipment with a protection system to allow unloaded start and stop, and to avoid surge conditions. Upon detection of any unwanted condition the poly make-up system(s) shall safely shut down automatically.

A continuous batching systems is the preferred system and shall include a poly feeder (screw for powder and pump for liquid) and shall be thoroughly mixed with make-up water to ensure a homogenous solution with a batch concentration of 0.2 – 0.5% (m/m), which shall subsequently be routed to a second chamber that provides at least 60 minutes maturation together before being abstracted from a third final product chamber.

The poly make-up system shall be supplied as an integrated system including dry material feeder, jet mixer, holding tank(s), stirrers, instrumentation, control panel, pipework, valves, etc. in order to effectively operate as per the intended use of a poly make-up system.

The dry poly shall be supplied to site in the form of 25 kg bags which will be lifted via an electric overhead traveling crane (details of crane are specified elsewhere) and loaded to a storage hopper from where accurate amount of dry poly will be mixed with make-up water

Washwater shall be sourced from the ’24 membrane permeate washwater tank and shall be used as the dilution water. The washwater shall be supplied via a ring main at an estimated pressure of nine (9) bar. The poly-make-up system shall be equipped with the necessary pressure-reducing valve (should it be required). The equipment supplied shall include all piping, valves, flow meter and fitting to draw form the ring main and deliver to the make-up tank’s jet mixer. All pipework located inside the dewatering building shall be manufactured from stainless steel (304 of better).

All pipework shall have flanged joints.

All valves shall be stainless steel 316 full-bore valves.

Dry solids feeder

The dry-material feeder shall be sized in consultation with the gravity thickener/belt filter press manufacturer.

The feeder installation shall be manufactured from grade 316 stainless steel or better.

The feeder and hopper installation shall be design to hold a dry poly load of 175 kg in order to store a full working day’s poly usage (estimated at seven 25 kg bags).

The Contractor shall be responsible for providing access walkways and stairs, should elevated access be required, to the feeder system.

The Contractor will be required to design an effective loading system for the dry poly bags, which will be subject to the approval of the Engineer.

PS.M20.4 Control and operation

An operator set dry material quantity and water flow will produce the desired polymer concentration. When the minimum level in the final storage chamber is reached, a level sensor will trigger to relevant valves and feeder to continue producing poly. Once the high level is reached the level sensor shall signal the dry feeder and dilution water to switch off. The level sensor in the storage compartment shall be used to relay the status of the poly make up system in the overall control.

PS.M20.5 Materials

The sludge feed pumps shall be of construction of the following materials or superior, subject to the acceptance of the Engineer:

Description	Material
Poly make up tank	Polypropylene homopolymer (PPH) or ASTM 1.4362 (2304)
Storage hopper	Stainless steel grade 316 or better
Dry feeder	Stainless steel grade 316 or better
Stirrers	Stainless steel grade 316 or better
Fasteners	Stainless steel grade 316 or better

Materials of all poly make-up components in contact with the polymer shall be suitable for this application and also be chemically resistant to proposed chemical solutions used. Substantiation for material compatibility shall be submitted to the Engineer, for acceptance, prior to ordering these units.

PS.M20.6 Poly dosing pumping system

The poly dosing pumping system shall include positive displacement pumps (progressive cavity pumps) with necessary pipes, fittings and valves for pumping of the diluted poly from the poly make-up storage tanks directly into the sludge feed pipe to the respective GBT/BFP unit(s) via a ring nozzle.

The poly shall be dosed into the dewatering feed pipe via a radial multi dosing point (minimum of six (6) dosing points) fitted on the sludge feed pipe. In order to create sufficient turbulence for thorough mixing of the poly dilution into the sludge a static mixer will be provided downstream of the injection point.

The Contractor shall ensure that the poly dosing pumping system delivers the diluted poly at a discharge pressure higher than that of the sludge feed pressure to avoid an effective close valve condition.

The poly dosing pumping system shall be equipped with a washwater connection to allow the pumps and pipework to be flushed after use.

PS.M20.7 Poly dosing pumps

Unless specifically stated otherwise here, poly dosing pumps shall conform to the requirements stipulated in section **D46** of the Standard Specifications for Mechanical Works.

The poly dosing pumps shall be design to meet the performance requirements in particulate the hydraulic performance, solids handling capability, robustness and reliability.

Easy access shall be provided to clean out the drive coupling and this shall not require dismantling the pump.

The poly dosing progressive cavity pumps shall be supplied with a maximum rubbing velocity of 1.5 v_{gm} (m/s) and operate at 650 rpm. Any deviation from these requirements shall be done with written approval from the Engineer, prior to ordering the equipment.

The pump manufacture shall have at least 10 similar installations in South Africa. The Contractor shall, upon request, submit satisfactory letters from clients to prove the performance of proposed pumps.

Pump

The poly dosing pumps shall be progressive cavity feed type, suitable for sludge transfer application.

Pumps shall be fitted with mechanical seals. Gland packing shall not be permitted.

Pump rotors shall be of hardened tool steel or better and preferable hard chrome plated.

The pump shall be designed such that the rotors and seals are readily accessible and replaceable for maintenance, with the pump installed in place.

Permeate pump shall be self-priming and dry running resistant. Pumps shall be provided with dry running detection and protection devices.

The stator of the pumps shall be manufactured from Acrylonitrile butadiene rubber (NBR) with hardness less than 80 on Shore A scale.

Motors

Motors shall conform to the requirements stipulated in section **D35** of the Standard Specifications for Mechanical Works.

Each of the sludge feed pump shall be variable frequency drive driven and designed to operate at the duty point running at 50 Hz. Variable frequency drive operating in “overdrive” mode or above the nominal 50 Hz shall not be permitted.

Reference shall be made to Clause 3.6 of the Detailed Mechanical Specifications regarding motor efficiency.

Base plate

Progressive cavity pump sets shall be supplied with baseplate manufactured with 304 stainless steel or better and plinth mounted.

PS.M20.8 Pipework and valves

The Contract shall design, supply and install the suction and delivery pipework for the poly dosing pumps.

The common suction manifold shall be DN40 or larger. The individual branches to the pumps shall be DN20 or larger. All pipework located inside the dewatering building shall be manufactured from stainless steel (304 of better).

All pipework shall have flanged joints.

All valves shall be stainless steel 316 full-bore valves.

Each discharge pipe shall be equipped with an electromagnetic flow meter (i.e. 8 no.s of). The flow meters shall conform to the requirements of Section **D66** of the Standard Specifications for Mechanical Works. Installation requirements shall be as per the manufacturers requirements.

Careful consideration shall be given to the minimum contact time required between the poly and sludge to ensure sufficient mixing and flocculation can occur prior to being discharged onto the belt of the dewatering unit.

Suction pipe works shall be fitted with a blank flange to act as a flushing / cleaning port. A permanent washwater connection with associated flow control valves to this flange shall be provided to ensure the pumping system can be flushed completely as part of the operation and maintenance requirements of this system.

PS.M20.9 Materials

The sludge feed pumps shall be of construction of the following materials or superior, subject to the acceptance of the Engineer:

Description	Material
Pump casing	Cast iron Grade 250 with epoxy coating
Rotors	Chrome steel hardened
Stator	Acrylonitrile butadiene rubber
Rotating parts	Martensitic stainless steel
Seals	Mechanical seals of tungsten carbide or silicon carbide
Baseplate	Stainless steel grade 316 or better
Fasteners	Stainless steel grade 316 or better
Pipework	Stainless steel grade 316 or better

Materials of all pump components in contact with the pumped media shall be suitably selected to handle any type of polymer.

PS.M20.10 Dewatering feed pump system (if required)

The dewatering feed pumping system shall include positive displacement pumps (progressive cavity pumps) with necessary pipes, fittings and valves for pumping of the sludge from the sludge storage tanks recycle ring main to the downstream dewatering unit (liner screen or Belt filter press). The dewatering feed pumping system shall also be designed to perform required inline poly dosing and conditioning of sludge prior to discharging onto the dewatering belt. The capacity of each sludge feed pump shall be sized in accordance with specified design parameters and recommendations of the dewatering unit(s) manufacture with sufficient suction and delivery heads to cope with the anticipated sludge concentration variation, pipe friction loss, minor losses and static head at different operation conditions.

The sludge feed pumping system shall be designed to allow draw of sludge from a pressurized sludge ring main to dewatering units, without affecting the operation of the remaining dewatering trains. The sludge feed pumping system shall also be designed to equally extract sludge from the ring main to each active dewatering train.

The sludge feed pumping system shall be designed with an anti-air locking arrangement/device to automatically eliminate any air lock conditions during all operations, namely, air release device and pipe priming devices.

The dewatering feed pumping system shall be equipped with a washwater connection to allow the pumps and pipework to be flushed after use.

PS.M20.11 Design requirements and process parameters

Design parameters and minimum design requirements of the sludge feed pumps shall be as follows:

<u>Waste activated sludge train</u>

Pump type: Progressive cavity feed pump (VFD driven)

Pump capacity:	65 to 100 m^3/hr (Average to Maximum)
Total delivery head:	TBC by Contractor (Minimum of 2 bar to be priced)
Pump starting:	VFD
Number of units:	Two (2) (1 duty + 1 standby)
Pump media solids content:	1 to 6 % dry solids
Rubbing velocity:	1.5 m/s
Rotor rotational speed:	350 rpm

PS.M20.12 Sludge feed pumps

Unless specifically stated otherwise here, sludge feed pumps shall conform to the relevant requirements stipulated in section **D46** of the Standard Specifications for Mechanical Works.

The sludge feed pumps shall be design to meet the performance requirements in particulate the hydraulic performance, solids handling capability, robustness and reliability.

The sludge feed pumps shall be progressive cavity feed type, suitable for sludge transfer application.

Easy access shall be provided to clean out the drive coupling and this shall not require dismantling the pump.

The progressive cavity pumps shall be supplied with a maximum rubbing velocity of 1.5 v_{gm} (m/s) and operate at 350 rpm and 250 rpm for WAS and PS, respectively. Any deviation from these requirements shall be done with written approval from the Engineer, prior to ordering the equipment.

The pump manufacture shall have at least 10 similar installations in South Africa. The Contractor shall, upon request, submit satisfactory letters from clients to prove the performance of proposed pumps.

Pump

Pumps shall be fitted with mechanical seals. Gland packing shall not be permitted.

Pump rotors shall be of hardened tool steel or better and preferable hard chrome plated.

Permeate pump shall be designed such that the rotors and seals are readily accessible and replaceable for maintenance, with the pump installed in place.

Permeate pump shall be self-priming and dry running resistant. Pumps shall be provided with dry running detection and protection devices.

The stator of the pumps shall be manufactured from Acrylonitrile butadiene rubber (NBR) with hardness less than 80 on Shore A scale.

Motors

Motors shall conform to the requirements stipulated in section **D35** of the Standard Specifications for Mechanical Works.

Each of the sludge feed pump shall be variable frequency drive (heavy duty) driven and designed to operate at the duty point running at 50 Hz. Variable frequency drive operating in “overdrive” mode or above the nominal 50 Hz shall not be permitted.

Reference shall be made to Clause 3.6 of the Detailed Mechanical Specifications regarding motor efficiency.

Base plate

Progressive cavity pump sets shall be supplied with baseplate manufactured with 304 stainless steel or better and plinth mounted.

PS.M20.13 Monitoring devices

Full details of the sensing equipment (thermocouples, etc.), and of the associated control and monitoring or indicating equipment indicated on the relevant P&IDs shall be submitted with the tender offer. Evidence shall also be submitted that adequate spares and services are readily available in this country.

Pressure gauges

Each pump set shall be equipped with two 150 mm dial diameter flush mounting pressure gauges. The gauges shall be calibrated in kilopascal and the angle shall suit the particular application. The gauge shall be filled with glycerine, and the bubble shall be out of the range of usual reading. The gauges shall be of a type that is possible to recalibrate (dead weight method) and reset on Site.

These meters shall indicate water pressure in kilopascal and shall have a range at least 50% higher than the normal duty point. However, in all cases the gauges must have a range at least 30% higher than the shut off, or maximum, head which the pump is capable of generating with the system conditions taking into consideration the maximum static suction pressure possible.

The meters for the suction side of pumps shall be compound gauges and shall be capable of indicating a negative pressure of up to 100 kPa. However, in all cases the gauges must have a range at least 30% higher than the maximum static suction pressure possible.

All pressure gauges shall be supplied and installed complete with isolating Steel cocks, copper or stainless steel piping, etc. and fitted with a pulsation snubber in stainless steel.

Due to the quality of the water, the Contractor shall ensure reliable operation of the gauges. Where necessary they must include for the pressure gauges to be fitted with diaphragms. Pipes to pressure gauges neatly supported between tapping point and pressure gauge. Pedestals to the Engineer's approval shall be supplied at a suitable position to house the pressure gauges.

PS.M20.14 Pipework and valves

Unless it is specifically stated otherwise here, all pipe work shall conform to the relevant specifications under Sections **D20, D21, D23, D24, D28, D29** and **D30** of the Standard Specifications for Mechanical Works.

The extent of the pipe work that shall be supplied under this section of the scope or work shall be:

- Suction pipework (including bends, eccentric reducer, couplings and flange adaptors)
- Discharge pipework (including bends, eccentric reducer, couplings and flange adaptors)
- Pressure relief valve or bursting disc with hardwired cut out switch
- Flange fasteners
- Valves
- Pipe and valve supports

All pipework shall be manufactures from EN 1.4401 (ASTM 316) stainless steel or EN 1.4362 (ASTM 2304) duplex stainless steel.

Suction pipe works shall be fitted with a blank flange to act as a flushing / cleaning port. A permanent washwater connection with associated flow control valves to this flange shall be provided to ensure the pumping system can be flushed completely as part of the operation and maintenance requirements of this system.

Isolation valves

Unless it stated otherwise here, all valves shall conform to the relevant specifications under item **D28** of Standard Specifications for Mechanical Works. Isolation valves shall be supplied for the following purposes:

- The Contractor shall provide actuated knife gate valves for each pump set (i.e. two (2) per pump) for operation and maintenance requirements.

An isolating valve must be able to check the system pressure from both sides.

All knife gate valves shall be double flanged with bolt holes drilled off-centre all in accordance with the requirements of SANS 1123 (Class 1000/3).

The design pressure of the valves shall not be less than 1000 kPA.

All valves shall be supplied complete including bolts, nuts, washers and gaskets in accordance with the class of valve. Bolts shall be of sufficient length to allow not more than three screw threads to protrude outside units after complete tightening of the assembly. Gaskets for flanged joints shall be of compressed synthetic fibre to BS 2815 Grade A and full faced with a minimum thickness of 3 mm for pressures up to and including 1 600 kPa cloth-inserted rubber may be used.

PS.M20.15 Flow meter

Flow meters shall be in accordance with Section **D66** of the Standard Specification of Mechanical Works.

A total of sixteen (16) flow meters shall be installed with this system.

The Contractor shall install the flow meter at least 3 x DN downstream of any item that causes turbulence (i.e. pump, bends, reducer, etc.), and allow for a straight section of pipe downstream of the flow meter. The straight section downstream of the flow meter shall be at least 2 x ND. For other installation guidelines, the Contractor shall consult the manufactures installation manual.

Cast iron components shall be protected with System – “Fusion Bonded Epoxy” or System – “Hot-Applied Thermoplastic”.

PS.M20.16 Materials

The sludge feed pumps shall be of construction of the following materials or superior, subject to the acceptance of the Engineer:

Description	Material
Pump casing	Cast iron Grade 250 with epoxy coating
Rotors	Chrome steel hardened
Stator	Acrylonitrile butadiene rubber
Rotating parts	Martensitic stainless steel
Seals	Mechanical seals of tungsten carbide or silicon carbide
Baseplate	Stainless steel grade 304 or better
Fasteners	Stainless steel grade 316 or better
Pipework	Stainless steel grade 316 or better

Materials of all pump components in contact with the pumped media shall be suitable for WAS and primary sludge application and also be chemically resistant to proposed chemical solutions used in membrane chemical cleaning process for membrane modules. Substantiation for materials compatibility shall be submitted to the Engineer, for acceptance, prior to ordering these units.

PS.M20.17 Gravity belt thickener/Belt filter press system

The Gravity Belt Thickener (GBT) /Belt Filter Press (BFP) system as a whole shall be new, of sound workshop, proven and robustly designed for a long and reliable operating life. The design life of the GBT/BFP is defined as that period for which it is designed to fulfil its intended functions and performance, meeting all the required dosing requirements and criteria as specified.

The design life of the GBT/BFP mechanical and electrical system shall be in excess of 10 years, unless otherwise specified or accepted by the Engineer. The design life for an element means that the element
will continue to be suitable for its purpose until the end of its design life, with regular inspection and routine maintenance in accordance with the respective servicing and maintenance schedules recommended by the manufacturer.

The design sludge flows and loads and discharge requirement of the dewatering train shall be as per the relevant specification. The design of the dewatering train shall be accommodated within the designated area as shown on the relevant drawing, unless accepted otherwise by the Engineer. The dewatering train shall be designed with sufficient capacity to accommodate the periodic/routine stopping of the dewatering process.

All process units shall be designed with consideration on operation flexibility in reasonable and practical manner. All process units shall be designed to be capable of being safely and easily isolated from the process stream for maintenance without affecting the overall treatment process.

The Contractor shall make reference to the relevant drawings for the proposed configuration and special limitations as a whole for the dewatering process, unless otherwise accepted by the Engineer.

It is a specific requirement that the GBT and BFP units are supplied from the same manufacture.

The Contractor shall also be responsible for the provision of any other auxiliary equipment, instruments, control requirements (hardware and software) etc. to make a complete and functional mechanical dewatering system design.

The <u>waste activate sludge</u> dewatering train shall entail the following dewatering configuration:

Sludge feed > Gravity Belt Thickener > Belt Filter Press > Sludge Cake Handling

It is a specific requirement that the GBT be mounted above/onto the BFP to allow discharge from the GBT to feed directly onto the BFP limit space requirements.

PS.M20.18 Design requirements and process parameters

Design parameters and minimum design requirements of the dewatering trains shall be as follows:

<u>Waste activated sludge dewatering train</u>

Total sludge production per day: 2 350 kg/day

Sludge feed volatile solids content:	70-75%
Dry solids concentration:	0.4 to 4%
Guaranteed sludge feed capacity per unit:	100 m^3/hour (only for GBT)
Rated solids loading capacity per unit:	150 kg/hour (only for GBT)
Operating hours per day:	8 hours
Maximum poly consumption:	7 kg/tonneDS
Guaranteed cake dryness:	15% solids
Average solids recovery (%):	95%
Number of units (GBT):	Two (2) (1 duty + 1 standby (Future))

PS.M20.19 Gravity belt thickener equipment

The Gravity Belt Thickener (GBT) shall be of the linear screen gravity drainage type, using a continuous belt. The Contractor shall ensure that adequate mixing of polyelectrolyte solution and flocculation of the sludge occurs prior to discharge onto the GBT.

The GBT shall be supported by structural steel work to position the GBT above corresponding BFP unit (i.e. cascade installation). The basic elements of the GBT shall include, but not be limited to, inline flocculation mixer, framework, maturing unit, rollers, filter belt, belt support members, chicanes, scrapers, drive units, belt tensioning system, belt tracking system, belt washing system, washwater collection system and drainage system, filtration collection and drainage system, closures and guards, etc.

A feed chute shall be provided to distribute sludge evenly from the flocculation chamber over the width of the thickener belt. Redistribution of sludge to provide efficient drainage shall be accommodated using a proprietary plough/chicane system. A discharge chute shall be provided to evenly distribute the thickened sludge onto the belt filter press unit located downstream of the GBT.

Sludge flocculation shall take place in piping and flocculation device which shall be installed downstream of the polyelectrolyte injection point on the sludge feed line. The Contractor shall consult the GBT manufacture when estimating the inlet pipe configuration (i.e. straight pipe length requirement).

Separate pans shall be provided for the collection of filtrate and wash water from the filter belt which shall be piped away separately to the filtration collection sump located underneath each Belt Filter Press (BFP) units.

The inlet and flocculation chamber, feed chute, filtrate and wash water pan, discharge chute and associated equipment in contract with sludge and filtrate and wash water shall be of rigid construction manufactured from grade 304L stainless steel of thickness not less than 2,0 mm.

The filter belt spray wash system, pipework, nozzles and valves shall be manufactured from grade 316 stainless steel. The spray bar shall be provided with a built-in cleaning brush which should not affect the operation of the GBT if used.

The screen cloth shall be manufactured from high permeability plain weave durable monofilament polyester fibre selected to meet the duty requirements with an operation life before refurbishment of not less than 3 000 hours.

The aperture size shall be selected to meet the specified performance.

The cloth shall be jointed by an approved clipper seam using high tensile stainless steel cable bonded with resin and incorporating a chevron or similar stabilising seam.

Spillage of sludge over the sides of the belt shall be avoided either by the provision of side skirting or by the dishing of the cloth surface in the drainage zone.

An automatic belt tracking system shall be provided to control alignment under all operational conditions. A proximity switch shall be provided which shall automatically switch off the linear screen in the event of the belt not being maintained on track i.e. belt out of alignment. The switch shall be used to initiate an alarm in the control panel and the feed to the unit shall switch off.

A cloth tensioning system shall be provided which shall include provision for adjustment to accommodate reduced length refurbishment belts.

Where hydraulic belt tracking or tensioning systems are employed a hydraulic power pack with pump reservoir pipework and all necessary equipment to provide a complete operational system shall be provided.

The drive roller shall be manufactured from carbon steel hollow bar and be provided with shafts to BS 4360 Class EN8 or equivalent material. A layer of reinforced neoprene rubber of thickness not less than 5 mm or similar material shall be applied to the roller surface and be machined to provide a true face after manufacture.

Other rollers shall be manufactured from standard schedule 40 seamless piping or equivalent material machined after manufacture with shafting and be coated with “Rilsan” or equal thermoplastic polymer material of thickness not less than 1 mm up to the bearing housing.

All bearings shall be of the adjustable roller or ball self-aligning type sealed type adequately rated and suitable for the environment in which they will operate including high pressure washing. A bearing cover and seal shall be provided to give further protection. Lubrication shall be from a common readily accessible location. All grease piping shall be grade 304L stainless steel or better.

The drive arrangement shall be of the mechanical variable speed gear reducer type utilising adjustable pulleys and wide toothed transmission. Rating shall be not less than 1,75 on installed motor power or 2,0 on absorbed power whichever is the greater. All bearings shall be selected for an L_{10} life of 150 000 hours.

The drain from the gearbox shall be accessible to the maintenance staff.

Only in-line or plug flow mixers may be used for mixing of polyelectrolyte and flocculation to achieve a well flocculated feed onto the belt and to meet the performance and duty requirements.

Air sparge bubble type mixers or back mixers are not accepted.

The unit shall be provided with a solid, impermeable containment enclosure on the four vertical sides. Access hatches shall be provided at all points where access is required during normal operation to observe machine operation, for wash down purposes and for maintenance.

Frame Construction and Design

The structural frame of the GBT shall be designed as a single weldment or monocoque design to provide maximum rigidity. It shall be constructed of welded stainless steel members and shall be so designed that rollers can be removed from the side or end of the

frame with minimum disturbance to other roller assemblies. Full and complete enclosure shall be provided to prevent egress of spray or spillage and against accidental contact with rolling assemblies during operation.

Access hatches shall be provided at all points on the belt press where access is required during normal operation to observe machine operation, or for wash down purposes.

The design of the structural frame shall be based on a minimum belt tension of 9 kg/cm of belt width. The structural members shall be pressed or otherwise machine-formed in minimum AISI grade 304L stainless steel. The design of the load bearing structural members shall be such as to ensure a maximum deflection of l/480 where l is the span length, except in the case of roller support members, where the maximum permissible deflection of the bearing support point from intentioned to tensioned state shall not exceed 2,5 mm. The maximum stress in structural elements shall not exceed one third of the yield stress.

The structural frame shall be designed to take all the horizontal loads imposed by the press components without external support from the press building, and all loads imposed on the building shall be vertical.

The frame shall be so designed and fabricated that roller alignment is determined by the frame geometry. The frame rigidity shall be such as to maintain roller alignment irrespective of movement of the supporting foundation.

Access platforms and the like shall be fabricated in mild steel to BS43C or ASTM A-36 specification, and suitably protected against corrosion as defined below. Adequate safe access, as required in terms of the OHS Act shall be provided for operation and maintenance of the equipment. The extent of the access platforms and ancillaries (i.e. ladders) shall be shown on a plan to be submitted with the tender.

The maximum overall length of the completely assembled GBT including cake conveyor and sludge conditioning tank shall not exceed 3.2 m.

Surface Finish

Matt finish stainless steel plate shall be used for the frame. On completion of welding work on the frame, all welds shall be acid-pickled. The pickling material shall be removed by steam cleaning after application.

After fabrication, the frame and other components fabricated in stainless steel shall be lightly sandblasted to provide a uniform, attractive external surface finish.

Pump support/base plates, access platforms and the like fabricated in mild steel shall be hot-dip galvanised to specification.

No galvanised materials shall be used inside the wetted area of the unit.

Bolts and other fasteners

All fasteners shall be grade 316 stainless steel. Where stainless steel bolts are fitted into structural carbon steel members, suitable anti-seize compound shall be applied to aid subsequent removal.

Fixing points for access platforms shall be provided.

Odour Control

The filter belt press shall be designed and constructed in such a way as to provide maximum protection for operations staff against injury to health from the bio-hazards present in sewage sludge.

As a minimum, the thickening or dewatering unit shall be provided with a solid, impermeable containment enclosure on the four vertical sides, which shall be contiguous with a bottom enclosure or sump to contain all spent liquors.

A top enclosure or hood with suitable air extraction points shall be provided for the filter belt press.

The enclosed volume shall be minimised by restricting the maximum width and height dimension of the enclosure.

The filter belt press shall be provided with watertight inspection hatches on the vertical sides of the enclosure at all points where the operator would normally require visual access during operation of the machine, and where access is required for operations such as replacing the filter belts. A minimum of one inspection hatch per 3 square metres of side frame area shall be provided.

Bearings or other mechanical or electrical equipment which would deteriorate in a moist environment shall not be located inside the enclosure in the wetted area of the press, or shall be designed to withstand the environmental conditions.

Sludge condition

The linear screen system shall incorporate a system for efficient mixing of polyelectrolyte and sludge with the objective of minimising polyelectrolyte consumption. Polyelectrolyte shall be introduced at six points located radially on the sludge feed pipe.

Once the polyelectrolyte has been thoroughly mixed into the feed sludge the flow shall enter a conditioning tank.

The conditioning tank shall have an adequate capacity and be equipped with a gear-motor driven slow speed flocculator. The mixing arrangement shall ensure that the entire contents of the tank are uniformly agitated and shall prevent short-circuiting of sludge. Flocculation tanks without mechanical agitation, in which settled sludge solids may accumulate, will not be acceptable.

The conditioning tank shall be manufactured in grade 304L stainless steel.

Sludge from the flocculation/conditioning tank shall be conveyed onto the linear screen in such a manner as to avoid excessive turbulence and consequent floc break-up. The distribution mechanism shall be so arranged that the maximum static head loss between the top water level in the flocculation tank, and the linear screen shall not exceed 75 mm.

The distributor shall spread the sludge evenly over the working width of the linear screen. A mechanism shall be provided to ensure that the incoming sludge flow is spread evenly over the effective working width of the linear screen. Further mechanisms shall be provided to “plough” the sludge blanket so that the maximum degree of free drainage is achieved prior to the gravity pressure zone.

The sludge plough mechanism shall be so designed as to facilitate adjustment by the operator in safety and comfort. It shall be possible to remove the ploughs from the sludge blanket if considered necessary during operation.

A minimum of three rows of ploughs shall be provided.

Sludge handling

The GBT shall be provided with three distinct thickening zones as follows:

- Flocculation zone
- Horizontal gravity drainage zone
- Extended thickening zone

The design of the dewatering zones shall permit a gradual increase in dewatering pressure after exiting the gravity zone. The first pressure stage shall be a wedge zone which shall be designed as to encourage run-off expressed water. Collection trays shall be positioned at entry to the first pressing stage to catch any material extruding sideways from the belts at this point, and to guide this material to the outlet sump.

Separate collection trays fabricated in grade 304L stainless steel or similarly corrosion-resistant material shall be provided to collect the filtrate from the gravity dewatering zone and from the belt wash system. A flanged outlet adequately sized, and in no case less than 150 mm (6 inch) nominal diameter shall be provided for both systems.

A mechanism shall be provided for removing the thickened sludge from the filter belt. It shall be positioned clear of a roller surface to prevent damage to the belt seam. It shall be possible to adjust the degree of contact with the belt along the length of the blade. The blade shall be fitted with a means of adjustment to allow for wear. Blade material shall be an abrasion resistant plastic.

The blade support shall be sufficiently stiff to prevent deflection in service which would permit material to pass by.

Scraper blade inserts shall be reversible or refurbishable. Blade inserts shall be replaceable.

Belt Wash System

A belt washing system shall be provided to ensure adequate cleaning of the belt and to prevent blinding.

(a) The GBT shall incorporate a high pressure wash system operating at a minimum pressure of 6 bar. Spray nozzles shall be specifically designed for cleaning purposes, shall have a 'chisel jet' form, and shall have an overlapping pattern. The nozzle header shall be easily removable for cleaning and inspection, if required.

(b) Spray bars shall be provided with a built-in cleaning brush, capable of being used while the filter belt press is in operation. The press control system shall monitor the spray water pressure, and shall incorporate a variable delay period to prevent nuisance shutdown while the cleaning brushes are in use. A suitably sized filter/strainer shall be provided on the wash water supply line.

(c) An adjustable pressure switch shall be provided sensing the post-filter washwater pressure. This shall be wired to the belt press control system and shall shut down the dewatering system in a sequenced manner if washwater pressure falls below the present value.

All pipework located inside the dewatering building shall be manufactured from stainless steel (304 of better).

All pipework shall have flanged joints.

All valves shall be stainless steel 316 full-bore valves.

Belt Alignment Controls

The belt alignment system shall comprise a slewing guide roller on each belt. The control mechanism shall not require either excessive belt wrap angles around the guide roller, or excessive slew travel, which would lead to belt deformation and wear.

An alignment system will be provided which anticipates belt movement and takes corrective action proportional to belt drift.

The slewing mechanism shall comprise an actuator coupled directly to the bearing housing on the slewing roller.

The slewing bearing housing shall be provided with low-friction tracks.

A pair of sensors for each belt shall be provided to sense a shutdown misalignment condition. The control logic shall prevent nuisance shutdown from occasional activation of these sensors.

Belt Tensioning

Belt tension shall be adjustable from the minimum required for correct belt tracking up to the maximum design value. The range of adjustment shall be from approximately 2 to 10 kg/cm and shall be compatible with the values used in the bearing selection and roller stressing calculations. Adjustment of belt tension shall be manual at the machine.

Belt Drive

The belt drive arrangement shall provide positive drive for each filter belt.

The transmission mechanism shall be totally enclosed, oil tight, and oil or grease lubricated.

The overall efficiency of the gearbox and final drive arrangement shall be in excess of 90%. The drive system shall be one of the following:

- Either a single drive direct-coupled to one press roller, and with a chain transmission to the second
  roller,

OR

- Dual drives, one for each belt, synchronously driven from a common variable frequency threephase drive.

Speed variation will preferably be by means of a variable frequency inverter in the Belt Press control panel of the Motor Control Centre.

Reference shall be made to Clause 3.6 of the Detailed Mechanical Specifications regarding motor efficiency.

PS.M20.20 Belt filter press equipment

Frame Construction and Design

The structural frame of the belt press shall be designed as a single weldment or monocoque design to provide maximum rigidity. It shall be constructed of welded stainless steel members and shall be so designed that rollers can be removed from the side or end of the frame with minimum disturbance to other roller assemblies. Full and complete enclosure shall be provided to prevent egress of spray or spillage and against accidental contact with rolling assemblies during operation.

Access hatches shall be provided at all points on the belt press where access is required during normal operation to observe machine operation, or for wash down purposes.

The design of the structural frame shall be based on a minimum belt tension of 9 kg/cm of belt width. The structural members shall be pressed or otherwise machine-formed in minimum AISI grade 304L stainless steel. The design of the load bearing structural members shall be such as to ensure a maximum deflection of l/480 where l is the span length, except in the case of roller support members, where the maximum permissible deflection of the bearing support point from intentioned to tensioned state shall not exceed 2,5 mm. The maximum stress in structural elements shall not exceed one third of the yield stress.

The structural frame shall be designed to take all the horizontal loads imposed by the press components without external support from the press building, and all loads imposed on the building shall be vertical.

The frame shall be so designed and fabricated that roller alignment is determined by the frame geometry. The frame rigidity shall be such as to maintain roller alignment irrespective of movement of the supporting foundation.

Access platforms and the like shall be fabricated in mild steel to BS43C or ASTM A-36 specification, and suitably protected against corrosion as defined below. Adequate safe access, as required in terms of the OHS Act shall be provided for operation and maintenance of the equipment. The extent of the access platforms and ancillaries (i.e. ladders) shall be shown on a plan to be submitted with the tender.

The maximum overall length of the completely assembled press including cake conveyor and sludge conditioning tank shall not exceed 6 and 6.5 meters for the WAS and PS BFP units, respectively.

Surface Finish

Matt finish stainless steel plate shall be used for the frame. On completion of welding work on the frame, all welds shall be acid-pickled. The pickling material shall be removed by steam cleaning after application.

After fabrication, the frame and other components fabricated in stainless steel shall be lightly sandblasted to provide a uniform, attractive external surface finish.

Pump support/base plates, access platforms and the like fabricated in mild steel shall be hot-dip galvanised to specification.

No galvanised materials shall be used inside the wetted area of the belt press.

Bolts and other fasteners

All fasteners shall be grade 316 stainless steel. Where stainless steel bolts are fitted into structural carbon steel members, suitable anti-seize compound shall be applied to aid subsequent removal.

Fixing points for access platforms shall be provided.

Odour Control

The filter belt press shall be designed and constructed in such a way as to provide maximum protection for operations staff against injury to health from the bio-hazards present in sewage sludge.

As a minimum, the thickening or dewatering unit shall be provided with a solid, impermeable containment enclosure on the four vertical sides, which shall be contiguous with a bottom enclosure or sump to contain all spent liquors.

A top enclosure or hood with suitable air extraction points shall be provided for the filter belt press.

The enclosed volume shall be minimised by restricting the maximum width and height dimension of the enclosure.

The filter belt press shall be provided with watertight inspection hatches on the vertical sides of the enclosure at all points where the operator would normally require visual access during operation of the machine, and where access is required for operations such as replacing the filter belts. A minimum of one inspection hatch per 3 square metres of side frame area shall be provided.

Bearings or other mechanical or electrical equipment which would deteriorate in a moist environment shall not be located inside the enclosure in the wetted area of the press, or shall be designed to withstand the environmental conditions.

Roller construction and bearing selection

The basic design criteria for rollers shall be:

- Maximum stress no more than 33% of the yield stress of the roller material, calculated at maximum belt tension.

- Maximum centre span deflection of 0,5 mm/m of roller length, at maximum belt tension. The design tension shall be stated.

Roller material shall be AISI grade 304L stainless steel (nylon or rubber coated). Roller dimensions and stress calculations shall be provided on request.

Roller bearing shafts and end flanges shall be so designed as to transmit bearing loads to the outer periphery of the end flange without significant diaphragm mode deflection of the end flange.

Roller shafts shall be stressed on the assumption that the end flange is rigid. Sufficient information shall be provided to demonstrate the integrity of the end flange design. Where through shafts are proposed, the supplier shall demonstrate that the design provides adequate support to the through shaft to prevent bending, excessive stress, or fretting in service.

(d) Bearing Selection

Bearings for drive, idle and press rollers shall be self-aligning spherical roller type, and shall accommodate a misalignment of up to 3 degrees included angle without reduction in capacity. Bearing inserts shall be stock sizes readily available from distributors and suppliers. A full list of bearings with identification type numbers shall be provided.

(e) Bearing Selection Data

Bearing selection data showing the method of calculating L_{10} bearing life, and detailing methods of calculating bearing loads shall be submitted on request.

Bearings shall be selected for a L_{10} life of 150 000 hours minimum, using maximum operating speeds, and a belt tension of 9 kg/cm belt width in each belt. Calculations shall also allow for roller self-weight and drive torque.

(f) Bearing Housings

Bearing housings on all pressure, tension and guide rollers shall be of the horizontally split type, to permit replacement of inserts and seals in service without major dismantling. Bearing housings shall be provided with lip seals to prevent entrance of moisture and other contaminants. Suitable shaft seals shall be provided. Grease fittings shall be supplied to each bearing with remote stainless steel lines to allow lubrication when the unit is running.

Centralised grease lubrication system in 304L stainless steel shall provide a metered charge of grease to each bearing in turn from a centrally located lubricator.

PS.M20.21 Sludge conditioning

(a) Sludge Conditioning

The linear screen/belt press system shall incorporate a system for efficient mixing of polyelectrolyte and sludge with the objective of minimising polyelectrolyte consumption. Polyelectrolyte shall be introduced at six points located radially on the sludge feed pipe.

Once the polyelectrolyte has been thoroughly mixed into the feed sludge the flow shall enter a conditioning tank.

The conditioning tank shall have an adequate capacity and be equipped with a gear-motor driven slow speed flocculator. The mixing arrangement shall ensure that the entire contents of the tank are uniformly agitated and shall prevent short-circuiting of sludge. Flocculation tanks without mechanical agitation, in which settled sludge solids may accumulate, will not be acceptable.

The conditioning tank shall be manufactured in grade 304L stainless steel.

(b) Sludge Distribution

Sludge from the flocculation/conditioning tank shall be conveyed onto the linear screen in such a manner as to avoid excessive turbulence and consequent floc break-up. The distribution mechanism shall be so arranged that the maximum static head loss between the top water level in the flocculation tank, and the linear screen shall not exceed 75 mm.

The distributor shall spread the sludge evenly over the working width of the linear screen. A mechanism shall be provided to ensure that the incoming sludge flow is spread evenly over the effective working width of the linear screen. Further mechanisms shall be provided to “plough” the sludge blanket so that the maximum degree of free drainage is achieved prior to the low pressure zone.

The sludge plough mechanism shall be so designed as to facilitate adjustment by the operator in safety and comfort. It shall be possible to remove the ploughs from the sludge blanket if considered necessary during operation.

A minimum of five rows of ploughs shall be provided.

Sludge handling

Dewatering Zones

The filter belt press shall be provided with three distinct dewatering zones as follows:

- Gravity dewatering zone, where the free water is removed completely from the conditioned sludge.

- Low pressure dewatering zone and/or wedge zone, where the drained sludge is subjected to a gradually increasing pressure as the two dewatering belts converge.

- Medium to high pressure zone where the sludge is subjected to gradually increasing pressure.

The design of the dewatering zones shall permit a gradual increase in dewatering pressure after exiting the gravity zone. The first pressure stage shall be a wedge zone which shall be designed as to encourage run-off expressed water. Collection trays shall be positioned at entry to the first pressing stage to catch any material extruding sideways from the belts at this point, and to guide this material to the outlet sump.

Separate collection trays fabricated in grade 304L stainless steel or similarly corrosion-resistant material shall be provided to collect the filtrate from the gravity dewatering zone, from the wedge or low pressure dewatering zone, and from the belt wash system.

The design layout of the pressure zones shall be compact, with minimum filter belt area wasted in tangents between press rollers. Roller layout shall encourage run-off of expressed water, and where necessary wiper blades shall be provided to prevent re-wetting of the sludge cake.

A sump shall be provided to collect and contain the excess filtrate and wash water from the press. A flanged outlet adequately sized, and in no case less than 150 mm (6 inch) nominal diameter shall be provided. The sump may form part of the structural foundations. If it is part of the enclosure it shall be of stainless steel.

For horizontal wedge zones the area of the wedge zone shall be calculated using one side of the belt only.

The area of the pressure zone shall be calculated as the contact area with the press rollers and shall not include any allowance for tangents between rollers.

Sludge cake removal blades

A mechanism shall be provided for removing the sludge cake from the filter belt. It shall be positioned clear of a roller surface to prevent damage to the belt seam. It shall be possible to adjust the degree of contact with the belt along the length of the blade. The blade shall be fitted with a means of adjustment to allow for wear. Blade material shall be an abrasion resistant plastic.

The blade support shall be sufficiently stiff to prevent deflection in service which would permit material to pass by.

Scraper blade inserts shall be reversible or refurbishable. Blade inserts shall be replaceable.

PS.M20.22 Filtrate Drainage System

(a) General Requirements

Discharge of filtrate onto the dewatering room floor, or any arrangement whereby spillages can discharge on to the floor, is unacceptable.

Filtrate drainage from the gravity and pressure dewatering zones shall be contained within the confines of the unit and discharged via piping.

The filtrate pipework shall be connected to a closed pipe system which drains to the recovery sumps.

The filtrate and wash water shall be discharged separately.

(b) Drainage Pan Construction

Drainage Pans which are part of the enclosure shall be constructed in minimum 1,5 mm grade 304L stainless steel. Interconnecting pipework shall be in stainless steel or PVC or similar corrosion-resistant material.

PS.M20.23 Belt Wash System

A belt washing system shall be provided to ensure adequate cleaning of the filter belts and to prevent blinding.

(a) The belt press shall incorporate a high pressure wash system operating at a minimum pressure of 6 bar. Spray nozzles shall be specifically designed for cleaning purposes, shall have a 'chisel jet' form, and shall have an overlapping pattern. The nozzle header shall be easily removable for cleaning and inspection, if required.

(b) Spray bars shall be provided with a built-in cleaning brush, capable of being used while the filter belt press is in operation. The press control system shall monitor the spray water pressure, and shall incorporate a variable delay period to prevent nuisance shutdown while the cleaning brushes are in use. A suitably sized filter/strainer shall be provided on the wash water supply line.

(c) An adjustable pressure switch shall be provided sensing the post-filter washwater pressure. This shall be wired to the belt press control system and shall shut down the dewatering system in a sequenced manner if washwater pressure falls below the present value.

All pipework located inside the dewatering building shall be manufactured from stainless steel (304 of better).

All pipework shall have flanged joints.

All valves shall be stainless steel 316 full-bore valves.

Belt Alignment Controls

The belt alignment system shall comprise a slewing guide roller on each belt. The control mechanism shall not require either excessive belt wrap angles around the guide roller, or excessive slew travel, which would lead to belt deformation and wear.

An alignment system will be provided which anticipates belt movement and takes corrective action proportional to belt drift.

The slewing mechanism shall comprise an actuator coupled directly to the bearing housing on the slewing roller.

The slewing bearing housing shall be provided with low-friction tracks.

A pair of sensors for each belt shall be provided to sense a shutdown misalignment condition. The control logic shall prevent nuisance shutdown from occasional activation of these sensors.

Belt Tensioning

Belt tension shall be adjustable from the minimum required for correct belt tracking up to the maximum design value. The range of adjustment shall be from approximately 2 to 10 kg/cm and shall be compatible with the values used in the bearing selection and roller stressing calculations. Adjustment of belt tension shall be manual at the machine.

Belt Drive

The belt drive arrangement shall provide positive drive for each filter belt.

The transmission mechanism shall be totally enclosed, oil tight, and oil or grease lubricated.

The overall efficiency of the gearbox and final drive arrangement shall be in excess of 90%. The drive system shall be one of the following:

- Either a single drive direct-coupled to one press roller, and with a chain transmission to the second
  roller,

OR

- Dual drives, one for each belt, synchronously driven from a common variable frequency threephase drive.

Speed variation will preferably be by means of a variable frequency inverter in the Belt Press control panel of the Motor Control Centre.

Reference shall be made to Clause 3.6 of the Detailed Mechanical Specifications regarding motor efficiency.

PS.M20.24 Horizontal screw conveyor

Conveyors shall be required to transport dewatered sludge from the dewatering presses to the respective sludge cake pump hoppers.

The sludge cake shall be conveyed to two sludge cake pump stations per dewatering train (i.e. WAS and Primary sludge), resulting in a total of eight (8) horizontal screw conveyors system. Each screw conveyor shall be sized to accommodate the maximum achievable sludge cake production rate of the associated dewatering units, which will be two (2) dewatering units per screw.

The Contractor shall take note of relevant drawings and ensure the conveyors are able to discharge sludge cake into the required hopper system, taking into account the equipment offered with his/her tender. Where a level transition is required, the Contractor shall make the necessary provision in his/her offer. The sludge cake pump stations has to be installed on plinths above the floor level and access from the floor level to the dewatering units is also required. It is therefore likely that the level transition will only be achievable via an inclined conveyor system.

Careful consideration to the general arrangement of the conveyor shall be made to ensure the screw can be removed from the trough without effecting surrounding mechanical equipment. If the spiral has to be supplied in sections which are bolted together the Contractor shall make provision for this in his/her tender offer.

PS.M20.25 Spiral trough

The spiral trough shall be manufactured in a "U" shape from stainless steel grade 316 with a lip on either side to accommodate the centreless spiral (minimum thickness of 3 mm). The trough shall be bent and not rolled for optimum lateral strength to specific diameters and clearances. The trough sections shall be joined and fully welded to the specified trough length. Support legs will support the spiral trough, to suit the application. These support legs shall be manufactured from carbon steel in a "H" shape from channel and be welded to the side of the spiral trough and bolted to the concrete floor with stainless steel anchor bolts.

Supports shall be coated in accordance with System 2 of Specification **D13.3** of the Standard Mechanical Specification (i.e. HDG).

The trough shall be covered by stainless steel grade 316 cover plates bolted to the trough lip where no sludge will be discharged into the trough. There shall also be a discharge chute on the opposite end to the drive unit for emergency conditions.

The spiral trough shall be flanged at the drive end to facilitate the mounting of the drive unit.

The spiral trough shall be fitted with replaceable liners or wear bar strips. The replaceable liner shall be manufactured from material with a low friction co-efficiency combined with high resistance to abrasion. The standard liner supplied will be a two-coloured liner (6 mm green & 4 mm red) ultra-high molecular polyethylene (UHMPE), with the red as an indicator to wear. The liner is restrained in position by holding down lugs, welded to the spiral trough. The liner will simply be clipped in or out from behind these lugs.

The replaceable liners are supplied pre-bent to the correct trough diameter in 1 meter sections.

The replaceable wear bars shall be spot welded to the spiral trough. The material of the wear bars shall be softer in nature than the material of the spiral to prevent excessive spiral wear. The wear bars are placed in the spiral trough to guide the spiral and to protect the spiral trough.

PS.M20.26 Spiral

The (centreless, if applicable) spiral shall be manufactured of continuous high tensile carbon steel flat bar (or suitable alloy), cold formed into a strong, flexible spiral.

The spiral shall be complete with lead-in and drive coupling plate to facilitate ease of maintenance.

The spiral conveyor shall be designed such that all silt and fine material shall be positively removed.

PS.M20.27 Drive unit

The drive unit shall be suitably sized with an output speed selected to facilitate the load transported and with a minimum service factor of 2,0 on installed power. The drive unit shall be a flanged mounted inline helical bevelled geared hollow shaft type to accommodate the drive shaft. The drive unit shall be bolted to a drive end flange, machined with spigots and tapped holes for accurate alignment. The protection rating to be IP 55 or higher, 400 V or higher.

The following electrical control equipment shall be supplied and installed with the conveyor.

A current sensing overload device with a built-in intelligent control facility shall be incorporated within the drive unit starter compartment in the motor control centre. The device shall have the facility to be able to reverse the direction of rotation of the spiral,

should a blockage occur in the spiral tube and cause the overload device to trip the normal operation of the conveyor.

The device shall have the additional facility to enable this reversing action to be affected twice for any one occurrence, before tripping the alarm. Further, the device shall either re-set automatically if the blockage causing the initial overload conditions is cleared, or should the blockage remain upon the completion of the second attempt at automatic clearance, an alarm shall be generated.

Reference shall be made to Clause 3.6 of the Detailed Mechanical Specifications regarding motor efficiency.

PS.M20.28 Isolation valves

Unless it stated otherwise here, all isolation valves shall conform to the relevant specifications under item **D28** of Standard Specifications for Mechanical Works. Isolation valves shall be provided for the following purposes:

An isolating valve must be able to check the system water pressure from both sides.

All valves shall be supplied complete including bolts, nuts, washers and gaskets in accordance with the class of valve. Bolts shall be of sufficient length to allow not more than three screw threads to protrude outside units after complete tightening of the assembly.

PS.M20.29 Materials

The sludge feed pumps shall be of construction of the following materials or superior, subject to the acceptance of the Engineer:

Description	Material
Pump casing	Cast iron Grade 250 with epoxy coating or better
Rotors	Chrome steel hardened
Stator	Acrylonitrile butadiene rubber
Rotating parts	Martensitic stainless steel
Description	**Material**
Seals	Gland packing (aramid) with water flushing
Baseplate	Stainless steel grade 304 or better
Fasteners	Stainless steel grade 316 or better
Pipework	Stainless steel grade 316 or better

PS.M20.30 Spares

Provision for spare parts shall be included in the Schedule of Quantities. The Contractor will prices this item in terms of the recommendation from the equipment manufacture. The spare parts / consumables offered shall be listed on a letter, which will be signed by an authorised representative from the manufacture in order to substantiate this allowance and shall be included in the tender offer as part of the evaluation file. Spare parts and consumables for an operational period of two (2) years shall be allowed for.

The following items shall be included in this list:

- Stator removal tool (chain wrench)
- Trolley assembly (one no.’s of)

PS.M20.31 Cake silo live bottom equipment

The live bottom shall consist of multiple (minimum of 3 per silo) screws installed in parallel. All screws in a live bottom shall operate simultaneously in order to prevent any chance of bridging. The live bottom shall be designed to operate continuously regardless of the sludge level in the bunker, including completely empty. Operation at all levels shall be safe and without damage. The live bottom shall be designed in such a way as to ensure that the entire content of the silo can be removed via the live bottom system.

The sludge cake will discharge directly into a truck trailer form the silos via a sliding gate fitted to each screw. Sludge cake will fall through a chute to avoid spillage due to strong wind during loading. The sludge cake silos will have an effective design volume of 320 m^3 and will have to be emptied within 4 hours (i.e. 80 m^3/hr discharge capacity per live bottom).

The live bottom shall include, but not be limited to, trough, liners, helical screws, discharge chutes, mechanical stops, drive motors, gearbox, support structure, etc.

PS.M20.32 Design requirements and process parameters

Design parameters and minimum design requirements of the silo live bottom shall be as follows:

Conveyor type:	Multiple screw feed (3 screws per silo)
Sludge cake concentration:	40% dry solids
Cake discharge rate:	80 m^3/hour (per live bottom system)
Conveyor starting:	VFD

PS.M20.33 Spiral trough

The spiral trough shall be purpose made to suite the application. The trough shall be manufactured from stainless steel grade 316 with a minimum thickness of 4.5 mm. The trough shall be bent and not rolled for optimum lateral strength to specific diameters and clearances. The trough sections shall be joined and fully welded to the specified trough length. The though shall be fixed in place as indicated on the relevant drawings.

The spiral trough shall be flanged at the drive end to facilitate the mounting of the drive unit and discharge chute.

The spiral trough shall be fitted with replaceable liners manufactured from material with a low friction coefficiency combined with high resistance to abrasion. The standard liner supplied will be a two-coloured liner (6 mm green & 4 mm red) ultra-high molecular polyethylene (UHMPE), with the red as an indicator to wear. The liner is restrained in position by holding down lugs, welded to the spiral trough. The liner will simply be clipped in or out from behind these lugs.

PS.M20.34 Spiral screw

The spiral shall be manufactured of continuous high tensile carbon steel flat bar (or suitable alloy), cold formed into a strong, flexible spiral.

The spiral shall be complete with lead-in and drive coupling plate to facilitate ease of maintenance.

The spiral conveyor shall be designed such that all silt and fine material shall be positively removed.

PS.M20.35 Drive unit

The drive unit shall be suitably sized with an output speed selected to facilitate the load transported and with a minimum service factor of 2,0 on installed power. The drive unit shall be a flanged mounted inline helical bevelled geared hollow shaft type to accommodate the drive shaft. The drive unit shall be bolted to a drive end flange, machined with spigots and tapped holes for accurate alignment. The protection rating to be IP 55 or higher, 400 V or higher.

A current sensing overload device with a built-in intelligent control facility shall be incorporated within the drive unit starter compartment in the motor control centre. The device shall have the facility to be able to reverse the direction of rotation of the spiral, should a blockage occur in the spiral tube and cause the overload device to trip the normal operation of the conveyor.

The device shall have the additional facility to enable this reversing action to be affected twice for any one occurrence, before tripping the alarm. Further, the device shall either re-set automatically if the blockage causing the initial overload conditions is cleared, or should the blockage remain upon the completion of the second attempt at automatic clearance, an alarm shall be generated.

Reference shall be made to Clause 3.6 of the Detailed Mechanical Specifications regarding motor efficiency.

PS.M20.36 Sludge discharge sluices

Each conveyor of a live bottom shall be fitted with an actuated gate or valve at its discharge. If a valve is used it shall be a knife gate valve in accordance with **D28** of the Standard Specifications for Mechanical Works. If it is a sluice gate, it shall effectively be a wall-mounted sluice gate in accordance with **D31** Standard Specifications for Mechanical Works.

PS.M20.37 Access and maintenance platforms

The Contractor shall design, supply and install walkways, guardrails, steps and ladders in accordance with mechanical and electrical design requirements and/or equipment . The Contractor shall take every possible measure to ensure that the Plant Operator(s) have adequate and safe access to any component which requires manual intervention as part of the general or emergency operation procedure. This includes items such as, but not limited to, valves, control panels, monitoring devices, etc. These maintenance/access platforms shall be designed to cause minimum impediment to maintenance and repair activities. The final installation shall conform to the relevant OHS and material specifications associated with each components of the access & maintenance platforms.

Steel stairs, platforms and walkways shall be manufactured from Mild Steel with a Hot Dipped Galvanised corrosion protection system. The Contractor shall refer to Section **D14, D15, D16, D17, D18 and D19** or any other relevant specification of the Standard Specifications for Mechanical Works and ensure his/her design conforms to all requirements stipulated under these sections. It should be noted that all handrails to be supplied with this contract shall be made from 316 stainless steel and shall not have any pop-rivet in the installation.

All components (i.e. BFP, GBT poly and sludge silos)

Testing and commissioning

PS.M20.38 Rotary Vane Feeder and Polyelectrolyte Dosing Pumps

Calibration curves shall be produced throughout the operating range to demonstrate the repeatability of the performance.

After the plant has been operating for 1 month the calibration curves shall be produced. The second curve shall not deviate from the first by more than 5%.

PS.M20.39 Jet-wet Head

Satisfactory performance shall be indicated by the absence of “fish eyes” in the polyelectrolyte solution.

PS.M20.40 Sludge feed pumps

The correct operation of the equipment and achievement of the specified performance requirements shall be demonstrated to the Engineer prior to the commissioning of the Works. All safety measures (e.g. over-torque cut-out) shall also be successful tested prior to acceptance and commissioning.

PS.M20.41 Dewatering system

After commissioning, the dewatering equipment shall be subjected to 10-day acceptance testing during the trial operation period to demonstrate compliance with the specification. The Contractor shall make the necessary allowance in his tender for the execution of these tests, including any/all quality sampling and analyses.

a) The following measurements shall be taken

- Flow rates to and from equipment (continuous monitoring);
- Feed sludge solids concentration (continuous monitoring);
- Volatile solids concentration of the sludge feed (measure twice per day);
- Polyelectrolyte consumption (continuous monitoring);
- Solids concentration of the filtrates (continuous monitoring);
- Solids concentration of the washwater if separate (continuous monitoring);
- Filtrate flow (continuous monitoring);
- Washwater flow (continuous monitoring);
- Solids concentration of dewatered sludge (continuous monitoring);
- Polyelectrolyte dilution water flow rate (continuous monitoring);

b) The Contractor shall submit calculations showing the performance of the dewatering equipment with respect to:

- Solids loading.
- Polyelectrolyte consumption in g/kgDS (with g = gram product)
- Solids recovery as a percentage of feed solids.
- Solids concentration of the thickened sludge.

The tests shall be repeated at the conclusion of the maintenance period if required by the Engineer.

PS.M20.42 Sludge cake handling system

Performance tests will be undertaken on the complete sludge cake handling systems. The tests shall consist of

a) The starting and stopping of the cake conveyors
b) The starting and stopping (and speed control) of the cake pumps
c) The hoppers’ sludge cake discharge screws and chutes

The equipment shall operate for three days under completely automatic control, with the Engineer determining the number and combination of operating belts. The control philosophy shall be able to successfully manage the transition from one to five operating presses, and the reverse, without spillage of the cake onto the building floor.

It shall also be displayed that the duty cycle on the dewatering units are implemented after each operational shift.

This test shall not run in parallel to the Belt Press Performance Test.

Any spillage of sludge cake onto the building floor shall indicate that the Test has failed.

The correct operation of the equipment and achievement of the specified performance requirements shall be demonstrated to the Engineer prior to the commissioning of the Works. All safety measures (e.g. over-torque cut-out) shall also be successful tested prior to acceptance and commissioning.

PS.M20.43 Dewatering performance evaluation

In addition to the dewatering system parameters monitored for the operational purposes the following data shall be recorded:

a) Washwater supply to each dewatering unit (i.e. linear screen and/or belt filter press).
b) Solids density (i.e. solids content) on the filtrate for the WAS and primary sludge dewatering trains.
c) Solids density meter for all sludge cake pump discharge mains (Valmet TS or similar approved).

Data from the instruments listed above shall be displayed as a trend line on the SCADA but shall also raise warnings if the reading/measurement falls outside a pre-set operational range.

The following performance data trend lines shall be recorded and shown as trend lines on the SCADA for each sludge system (i.e. WAS and primary sludge):

1. Mass of dry sludge treated (tonDS, daily amount).
2. Mass of dry sludge exiting via the filtrate stream (tonDS, daily amount).
3. Consumption of polyelectrolyte per dry sludge treated (kgPoly/tonDS).
4. Consumption of polyelectrolyte per dry sludge (kgPoly/tonDS).
5. Sludge cake concentration (kgDS/m^3 or %)

PS.M20.44 Spare parts

Provision for spare parts shall be included in the Schedule of Quantities. The Contractor will prices this item in terms of the recommendation from the equipment manufacture. The spare parts / consumables offered shall be listed on a letter, which will be signed by an authorised representative from the manufacture in order to substantiate this allowance and shall be included in the tender offer as part of the evaluation file. Spare parts and consumables for an operational period of two (2) years shall be allowed for.

PS.M21. LIFTING EQUIPMENT

The Contractor shall provide lifting equipment in accordance with the relevant drawings. Areas where lifting equipment are required include:

- Axial flow pump stations
- Gravity belt / belt filter press units
- Poly loading system
- RAS pump station
- WAS pump station

Unless specifically stated otherwise here, lifting equipment shall conform to the requirements stipulated under section **D59** of the Standard Mechanical Specifications.

PS.M21.1 Design requirements and process parameters

Design parameters and minimum design requirements of the lifting equipment be as follow:

PS.M21.2 Mixed liquor pump stations

The Contractor shall provide lifting equipment to remove the mechanical equipment in the '24 biological reactor mixed liquor pump stations (i.e. pumps, motors, etc.). The lifting equipment shall consist of a support structure, crawler beam, with a crawl and hoist (i.e. gantry crane, manual operated). Where possible gantry cranes can be combined to service more than one pump station.

The Contractor shall take every precaution to ensure the rated design capacity of the offered lifting equipment allows for the maximum load that will be exerted onto the lifting system. The Safe Working Load shall be at least 20% higher than the maximum load associated with the heaviest equipment to be lifted. The Contractor shall provide the details of this design to the Engineer such that the Engineer can incorporate it into the civil design.

Gantries cranes shall be supplied for:

- Four (4) A-recycle pump stations

PS.M21.3 Dewatering building

The Contractor shall provide lifting equipment to remove the mechanical equipment in the dewatering building (i.e. gravity belt thickeners, belt filter presses, PC pumps, motors, pipes, valves, etc.). The lifting equipment shall be used to lift any component from the dewatering building onto a load bed inside of the building (refer to relevant drawings). The lifting equipment shall be capable of traveling across the entire width and span of the dewatering building but shall have the necessary limits switches to avoid damage to the structure. The lifting equipment shall consist of a travelling beam, with a crawl and hoist. The long travel, cross travel and hoist shall be electric (pendant controlled). The travelling beam shall be positioned on rails fixed to concrete corbels. The Contractor shall provide the rails as well. The rails shall be sized to suit the beam and the mass it has to lift.

The Contractor shall take every precaution to ensure the rated design capacity of the offered lifting equipment allows for the maximum load that will be exerted onto the lifting system. The Safe Working Load shall be at least 20% higher than the maximum load associated with the heaviest equipment to be lifted. The Contractor shall provide the details of this design to the Engineer such that the Engineer can incorporate it into the civil design.

PS.M21.4 Dewatering building poly-make room

The Contractor shall provide lifting equipment to remove the mechanical equipment in the dewatering building poly make-up and storage room (i.e. poly make-up units, PC pumps, motors, pipes, valves, etc.). The lifting equipment shall be used to lift any component from the dewatering building onto a position next to a loading gantry at the building door. The loading gantry shall be used to transfer the equipment from the building onto a load bed outside of the building (refer to relevant drawings).

The lifting equipment shall also be used to load dry into the continuous poly make-up storage hopper located on top of the dry feeder. The Contractor shall be responsible for the design and supply of this loading system. The system shall be designed to handle both 25 kg bags and bulk bags (i.e. 1 m^3).

The lifting equipment shall be capable of traveling across the entire width and span of the poly make-up room but shall have the necessary limits switches to avoid damage to the structure. The lifting equipment shall consist of a travelling beam, with a crawl and hoist. The long travel, cross travel and hoist shall be electric. The travelling beam shall be

positioned on rails fixed to concrete corbels. The Contractor shall provide the rails as well. The rails shall be sized to suit the beam and the mass it has to lift.

The Contractor shall take every precaution to ensure the rated design capacity of the offered lifting equipment allows for the maximum load that will be exerted onto the lifting system. The Safe Working Load shall be at least 20% higher than the maximum load associated with the heaviest equipment to be lifted. The Contractor shall provide the details of this design to the Engineer such that the Engineer can incorporate it into the civil design.

PS.M21.5 Emergency WAS recycle pump station

The Contractor shall provide lifting equipment to remove the mechanical equipment in the WAS recycle pump station (i.e. pumps, motors, etc.). The lifting equipment shall consist of a support structure, crawler beam, with a crawl and hoist (i.e. gantry crane, manual operated). Where possible gantry cranes can be combined to service more than one pump station. The design shall ensure that the crawler beam extends to a positioned easily accessible from the nearest road.

The Contractor shall take every precaution to ensure the rated design capacity of the offered lifting equipment allows for the maximum load that will be exerted onto the lifting system. The Safe Working Load shall be at least 20% higher than the maximum load associated with the heaviest equipment to be lifted. The Contractor shall provide the details of this design to the Engineer such that the Engineer can incorporate it into the civil design.

PS.M21.6 RAS pump station

The Contractor shall provide lifting equipment to remove the mechanical equipment in the new RAS pump stations (i.e. pumps, motors, etc.). The lifting equipment shall consist of a support structure, crawler beam, with a crawl and hoist (i.e. gantry crane, manual operated). The design shall ensure that the crawler beam extends to a positioned easily accessible from the nearest road. The portal crane shall serve the dual purpose of acting as a roof structure for the sludge screening station. To this end the portal crane shall be equipped with 0.5mm thick 700mm cover Klip-Lok 700TM profile Chromadek Ultim® Z275 spelter ISQ 550 Dolphin Grey finish top coat and Pebble grey backing coat roof sheeting, all in accordance with the manufacturer's specifications. For further detail refer to the relevant drawings.

The Contractor shall take every precaution to ensure the rated design capacity of the offered lifting equipment allows for the maximum load that will be exerted onto the lifting system. The Safe Working Load shall be at least 20% higher than the maximum load associated with the heaviest equipment to be lifted. The Contractor shall provide the details of this design to the Engineer such that the Engineer can incorporate it into the civil design.

PS.M21.7 Electrical cranes

The cranes shall each comprise of an appropriate girder crane, traversing hoist, lifting rope for the main hook, control pendant, together with all necessary hoisting, travelling and traversing equipment and cable systems.

The hoisting, travelling and traversing motions shall be electrically operated by separate drives.

The hoist will have at least two falls of rope and will be supplied with a heavy duty rope guide to ensure close and accurate rope lay on the drum. The rope lay on the drum will be such as to ensure the maximum distance between the ropes on the drum at the point of maximum reach of the hook.

Each crane will be controlled by means of a single pendant fitted to the hoist – the cord to the pendant to be of sufficient length to control the hoist from the lowest floor level in the structure.

PS.M21.8 Chain-operated cranes

The chain operated cranes will run on a single straight traverse beam secured to the underside of the concrete beams at the relevant structure and will be chain-operated for lifting and travel. The tendered rate must include for the complete unit i.e. the beam, travelling trolley, hook, chain, chain box and stop ends. The chain shall be hot dip galvanised.

PS.M21.9 Design and rated capacity

The crane shall be designed to comply with the latest amendments of BS466; 1984, BS2573: Part 1:1983 and BS2573:Part 2:1980. The crane shall be suitable in all respects for service in the pump stations and workshop where it will be used for the installation and maintenance of electric motor driven pump sets assembled to close tolerances. Provision shall be made for such duties to be performed safely and effectively. The group classification of the mechanism shall be not lower than M3- Maintenance duty.

PS.M21.10 Structural steelwork

The permissible stresses and design of the crane structures shall comply with Clause 6.2 of BS466:1984 and BS2573:Part 1:1983.

The crane shall be of approved design giving stiffness in all directions, and suitable gusset plate connections shall be provided where the carriages are secured to the crawl beam members to prevent any distortion or cross whipping while travelling. The vertical deflections caused by the maximum safe working load and the test load suspended from the centre of the span shall be stated in the Technical Schedules.

Double traversing rails of adequate strength shall be securely fixed on each crawl beam.

PS.M21.11 End carriages

The end carriages shall be of approved design and stiffness in accordance with BS466:1984 and BS2573: Part 1:1983 and suspended via twin set rail wheels from the crawl beams. Provision for easily accessible lubrication shall be made and the type of bearing shall be stated by the Tenderer. Wheel bearings shall be removable. The end carriage shall be provided with suitable buffers to engage with the end stops to the crawl beams.

Steel tyred wheels shall have cast iron or cast steel centres. Tyres shall be supplied in accordance with BS3037.

PS.M21.12 Traversing hoist

The framework of the hoist shall provide stiffness in all directions and full particulars of the mechanism shall be submitted for approval. The hoist gear box shall be totally enclosed and arranged for oil bath lubrication. Preference will be given to a centralized group of nipples for grease gun lubrication of all journal bearings.

The hoisting gear shall be so arranged that the main load is evenly distributed on the hoist wheel bearings to avoid distortion due to uneven loading.

Wheel bearings shall be renewable

PS.M21.13 Drives

Machine cut gears of high carbon steel shall be used throughout.

The Contractor shall guarantee that the drive between the hoisting and lowering motor and the drum is non reversible under the mass of the rated maximum load.

PS.M21.14 Hoisting drums

The hoisting drums shall be of robust manufacture in fabricated mild steel. The length of the drums shall be capable of taking the full amount of rope without overlapping. At least three full turns of rope shall remain on the drum when the associated hook is in its lowest position. The diameter of the drums and the depth of the machined spiral grooves shall conform with the requirements set out in BS466:1984 for class 4 cranes.

PS.M21.15 Brakes

A brake of approved electrical mechanical type shall be provided on each of the hoisting and lowering systems of the crane and hoist. Each brake shall be so designed that in the event of failure of the electrical supply it shall arrest and hold any load up to and including the test load at any position of the lift. The brake is to be electrically operated and shall be released as soon as the supply is switched on to the hoisting motor. Immediately the supply is switched off, or in the event of a power failure, the brake shall be applied instantly. The brake shall bring the motion, with or without load, to rest without shock.

An electrically operated brake similar to that on the hoist mechanism shall also be provided on the travelling and traversing motions of the crane and hoist.

Braking mechanisms shall comply with BS466:1984 and full particulars shall be submitted with the tender.

PS.M21.16 Ropes

All crane ropes shall be of special flexible steel wire complying with BS302, BS621 and ISO2408. The length of the ropes supplied shall permit the hoisting conditions to floor levels shown on the drawings.

Duplicate copies of certificates of test and inspection for each rope shall be supplied by the Contractor giving the results of every examination and the nature of the tests carried out.

PS.M21.17 Fall blocks and hooks

The fall blocks shall be of mild steel construction with approved sheaves. The grooves shall be machined in accordance with BS466:1984. The sheaves shall be provided with bronze bushings bored to fit the centre pin and provision shall be made for the proper lubrication of these bearings.

The proportions of the fall blocks and the suspension arrangements shall be such as to ensure that twisting of the blocks does not occur.

The hooks shall be of the swivelling type with safety latch mounted on ball bearings and the material and design shall comply with BS2903 and BS3017 as applicable.

PS.M21.18 Gantry I-beams

The gantry rails shall be supplied and installed by the Contractor in accordance with BS 466:1984 Appendix F.

The gantry I-section shall be levelled by means of packing plates between the portal frame and the bracket if required.

The gantry beams have been designed for bending moments and shear loads generated by the following load conditions. Actual load conditions of the proposed crane shall be stated in the Technical Schedules.

Fixed endstops shall be supplied, installed and positioned at each end of the gantry I-beams and a suitable mechanism shall be fixed to the gantry I-beams to ensure that the limit switches on the crane are actuated to stop the long travel motion of the crane prior to any contact with the fixed endstops.

PS.M21.19 Erection and site testing

After installation at site the crane will be subjected to the tests specified in clauses 44.2, 44.3 and 44.4 of BS466:1984.

The overload, deflection and performance tests specified in clauses 44.5, 44.6 and 44.7 of BS466:1984 may be carried out either at the Contractor's works or on site. In either case the vertical deflection of the main girders shall be measured to provide compliance with BS466:1984 clause 7.

If the overload tests are to be carried out on site the Contractor shall include for the supply, transport to and from the site, offloading and re loading of all test weights, cradles and slings, etc, necessary to carry out the tests and the requisite instruments for measuring the deflection.

PS.M21.20 Painting

All corrosion protection and painting shall be done in accordance with the relevant specification included in Section **D59** of Standard Specifications for Mechanical Works.

PS.M21.21 Electrical equipment

General Requirements

The electrical supply for the crane will be from a 400 V, 3 phase, 4 wire, 50 Hz RWBR phase rotation system with the star point of the main supply transformer connected to earth and all components shall be suitable for operation at 400 V + 10% 20%.

The crane motors and brake mechanisms shall be operated by contactors and all motions shall be controlled from a pendant control. The mass of the pendant control shall not be supported by the electric cable; a suitable steel rope shall be provided to support the pendant.

All the electrical equipment, including the down shop conductor system control panel, cabling, wall mounted isolator, pendant controller for the crane shall be supplied. A 400 V, 3 phase, 4 wire power supply cable, protected by a circuit breaker to the main isolator for the crane will be supplied under a separate contract.

The main power supply to the crane through a three pole circuit breaker supplied and a main isolator for the crane will be supplied under a separate contract. The Contractor shall supply and install the cable between the collector system and the isolator.

All control panels, junction boxes etc shall be located such that safe access is possible irrespective of where the crane is positioned or without having to erect special platforms, scaffolds etc.

Motors, Brake Solenoids and Contractors

All motors shall be totally enclosed fan cooled IP 55 squirrel cage induction type and shall conform to SANS IEC 34. All motors, unless otherwise approved, shall be fitted with ball or roller bearings. The motors shall be rated for at least 240 starts per hour at a design altitude of 10 m above mean sea level, and shall be adequately rated for the duty.
All brake solenoids shall be adequately rated to prevent burn out under the most arduous operating conditions and if it is considered necessary shall be provided with protective cut outs connected in the appropriate motor control circuit.

Each motor shall be controlled by a AC4 crane duty rated reversing contactor comprising two 3 phase air break contactors mechanically and electrically interlocked to prevent simultaneous closing. Thermal time delay overload elements shall be fitted in each phase for normal motor overload protection. Fault protection shall be provided by means of one suitably rated MCCB for each motor.

Each motor control circuit shall be provided with a separate control miniature circuit breaker and link so that individual control circuits can be isolated for test purposes.

The tender shall include full details of the contactors and thermal overloads offered which shall be suitable for AC 4 crane duty.

Reference shall be made to Clause 3.6 of the Detailed Mechanical Specifications regarding motor efficiency.

Pendant Controller

Control of all motions of the crane shall be by means of a pushbutton pendant controller. The Contractor shall confirm the voltage requirement and ensure provision is made based on the electrical supply stated as part of this design.

Individual control pushbuttons shall be provided for each direction of the long travel and cross travel motions of the crane; these buttons shall be held pressed to maintain the required motion.

Individual control pushbuttons shall be provided for each of the hoisting and lowering motions of the crane; the appropriate button shall be held pressed while the crane is lowering or hoisting.

The pushbutton pendant controller shall move independently of the crab, and shall be operated in any position along the span of the crane. The crane shall be operated from the floor level. Full particulars of the method of supporting and moving the pendant controller to any position and the method of adjusting the level of the pendant controller shall be stated in Schedule IV.

An emergency on/off switch shall be provided on the controller to break the control circuits of the crane in the event of any pushbutton sticking.

Full details of the pushbutton pendant controller shall be submitted with the tender.

Control Buttons Or Switches

The control pushbuttons for the crane shall be of substantial heavy duty construction and shall be of the best quality that can be obtained for the purpose; sample of the type of pushbutton it is proposed to use shall be submitted to the Engineer for approval.

Control Locking Arrangements

A detachable locking key shall be provided for the crane controller and it shall not be possible to operate any of the crane motions unless the key is inserted; the key may be incorporated with the emergency switch specified in subclause TS 2.3. An indicating light shall be provided on the controller to indicate only when the crane control supply is switched on.

Control Panels

The crane control panels shall be manufactured from mild steel and shall form a robust enclosure affording IP 55 degree of protection. The panels shall be painted light orange, colour B26 to SANS1091. The control panels shall be positioned so as to permit safe access from the walkway on the main bridge and without having to position the crane in any special position.

The main circuit breaker on the panel shall be fitted with a door mounted operator that shall be mechanically interlocked such that it shall only be possible to open the door if the main circuit breaker is in the off position.

Limit Switches

Limit switches shall be provided for limiting the hoisting, lowering, travelling and traversing motions of the crane. These limit switches shall operate to cut out the appropriate contactor and apply the brakes. Operation of the limit switches shall not necessitate hand resetting of any equipment on the crabs or bridges. An additional limit switch which shall be operated by the fall block lifting a pendant weight shall be provided on the hoist of the crane and shall be set out at the ultimate hoisting position.

One rope fall of the hoist shall be fitted with a suitably rated load limiting switch of the "Liftco" or equivalent pattern. The switch shall be installed in the crane manufacturer's works and set during load testing to trip the hoist mechanism at a load not exceeding 110% of the specified load. The Engineer's Representative shall witness the setting of the switches.

All limit switches shall be mounted on the crane, shall be of substantial heavy duty construction and of the best quality that can be obtained. Details of all limit switches shall be submitted to the Engineer for approval.

The operating ramps for the limit switches for the travelling motion of the crane shall be installed at the ends of the building in positions to be agreed with the Engineer.

Down Shop Conductors

An enclosed busbar collector system shall be supplied for the long travel motions of the crane and shall include the supply and erection of collectors and brackets complete with supports from the crane and gantry rails and the drilling of the fixing bolt holes.

Adequate arrangements shall be incorporated for easy maintenance; the Tenderer shall state in the Price Schedule the price adjustment required for the supply of a Vahle PVC enclosed busbar collector system as an alternative to any other make which may offered. A platform shall be provided to give access to the collectors on the down shop conductors.

The down shop conductor cross sectional area shall be suitable for the supply connection at one end and a volt drop of less than 2 per cent when the crane is drawing maximum load current at the remote end. The enclosed busbar systems shall be designed and constructed to ensure the minimum amount of maintenance and full details of the down shop conductor systems offered shall be submitted with the tender. See Schedule IV.

The length of the down shop conductor system to be provided shall be determined from the long travel distance given.

The Contractor shall be responsible for the installation and proper alignment of the entire busbar system for both the travelling and traversing motions.

Festoon systems are acceptable for:

- Cross travel motions on the crane.
- The independent pendant travel on the crane.

Wiring, Terminals and Labels

The terminals and wiring shall be totally enclosed by means of galvanized metal conduit and covers or by other approved means and there shall be no possibility of oil coming into contact with any insulation unless such insulation is of approved oil resisting type.

Only PVC PVC SWA PVC cable will be considered as an alternative to conduit protected wiring.

Power wiring shall be carried out in standard phase colours, red, yellow, blue and black for neutral.

All power wiring shall be terminated onto bolted terminals complete with washers, nuts and locknuts and separated by flash barriers insulated for 660 V.

All control wiring shall be terminated by means of approved crimped lugs onto approved klippon or equivalent spring loaded terminals suitable for 6 mm^2 conductors.

All power wiring terminals shall be grouped together and the various terminal groups shall be identified by means of engraved sandwich board labels attached by means of cheese head brass screws.

All relays, contractors etc, shall be identified by similar labels as specified above.

All control circuit wiring shall be numbered at all terminal points with engraved interlocking ferrules and these numbers shall appear on all schematic and wiring diagrams.

Unless otherwise approved, all secondary wiring shall be carried out in 660 V grade 2.5 mm^2 PVC insulated multi stranded copper conductor with a minimum of 7 strands per conductor bearing the mark of approval of the South African Bureau of Standards.

Earthing

The crane rails shall be electrically bonded together with 35 mm^2 minimum stranded copper conductor and an additional conductor shall be supplied as part of the down shop conductor system exclusively for earth continuity.

The crane earthing system shall be continuous and shall terminate at a point adjacent to the isolator specified.

On no account shall cable armouring be used for earth continuity.

Insulation

All wiring shall be insulated to a level suitable for operation at 600 V. All wiring will be pressure-tested by means of a 1 000 V megger before the equipment is put into service.

Schematic and Wiring Diagrams

Complete single line and schematic diagrams of all main and control circuits for the crane and separate hoist shall be submitted to the Engineer for approval within four weeks after the contract is placed. The schematic diagrams shall each include a detailed list of components showing type, make, rating, etc.

Manufacture of any equipment shall not be commenced until such time as approval has been obtained for the schematic diagrams. The single line diagram shall show the motor ratings.

Symbols used in electrical drawings and schematics shall be drawn to NRS Specification 002-1990 requirements.

Final approved schematic diagrams of all main and control circuits of the crane and hoist shall be supplied. The Taking-Over Certificate will not be issued until all such diagrams have been received.

A photographic sepia copy of the approved schematic diagram shall be fixed to the inside of the doors of the cabinet housing the control equipment of the crane. The photograph shall be of adequate size to permit all details to be easily read, shall be non fading and shall be covered by a clear perspex sheet.

Detail Electrical Equipment

The Engineer shall approve the make and type of motors, contractors, pushbuttons and collector systems, type of wiring, construction and arrangement of the control panels, etc, before any items are ordered from sub contractors or their manufacture commenced.

Electrical Tests on Site

All apparatus shall pass such tests on site as are required by the Engineer to prove compliance with the specification independently of any tests which may have been carried out at the manufacturer's works. In particular all electrical pressure tests made at the manufacturer's works shall be repeated on site.

The tests shall include, but shall not be limited to the following:

(a) Megger testing of all cables and wiring using a 1 000 V Megger.
(b) All motors and brakes shall be meggered using a 1 000 V Megger.
(c) All safety devices shall be set and tested for functionality.
(d) Down shop conductors shall be checked for alignment and contact.
(e) Access to all control panels shall be checked for ease of access and safety.

PS.M21.22 Spare parts

Provision for spare parts shall be included in the Schedule of Quantities. The Contractor will prices this item in terms of the recommendation from the equipment manufacture. The spare parts / consumables offered shall be listed on a letter, which will be signed by an authorised representative from the manufacture in order to substantiate this allowance and shall be included in the tender offer as part of the evaluation file. Spare parts and consumables for an operational period of two (2) years shall be allowed for.

PS.M22. DIESEL TANKS

The Contractor shall provide a new fuel tank for new generators specified in the Project Specifications for Electrical Works, with a capacity to run the generators for at least 24 hours at full power. The storage shall be achieved in one large fuel tank. The fuel tank shall be installed inside in a bunded area, in the allocated fuel tank room. Both the bunded area and room will be provided by the civil contractor.

PS.M22.1 Design requirements and process parameters

Design parameters and minimum design requirements of the Generator Diesel Tank shall be as follow:

Tank volume: 10,000 litre

PS.M22.2 General

The fuel tanks shall comply with Section **D63** of the Standard Specifications for Mechanical Works.

The fuel tanks shall be provided in accordance with SANS 10131 (2004): Aboveground Storage Tanks for Petroleum Products. The complete installation shall comply with all safety and fire regulations. The Contractor shall provide a fuel supply and return lines between generators and their associated fuel tanks. Fuel lines shall be installed through the wall separating the fuel tank and generator rooms.

The Contractor shall provide fuse links for the fuel supply line on both sides of the wall separating the two rooms and the fuse links shall close a fuel isolation valve in the event of fire. A manual shut off valve shall be provided upstream of the fuse links.

The Contractor shall provide new lockable-type refuelling caps for the tanks. The Contractor shall provide the tanks with a 4 micron rated (insect screen) breather with a flow rate equal to the re-fuelling pump. The breather pipe shall comply further with SANS 10131(2004).

The tanks shall be fitted with an Ex-rated analogue fuel level transmitter linked with the respective controllers for real time fuel level indication. Adequate earthing of the tanks shall be provided. The Contractor shall loop the 4 – 20mA signal into the generator controller and into PLC.

The Contractor shall provide an electric diesel pump, (with manual hand pump standby), with suction and discharge hoses to facilitate the transfer of diesel from drums and other portable storage devices. The hoses shall be provided with a wall docking facility as well as end closure in order to prevent damage and entry of dirt.

The Contractor shall specifically note that the aspects reflecting to design and manufacture, which are dealt with in detail in SANS 10131:2004, shall be strictly enforced.

PS.M22.3 Spare parts

Provision for spare parts shall be included in the Schedule of Quantities. The Contractor will prices this item in terms of the recommendation from the equipment manufacture. The spare parts / consumables offered shall be listed on a letter, which will be signed by an authorised representative from the manufacture in order to substantiate this allowance and shall be included in the tender offer as part of the evaluation file. Spare parts and consumables for an operational period of two (2) years shall be allowed for.

PS.M23. TESTING AND COMMISSIONING

Unless otherwise specified, requirements of the testing and commissioning of the works shall generally follows as per the relevant clauses of the Standard Specifications of Mechanical Works.

The Contractor shall be responsible to provide all necessary labour, materials, plants, utility services, lubricants, apparatus, tools instruments, proper disposal of the waste materials, screenings, grits, sludge or alike, temporary pipework and pumping, 3rd party inspection body services, laboratory services, and etc. as required, for the purpose of testing and commissioning.

All consumable materials, including but not be limited to, water, electricity, fuels lubrication and chemicals, necessary for carrying out the works, testing and commissioning of the equipment shall be responsible by the Contractor. Sewage and sludge for tests and commissioning shall be arranged by the Contractor. For the avoidance of doubt, the availability, quantity and quality of any sewage and sludge from the Robertson WWTW cannot be guaranteed by the Engineer.

The Contractor shall conduct the tests in accordance with the accepted testing procedures without which no test shall be commenced. All costs involved in the testing and commissioning shall be borne by the Contractor.

Within 14 days upon completion of the FATs and/ or site tests, the Contractor shall submit three (3) copies of the test report giving details and results of all tests.

The Contractor shall be responsible to liaise with the relevant government department(s) in advance to ensure that all the relevant application(s) of approval(s) and/ or permit(s) for the testing and commissioning work, if required, shall be made in a timely manner. The Contractor shall ensure that such approval(s) and/ or permit(s) are formally received prior to commencing the preparation of testing and commissioning work. Any consequential costs and/or delay claims as a result of the Contractor's belated liaison and application of such approval(s) and/ or permit(s) shall not be entertained.

The Contractor shall liaise and coordinate with the existing Robertson WWTW operator to ensure minimum interruptions to their operation before, during and after the testing and commissioning work. The Contractor shall propose and diligently execute the contingency measures as agreed and accepted by all parties.

The Contractor shall also refer to the various testing and commissioning requirements as specified in the relevant Clauses of this Specification.

PS.M23.1 Factory Acceptance Tests (FATS)

All equipment shall be tested at the factory before delivery to Site. If deemed to be necessary, the Engineer or an Engineers Representative will attend the local FATs to be arranged by the Contractor.

For equipment fabricated or manufactured locally, the Contractor shall notify the Engineer of the proposed FAT at least two (2) calendar weeks before the test. The Contractor shall submit the relevant testing procedures with the notice of the test.

If equipment are fabricated or manufactured overseas, the Contractor shall notify the Engineer of the proposed FAT at least sixty (60) calendar days before the test. The Contractor shall submit the relevant testing procedures thirty (30) calendar days before the test for Engineer's acceptance. After the tests, the Contractor shall submit the test reports to the Engineer for acceptance before shipment.

The following of equipment/ system FAT shall require to be witnessed by the Engineer at the factory:

1) Inlet Works Equipment;

2) Bioreactor Mixing Equipment;

3) Bioreactor Aeration Equipment;

4) Dewatering Equipment;

For the specified FATs requiring witness by the Engineer, the Contractor shall plan for a maximum of two (2) personnel from the Engineer, with all the costs related to the witnessing of the FATs at the manufacturers' factories being borne by the Contractor. Details of the complete travel, accommodation arrangements and agenda shall be submitted for the Engineer's acceptance. Such details shall be submitted as part of the specified written notification for the Engineer's acceptance.

Written notification shall be submitted by the Contractor at least sixty (60) calendar days before the commencement of each of the FAT requiring the witness by the Engineer's at the respective manufacturer's factory. The Engineer will, within thirty (30) calendar days upon the receipt of the said notification, reply to the Contractor in writing confirming their attendance or not of the FAT, complete with any relevant details.

For the FATs other than those requiring the Engineer's witness at the manufacturer's factory, the Contractor shall provide written notice to the Engineer at least forty-five (45) calendar days before commencement.
The results of all factory tests and other pre-installation tests conducted shall be certified by the manufacturer and submitted to the Engineer.

The FAT report shall include but not limited to:

1) A description of the work or materials that have been tested;

2) A description of the test undertaken with details of the testing rig and instrument accuracy where appropriate;

3) The criteria achieved during each test with acceptable tolerances;

4) Material certificates;

5) Welding procedures;

6) Test and inspection reports and certificates etc. for each item of equipment; and

7) Remedial actions for defects/deficiencies identified.

The FAT report/ factory certificate shall be submitted within fourteen (14) calendar days after the successful completion of the FAT for the acceptance of the *Engineer.* Shipment of the equipment/ system shall only be allowed by the *Contractor* upon the receipt of the *Engineer's* acceptance or not tested to his satisfaction may be subject to rejection and removal from Site and that shall be at the cost of the *Contractor.*

PS.M23.2 Pre-commissioning tests (PCT)

During the Pre-Commissioning Tests (PCTs) the *Contractor* shall demonstrate to the *Engineer* the proper installation, functionality, materials of construction, arrangement, workmanship and performance of the installed equipment as per the accepted design submission. PCT shall include, but not limited to the following:

1) Installation alignment and level checks;

2) Leakage tests;

3) Hydraulic/ pressure tests;

4) Dry running of equipment;

5) Welding tests;

6) Installation checks;

7) Earthing checks;

8) Cable checks;

9) Pipework and vessels pressure tests;

10) Temperature tests;

11) Vibration tests;

12) Noise level tests;

13) Safety Equipment tests;

14) Voltage and current tests;

15) Functional tests and site tests of all electrical equipment including switchboards, switchgears, transformers and CHP generators;

16) Equipment protection interlock checks;

17) Motor rotation direction and electrical tests;

18) Control and functional checks of the operation management system and all equipment/systems/plant automated control systems;

19) Local, remote, automatic manual checks;

20) Control/ instrument loop checks;

21) Instrument calibration checks;

22) Equipment performance test; and

23) Any other relevant test/ check/ inspection of the equipment/ system considered to be necessary by the *Contractor* or the *Engineer.*

All PCT plans including procedures, method statements, risk assessments and forms shall be submitted for the Engineer's acceptance at least three calendar weeks prior to commencement of the PCTs. This plan shall include details of any temporary works required for the onsite testing of equipment/ system. Any specific requirements and/ or equipment for carrying out the PCTs of individual equipment suppliers, including safety precautions. Contingency measures shall be included in these procedures.

The Contractor shall submit notification/ request with seven (7) calendar days advance notice to the Engineer for their witness and/ or inspection of the PCT work.

The Contractor shall return the individual completed PCT forms/ reports for the Engineer's acceptance within five (5) calendar days upon completion of the test. Where considered to

be necessary by the Engineer, the Contractor shall obtain documentations and/ or certifications and/ or endorsement from the manufacturers on the satisfactory site installations and testing of their equipment/ system as part of the PCT forms/ reports.

All hardware and software set points and/ or settings for equipment/ system protection, operation, control etc. shall be provided and accordingly set by the Contractor.

The Contractor shall be responsible for all the associated costs, labour and materials, inclusive of any temporary works/ installations, calibration for all instrumentation, testing equipment, testing media, chemicals, electric power etc. related to the PCTs.

PS.M23.3 Commissioning tests (CT)

Upon the satisfactory completion of all the relevant FATs and PCTs of the systems, the Contractor shall then be allowed to proceed with the Commissioning Tests (CTs) in terms of Clause 9 of the Conditions of Contract.

CTs of the E&M systems shall include those as specified in relevant Clause of the Specification.

Unless specified or agreed by the Engineer, the Contractor shall demonstrate to the Engineer, during the test period:

- The proper functioning and performance verification of each system's equipment when operated as a whole at its designed capacity over a minimum continuous duration of 3 calendar days (24 hours/ day) of using operation media.

- All modes (including automatic and manual controls in SCADA Control mode of operation available from the system; and

- Any other requirements considered necessary by the Engineer.

Unless otherwise specified by or agreed with the Engineer, the following shall not be permitted during the test:

1) Use of alternative testing media;

2) Change of testing capacity to a range below the designed capacity of any system; or

3) Use of temporary power supply; or

4) Any other requirements considered necessary by the Engineer.

The **Commissioning Test Plan** (CTP) shall include, but not limited to the following:

a. Checklist of pre-requisites and system pre-checks (including all related and supporting auxiliary systems and subsystems), namely equipment test records, instrument calibration certificates, setting done etc.;

b. Acceptance criteria;

c. System commissioning test programme;

d. Pre-start-up checklist;

e. Equipment/ system start up and test procedures;

f. Operation team and rosters;

g. Safety, emergency and contingency plan;

h. Testing/ monitoring parameters;

i. Appointed Laboratory, if required;

j. Sampling and testing schedule, if required;

k. Test forms and daily reports format;

l. Estimation of quantity of testing media required;

m. Estimation of quantity of any discharge from the system including method of the handling and disposal requirements, if required;

n. Temporary work, if required;

o. Flow diversions, if required;

p. Daily (or routine) liaison and coordination activities required with the Robertson WWTP operator and/ or relevant parties, if required;

q. Details of any other relevant activities as required in the relevant Clauses of this Specification, where applicable; and

r. Details of any other relevant test activities requested by the Engineer.

Unless otherwise specified, the Contractor shall submit written notification on the commencement of each of the TOC at least 14 calendar days in advance for the Engineer's acceptance.

Unless otherwise specified, the Contractor shall return all completed commissioning test forms and reports for the Engineer's acceptance within seven (7) calendar days upon successful completion of the System Commissioning Test.

Unless otherwise specified, subject to discretion of the Engineer, the occurrence of any of the following may constitute to a failure of the Commissioning which would require the restart of the required duration:

1) Failure to follow the steps or procedures of the accepted system commissioning test plan;

2) Failure of monitoring and control system;

3) Failure of major equipment;

4) Repetitive failure of instruments and/ or equipment;

5) Equipment/ system failing to achieve the designed throughput, capacity and/ or process requirements;

6) Unsafe equipment or system operation; or

7) Any other performance considered to be unsatisfactory by the Engineer.

During the Commissioning Test, the Contractor shall fine-tune the system process and settings of equipment, instrument and control as far as practical for preparation of the subsequent Plant Commissioning.

All real time data/ events/ alarms shall be logged by the SCADA system throughout the period shall be made available to the Engineer.

All sampling and laboratory analysis for the system commissioning tests shall be subject to Contractors commissioning specialist's requirements and recommendations and the Engineer's acceptance.

PS.M23.4 Plant commissioning

Unless otherwise accepted by the Engineer, the Contractor shall only be allowed to proceed with the plant commissioning of the entire works under the contract upon the completion of the following to the Engineer's satisfaction:

- FATs of the E&M equipment/ systems;
- PCTs of the E & M equipment/ systems;
- Relevant system commissioning tests;
- Energization of permanent power supply; and
- Any other requirements considered necessary by the Engineer.

A written notification endorsed by the treatment process specialist on the commencement of the plant commissioning shall be submitted by the Contractor at least seven (7) calendar days in advance for the Engineer's acceptance. This written notification shall include all the relevant and necessary documentation as confirmation and substantiation of the readiness of all the process units.

For plant commissioning, the Contractor shall demonstrate to the Engineer the following, over a continuous period of thirty (30) calendar days (24 Hours/ day) of duration to treat the incoming sewage of the Robertson WWTP through the works provided under this contract as if it is under normal operation, unless otherwise accepted, agreed or required by the Engineer:

a. Demonstration of trouble free and stable overall E&M equipment/ systems operation and functioning, and treatment process performance;

b. The stable and proper automatic operation of the process monitoring and control and the SCADA system;

c. The continuous treatment of sewage with throughput of at least 60,000 m3/d (ADWF) and effluent quality meeting the specified requirements; and

d. Any other requirements consider to be necessary by the Project Manager before the commencement of the plant commissioning.

During plant commissioning, the treatment process specialist shall be responsible for the daily onsite process monitoring and adjustments to ensure the overall treatment process performance as a whole. The treatment process specialist shall also work together and closely with the SCADA system supplier, and the membrane filtration system (MFS) supplier to continually fine tune the overall process control and monitoring system.

The Contractor shall submit a plant commissioning plan including procedures and forms for the Engineer's acceptance at least three (3) calendar months prior to the commencement of the plant commissioning or as requested by the Engineer, whichever is earlier.

The Plant Commissioning Plan shall include, but not limited to the following:

1) Coordination and interfacing requirements with THE MUNICIPALITY's operation and other contracts;

2) Plant commissioning programme;

3) Onsite sampling and laboratory analysis schedule;

4) Onsite sampling laboratory analysis requirements;

5) Checklist of pre-requisites and system pre-checks (including all related and supporting auxiliary systems and subsystems). Namely equipment test records, instrument calibration certificates, settings done etc.;

6) Pre-start-up checklists;

7) Plant commissioning methodology and procedures;

8) Commissioning organization, team and rosters;

9) Safety, emergency and contingency plans;

10) Format of test forms and daily reports;

11) Estimation of quantity of any discharge, including method of the handling and disposal requirements;

12) Anticipated temporary interruptions and/ or disruption to the existing operating Facility, if required;

13) Interfacing and coordination requirements with the existing Robertson WWTP operator and other contractors; and

14) Any other requirements considered necessary by the Engineer. (To be confirmed before the commencement of plant commissioning).

All real time data/ events/ alarms shall be logged by the SCADA system throughout the period shall be made available to the Engineer. Unless otherwise intended and designed or accepted by the Engineer any form of “manual” or “semi-automatic” operation control of the system during this commissioning period shall only be acceptable.

During this commissioning period, the Contractor shall put all equipment/ system of the works and all its peripherals systems in continuous operation as if it is under normal operation situation.

A plant commissioning report with all the daily log sheets, test records & SCADA system printouts, namely, operation and process trends and/ or curves, and finalized settings, complete with by the treatment process specialist’s endorsement, shall be submitted to the Engineer for acceptance within seven (7) calendar days upon the completion of plant commissioning duration. If any portion of the E&M equipment/ system fails the tests, testing of the said portion shall be repeated within two weeks or a reasonable time agreed by the Engineer under the same terms and conditions until satisfactory completion. The Contractor shall bear all the associated costs and time so arisen from.

Subject to discretion of the *Engineer*, occurrence(s) of the following may constitute to a failure of the plant commissioning which would require the restart of the required duration:

- Failure to follow procedures and requirements as per the plant commissioning plan as accepted by the Engineer;

- Failure of SCADA system or automated process control;

- Failure of major equipment/ system;

- Repetitive failure/ tripping of instruments/ equipment/ system;
- Failure to achieve the required throughput, capacity and/ or process treatment requirements;
- Unsafe equipment or system operation;
- Failure in meeting the specified treated effluent quality requirements; or
- Any other performance considered to be unsatisfactory by the Engineer.

PS.M24. TRAINING OF EMPLOYERS STAFF

Operation and Maintenance (O&M) Training

The Contractor shall commence the O&M training of the Employer's staff when the installation is completed and during testing and commissioning or when requested by the Project Manager and/or the Employer.

Each O&M training session shall be conducted in two (2) parts classroom training at the Contractor's office or at a venue as agreed by the Project Manager and/or the Employer, and onsite at location for O&M demonstrations. All costs incurred for the training shall be included in the contract.

The O&M training shall include all materials and labour necessary to prepare training materials and provide classroom, on-site and on-site maintenance demonstration. The Contractor shall submit details of the training programme, training material and syllabus for the Project Manager and the Employer's acceptance at least 3 calendar months before the commencement of the training.

The training syllabus shall include but not be limited to the following, which shall be accepted and agreed by the Project Manager and the Employer.

The O&M training programme shall be organised, coordinated and conducted by a training team consisting of a minimum of one (1) trainers and two (2) supporting staff who shall be the Contractor's team. Where necessary and required, a English speaking interpreter to assist with the O&M training shall be provided. The MBR system training shall be conducted by a training team consisting of a minimum of one (1) MBR system supplier representative as the trainer and one (1) supporting staff from the Contractor's team.

If the Contractor considered necessary, they may engage and conduct the O&M training by a training specialist sub-consultant as accepted by the Project Manager. This training specialist sub-consultant shall have the following:

1) Environmental engineering background

2) Job references of not less than 10 years of previous experiences in the training of facility operators and engineers in sewage treatment works, with similar sewage and sludge treatment process and capacities of SWHEPP

3) The training specialist team shall be bilingual, fluent in spoken Afrikaans and English when conducting training.

Experience, qualification and their curricula vitae of the training team members (including those from the training specialist sub-consultant) shall be submitted to the Project Manager for acceptance. Where specified and/or deemed necessary by the Project Manager and/or the Employer, equipment manufacturer representative(s), system supplier's representatives, computerised systems integrator or alike shall be invited and provided for staff training purpose.

The training team shall have the following minimum requirements:

1) Trainers shall have a minimum of 10 years of training experiences of facility operators and engineers in sewage treatment works of similar sewage and sludge treatment process and scale of SWHEPP, holder of a Bachelor degree in civil engineering, environmental engineering, chemical engineering, mechanical engineering, electrical engineering or similar and member of HKIE;

2) Supporting staff shall have a minimum of 5 years of training experiences of facility operators and engineer in sewage treatment works, with similar sewage and sludge treatment process and capacities of SWHEPP and holder of a Bachelor degree in civil engineering, environmental engineering, chemical engineering, mechanical engineering, electrical engineering or similar;

3) The trainer and supporting staff shall be fluent in spoken English.

The Employer's staff name list will be provided by the Employer with a total number of attendances not more than fifteen (15) people per session.

Unless otherwise specified or agreed with the Project Manager and/or the Employer, classroom training shall include a minimum of four (4) identical sessions of training with a maximum period of forty (40) hours of training for each session. The classes shall be taught by the trainers accepted by the Project Manager and/or Employer using the agreed training materials and O&M manuals for the works.

Unless otherwise specified or as agreed with the Project Manager and/or the Employer, O&M field training shall be conducted for all systems. O&M class field training shall include a minimum of four (4) sessions of training with a maximum period of twenty eight (28) hours of training each session.

PS.M24.1 O&M Classroom Training

Unless otherwise specified, for all systems and their components, O&M classroom training shall include, but not limited to the following:

1) Introduction and overview to the works:

   a) Treatment processes, including process flow description; and

   b) All equipment/systems as provided.

2) Treatment process operation start up, shut down and procedures during normal and emergency
situations;

3) Operation control and monitoring of individual item of equipment and systems, and process control and process (and performance) monitoring of the treatment processes working as a whole.

4) Operation and control during normal and abnormal conditions/situations;

5) Contingency/emergency operational procedures

6) Problems and troubleshooting of all equipment/systems/treatment processes; and

7) Training on trouble-shooting and minor modifications of control parameters;

8) Preventative maintenance, routine inspection, lubrication and periodic adjustments required for effective and satisfactory performance of the equipment/system;

9) Corrective maintenance, overhaul and repair of individual item of equipment, including onsite demonstration as requested by the Project Manager and/or the Employer.

10) Use of testing and monitoring equipment and procedures of their calibrations/validation.

11) Operational safety and use of personal protective equipment; and

PS.M24.2 O&M Onsite Demonstration Training

On-Site demonstration shall include, but not be limited to, the following:

1) Demonstration of all possible operating conditions, including normal, abnormal and emergency conditions;

2) Simulation of all alarm and fault conditions; and

3) Demonstration of equipment removal and refitting.

The Contractor shall also employ a professional video filing company to record all classroom and field training. All videos become the property of the Employer. Qualifications of the video filming company shall be submitted for the Engineer's acceptance.

All video filming shall be done by an experienced professional. All classroom and field sessions are to be filmed and include additional artificial light where conditions (such as interior spaces) warrant. After video filming of the sessions, the company shall professionally edit and dub (add sound) to produce a professional quality product.

After the first training session is filmed and edited/dubbed, one (1) set of DVD format preliminary training videos shall be submitted for the Project Manager and the Employer's acceptance, if found to be unsatisfactory, the training and filming shall be redone. If the filming during active training sessions does not provide satisfactory results (namely, poor lighting, poor sound, obscured view of equipment, etc., all training shall be conducted a second time with no students to provide clear and unobstructed filming of the instructors. All related costs shall be borne by the Contractor.

The Employer's accepted final version of the training video shall form part of the Contractor's O&M Manuals. The Contractor shall furnish three (3) sets of copies training videos in movie format in DVD, portable hard discs or accepted equivalent for the Employer's record.

SECTION 4: ELECTRICAL

SECTION PS.E

DETAILED ELECTRICAL SPECIFICATION (INCLUDING GENERAL WORKS)

PS.E1. GENERAL

This Contract comprises the electrical, control and instrumentation installation for the proposed upgrades at the Robertson Wastewater treatment works (WWTW). The site is situated in Robertson, within the Langeberg Municipal district, Western Cape.

This portion of work forms part of the Mechanical Contract and comprises the electrical and instrumentation component for the Mechanical work described in that Section of the document.

Generally, the upgrade project entails the following:

- New Mechanical screening at Inlet works
- New (additional) Biological reactor
- Modifications to control of aeration in existing Biological reactor
- New Clarifier (Secondary Settling Tank)
- New RAS pump station
- New Scum pump station
- New Sludge dewatering plant
- New Chlorine contact channel at works outfall

PS.E2. SITE CONDITIONS

The WWTW is located within the Langeberg Municipal district, in the town of Robertson.

The site is accessible via tarred roads, with tarred roads inside the site boundaries. The Contractor shall make his own arrangements for access to the sites via the relevant Operational personnel.

The Subcontractor shall make his own arrangements as far as lights, water and communications on the site is concerned. Cellular telephone reception is 4/5.

All equipment and materials shall be designed to operate at the ambient conditions on site, where the effects of corrosion are severe.

The Contractor is advised that the possibility of theft is high, as the works is on the outskirts of Robertson, in a rural area. Suitable security arrangements must this be made by the Contractor.

PS.E3. EXISTING MAIN ELECTRICITY SUPPLY

The site is serviced by the Langeberg Municipality by means of an 11 kV overhead line which supplies a plinth-mounted 500 kVA, 11 kV / 400 V miniature substation on site.

This miniature substation feeds the various existing switchboards on site that supply the existing equipment, and the supply for the new Main Switchboard will also be taken from this miniature substation.

PS.E4. DRAWINGS

PS.E13.1 Engineer's Drawings

Electrical drawings included in this Tender are:

X_19-11/001 : Site layout with LV Cable Routes
X_19-11/101 : Main LV Switchboard (Main MCC) Single Line Diagram
X_19-11/102 : Building Services Distribution board Single Line Diagrams
X_19-11/501 : Proposed Main LV Switchboard General Arrangement Layout

PS.E13.2 Contractor's Drawings

Workshop drawings of all Switchboards, including Motor Control Centres and Distribution Boards are required for approval by the Engineer and the Client prior to fabrication. This also includes the General Arrangement drawings.

Record drawings (previously termed "as-builts") of the installation indicating cable routes, sleeve positions and circuit wiring details are required on completion. All these record drawings shall be checked by the Subcontractor before submission to the Engineer.

A full set of switchboard schematic drawings and wiring diagrams shall be handed over at the end of the Contract.

The Contract will be deemed incomplete until the Electrical contractor has handed all these drawings over to the Engineer, and they have been checked, and approved.

PS.E5. SCOPE OF WORK

The installation comprises various sections of the works, and sections of Work for each process area are specified in more detail under the respective process areas in this section.

PS.E.5.1 LV Distribution boards:

Two new Low Voltage Switchboards shall be supplied and installed under this Contract, for the new Biological reactor basin and for the New Inlet works. Both these switchboards shall be supplied from the existing miniature substation.

Allowance has also been made for the replacement of the existing switchboard feeding the existing Biological reactor, but this may be omitted from the scope if budgetary constraints do not allow for the replacement under this Contract.

The existing MCC currently feeding the current Inlet Works shall be removed together with the existing Inlet Works mechanical equipment.

PS.E.5.2 General Lighting and Power:

Several new buildings will be constructed, requiring General Building Services electrical (Lighting and Power) installations.
These include:
- New MCC / Control Building
- RAS pump station

PS.E.5.3 Field Control Stations, Cables and Cable support systems:

Equipment common to all process areas includes:
- Local Field Control Stations (FCS) for all equipment
- Field Instrument Enclosures (FIE) for instrumentation transmitter accommodation
- Power, Control and Instrument cables from MCC to all items of equipment
- Cable support systems for all cables

PS.E.5.4 Inlet works:

The inlet works is presently equipped with a Coarse screen, Screw conveyor and Screw compactor, which is all to be removed and replaced with new equipment. The initial installation will comprise one coarse front-raked screen with screw conveyor and washer / compactor system. Allowance must be made for a second coarse screen in future, to share the first conveyancing and washing / compacting system.

Further allowance must be made for an additional 2 x Fine drum screens in future, equipped with their own conveyancing and washer / compactor system.

The new Inlet works will also include a Grit removal system, complete with Grit pumps and Grit classifier.

A Washwater pumpstation will be provided, with Washwater pumps drawing from an above-ground tank (filled by potable Municipal water) for Washwater supply to the screen, conveyancing and washer / compacting system.

Allowance must be made for a Skip dolley system in future, allowing changing of waste skips by mechanical means.

For this Contract, the following new Mechanical equipment shall be added:

- 1 x Mechanical front-rake screen
- 1 x Screw conveyor
- 1 x Washer / Compactor
- 2 x Vortex Degritter paddle drives
- 2 x Degritting lift pumps
- 2 x Washwater pumps
- Inlet flowmeter (Ultrasonic level over flume)
- Ultrasonic differential level control for screen
- Float switches in Washwater holding tank

PS.E.5.5 New Biological Reactor:

The new Biological reactor will be equipped with 4 x Surface Aerators and 4 x Vertical shaft Mixers, with a set of Mixed liquor (a-Recycle) pumps, and a set of WAS pumps.

The Aerators will be VSD-driven, the speed controlled by means of dissolved oxygen measurement from DO probes in the basin.

New equipment shall be installed as follows:

- 4 x Vertical shaft Mixers
- 4 x Surface Aerators
- 2 x Mixed Liquor (A)-recycle pumps
- 2 x Submersible WAS pumps
- Dissolved oxygen measurement in Aeration basin
- Measurement of Suspended Solids in Aeration basin
- Measurement of A-Recycle flow by Ultrasonic over outflow weir

PS.E.5.6 RAS Pump station:

The new Return Activated Sludge pump station consists of a sump equipped with submersible pumps.

New equipment shall be installed as follows:

- 2 x RAS pumps for Existing Biological reactor
- 2 x RAS pumps for New Biological reactor
- Ultrasonic level control
- Float switch level control backup
- Magnetic flowmeter for measurement of RAS flow to Existing reactor
- Magnetic flowmeter for measurement of RAS flow to New reactor / Sludge dewatering facility

PS.E.5.7 Clarifier (Secondary Settling Tank):

The Works is equipped with one existing clarifier, and a new peripheral drive Clarifier will be added under this Contract.

New equipment to be provided is as follows:

- 1 x Peripheral drive for the new clarifier

PS.E.5.8 Scum removal Pump station:

A new Scum pump station will be provided for the scum collected from both the existing as well as the new Clarifiers. The pump station will be equipped with submersible pumps.

New equipment shall be installed as follows:

- 2 x Submersible scum pumps
- Ultrasonic level control
- Float switch level control backup

PS.E.5.9 Existing Biological reactor:

The existing Biological reactor is equipped with VSDs to all four aerators, but without direct feedback control. This installation was done in June 2005, and the VSDs form part of the existing Phase 2 Motor Control Centre.
A new Dissolved Oxygen probe must be supplied to the existing Biological reactor for the control of the existing surface aerators.

In a more recent upgrade, a Fine bubble diffused aeration system was added to the existing Biological reactor, with a single blower for air supply. A second Blower must be added to the fine bubble aeration system to function as a duty / standby pair.

New equipment to the existing Biological reactor is as follows:

- 1 x Air Blower for Fine bubble diffused aeration
- Dissolved oxygen measurement in Aeration basin
- Measurement of Suspended Solids in Aeration basin
- Modifications of control to Surface Aerators for speed control from DO level measurement

PS.E.5.10 Chlorination Contact channel:

A new Chlorination contact channel will be constructed at the Works outfall. The Chlorination equipment will be provided by a specialist subcontractor, complete with OEM control panel.
The extent of work under this Contract is for an electrical power supply to the Chlorination equipment, and measurement of outflow by means of an ultrasonic over a weir in the contact channel.

New equipment to be provided is as follows:

- 1 x Power supply (cable) to OEM Chlorination equipment panel
- Measurement of Outflow by Ultrasonic over outflow weir

PS.E.5.11 Sludge dewatering facility:

A new Sludge dewatering facility will be constructed in the vicinity of the Inlet works.
The Sludge dewatering plant shall be provided complete with all control and protective devices necessary as required by the suppliers of the equipment. The Belt press will be supplied with an OEM control panel constructed from Stainless steel with an environmental ingress rating of at least IP65. A power supply will be provided to this Belt press panel, with all wiring being part of the Belt press machine supply.

A Polyelectrolyte dosing system shall be provided, also complete with OEM control panel, in Stainless steel, of IP65 rating, for which a power supply only will be made available. All control, instrumentation, and interconnecting cabling shall be supplied as part of the Polyelectrolyte dosing system as OEM components.

A set of Washwater pumps shall be provided, of which the control will be from the OEM Belt press and Polyelectrolyte make-up systems.

A Sludge conveyancing system must be provided, comprising a single horizontal conveyer feeding an inclined conveyer, which in turn feeds 3 x secondary horizontal conveyers. The starters and controls for these conveyors form part of the new Dewatering MCC.

Chlorination contact channel will be constructed at the Works outfall. The Chlorination equipment will be provided by a specialist subcontractor, complete with OEM control panel.
The extent of work under this Contract is for an electrical power supply to the Chlorination equipment, and measurement of outflow by means of an ultrasonic over a weir in the contact channel.

New equipment to be provided is as follows:

- Belt press dewatering plant
- Polyelectrolyte make-up and dosing system
- 2 x Washwater pumps
- 1 x Primary Horizontal conveyor
- 1 x Inclined conveyor
- 3 x Secondary Horizontal conveyors

PS.E6. LV SWITCHBOARDS

PS.E.6.2.1 General

The following new Switchboards are to be supplied under this Contract:

- MCC-Reactor 2 (For new Biological reactor)
- MCC-Reactor 1 (To replace existing MCC for existing Biological reactor)
- MCC-Inlet Works (To replace existing MCC for existing inlet works)
- MCC-Dewatering (For Dewatering plant)

Note that MCC-Reactor 1 may be omitted from this scope if the budgetary constraints do not allow the cost for the replacement of the existing MCC.

PS.E.6.2.2 Generic Specifications for MCCs

This generic specification applies to all indoor MCCs, the specific details of each are shown on the drawings, and shall include all starters and equipment as indicated on the Switchboard matrix.

The MCC will be mounted to a Hot Dip Galvanized base, installed over a cable trench for bottom entry incoming and outgoing cables.

Type	: Indoor, floor standing with HDG base
Manufacture	: 1,6 mm 3CR12
Sectioning	: Multi-section, Form 3b to SABS IEC 60439.
Sections	: As described under 6.2.1 below
Fault level withstand	: 10 kA for 1 second at 400 V
Finish	: Epoxy coated structure orange externally and internally, with white arc-free internal chassis plates
Cable entry	: Incoming & Outgoing – Bottom
Frame / Base	: 45 x 45 x 3 mm thick Carbon Steel base, HDG
Functional units	: Removable but not fully withdrawable.
Access	: Front and rear access
Doors	: Individual door per cubicle
Electrical details	: As per 6.4.1 below
Protection	: IP54 (cubicle doors closed) IP21 (cubicle doors open)

PS.E.6.2.3 Sections:

This switchboard shall be divided into sections for the following.

PS.E.6.2.4 Incoming section

Equipped with a suitably rated door-interlocked main circuit breaker with a fuse-protected voltmeter of 96 mm x 96 mm with a seven-position selector switch. The voltmeter selector switch shall be arranged so that voltages between phases, and phases to neutral, can be read. The switch shall be of the break-before-make type.

Phase failure protection shall be provided on the incomer section, which will trip all equipment by disconnecting the control circuit in the event of a phase failure or voltage imbalance.

Class II surge arresters (3P + N) as according to SANS 10142 shall be installed, protected by suitable miniature circuit breaker or fuses, as per the requirements of the surge arrester supplier.

A “master” Emergency stop pushbutton shall be provided on the door of the Incoming section. This E-stop shall interrupt the main control circuit, disconnecting all driven machinery starters.

A 230 V, 16 A 3-pin door mounted switch socket outlet shall be provided complete with protective circuit breaker and earth leakage device.

PS.E.6.2.5 Generator section

The Generator section shall include an incomer and automatic Mains Failure panel with change-over for the connection of a future stand-by generator. The generator section shall be rated similarly to the Mains incoming section.

This shall be equipped with a suitably rated door-interlocked main circuit breaker with a fuse-protected voltmeter of 96 mm x 96 mm with a seven-position selector switch. The voltmeter selector switch shall be arranged so that voltages between phases, and phases to neutral, can be read. The switch shall be of the break-before-make type.

PS.E.6.2.6 Power Factor correction section

The Power Factor Correction (PFC) shall be rated to provide correction of the total works power factor to at least 0.96 (lagging).

This section shall include an automatic PFC controller to switch at least 6 steps of capacitance according to a varying load.

All capacitators, contactors and associated equipment shall be accommodated within the PFC section of the MCC.

PS.E.6.2.7 Supplies for equipment:

Distribution section for supplies to DB’s; Control and Instrumentation.

PS.E.6.2.8 Starters Sections:

Dedicated cubicle for each starter as shown on the SLD and on the Switchboard Matrix, equipped with the minimum of:

- Suitably rated door-interlocked CB
- Starter as indicated
- CT-operated Ammeter
- Run-hour meter
- Hand / Off / Auto selector switch
- Start / Stop pushbuttons
- Run / Trip (or fault) indicator lights

For specialized starters, the following shall be added to the minimum requirements:

- Forward / Reverse start pushbuttons for reversible motors

- Fault indicator lights and Reset pushbuttons where additional protection has been specified (Torque limit switches; No-flow circuits; Seal Fail; Overheat; Thermistors)

Note that all starters shall be equipped with a delay feature on the control circuit, preventing instantaneous starting of the equipment when restoring mains power after a trip. This is to prevent the motor starting current being carried by the door-interlocked circuit breaker if switched on while the control circuit is in the auto run mode.

PS.E.6.2.9 Control sections

Separate cubicles with all common controls for the motor-driven mechanical equipment, as well as indicator lights for general alarms, levels etc.

This includes:

- Duty selector switches for Duty / Standby equipment (P1/P2/ALT)
- Sump and Tank “High” and “Low” level alarm indication lights
- “Level Reset” pushbutton
- Time clock controls for aerator sequencing

The Control cubicle shall also be fitted with a multi-channel process display as specified in the Instrumentation clause of this specification.

PS.E.6.2.10 Enclosure for OEM control panels

In the event that the Tenderer offers Original Equipment Manufacturer (OEM) control panels with any of the Mechanical equipment such as the Front-rake screen or Washer compactor equipment, Belt Press main panel, Polyelectrolyte make-up and dosingthese must be supplied complete with all control equipment as specified and required by the OEM.

These control panels will perform all necessary actions to control the equipment in automatic, but it shall also be possible to switch the mode of control to manual at this panel and operate the equipment in local from there.

All parameters such as timers, positions etc. shall be accessible via this control panel.

The supplied OEM panel shall be installed in a suitably sized stainless steel weatherproof (IP65) enclosure, mounted to a HDG stand in close proximity to the equipment.

PS.E.6.2.11 Field Control Stations

These constitute Start / Stop stations mounted adjacent to the equipment installed to firstly, provide emergency stop facilities in proximity to rotating machinery, and secondly, to provide a means of starting the equipment in the field during maintenance of the equipment.

Each item of motor-driven mechanical equipment shall be equipped with a Field Control Station (FCS) mounted in close proximity to the item of equipment.
The FCS shall be either mounted directly on the equipment, on a wall adjacent thereto, or on a Hot Dipped Galvanized U-channel stand fixed to the concrete apron.to the side of the tank (on the concrete wall), complete with Emergency Stop and Green Start push buttons. These pushbuttons shall be mounted on a Glass Reinforced Polyester enclosure, suitably sized to also function as a junction box for the supply and control cables.

The Emergency stop pushbuttons for each drive shall be wired in series with the main control circuit, and shall be a mushroom head emergency stop push button of the push to activate and twist-to-release type.

Where drives are both forward and reverse, the FCS shall be equipped with an Emergency stop button and two green start buttons, one for starting in forward and the other for starting in reverse.

There shall be no exposed metal parts to either the Emergency Stop or Start pushbuttons or their holders or surrounds.

Where there is more than one piece of equipment in a particular area, these FCS's may be grouped together in a junction box of Stainless steel construction, and mounted to a HDG frame bolted to the concrete slab. The Emergency stop and start pushbuttons for each item of equipment must be logically grouped together and clearly marked.

PS.E.6.2.12 Field Instrument enclosures

Where instruments are installed in the field, the transmitters shall be accommodated in Field instrument Enclosures (FIE's) manufactured of Stainless steel, mounted to a HDG frame bolted to the concrete slab.

These enclosures shall have outer and inner doors, of which the inner shall be equipped with a viewing window covered with Perspex such that the operator can read the instrument.

The FIE shall be fitted with a rubber flap (of insertion rubber at least 3 mm thick) to prevent the sun from shining directly through the window onto the transmitter.

PS.E7. WIREWAYS, CABLE LADDER AND DUCTS

General

The power cables as well as all instrumentation and control cables shall be installed on heavy duty cable ladder of at least 2.0 mm thickness or medium duty hot dip galvanized steel mesh cable trays manufactured of steel wire mesh at least 4.0 mm diameter. The cable tray shall have shoulders at least 50 mm high.

All fixings, splices and stand-offs shall be purpose-made for the specific cable tray and shall be of mild steel, hot dip galvanized material.

Where power and instrumentation or signal cabling is run on a single tray, these shall be separated to prevent electromagnetic interference. All cabling shall be strapped to the tray at a minimum of 500 mm intervals with PVC cable ties.

Where trays are cut to length, the ends shall be treated with "Zinkfix" twin pack repair kit application. No welding of the cable trays shall be permitted.

PS.E8. BUILDING SERVICES ELECTRICAL

Conduit

All conduit shall be surface, SABS approved PVC.

Outlet boxes shall be PVC and shall be supplied complete with covers in cases where no equipment is mounted to the box.

Light switches and socket outlets

Light switches and socket outlets shall be of the CRABTREE Industrial range.

Luminaires

Luminaires shall be of the following types and specifications:

Type B1:

Wall mounted industrial type discharge bulkhead luminaire with cast aluminium body and high impact acrylic diffuser complete with 35 W LED lamp.

- BekaNova 35 W LED

Type B2:

Surface mounted Bulkhead fitting with acrylic dome diffuser and aluminium body, complete with 2 x PL9 CFL lamps.

- BekaBulk 18 W LED

Type F1:

Commercial corrosion protected fluorescent luminaire with IP66 rating, suitable for either wall or ceiling mounting with moulded glass fibre body and acrylic diffuser complete with 2 x 58 W fluorescent lamps

- Lighting Innovations MITO IPZ-51W-2R12

Type S1:

Pole-mounted Outdoor luminaire with Aluminium housing, high-impact polycarbonate diffuser complete with 1 x 19 W LED lamp, complete with spigot for pole mounting.

- Beka Ziya-1 19W

Pole for S1:

GRP pole for S1 fitting: 5.2 m pole for 4.5 m Mounting Height, complete with galvanized gland plate, planted in hand-pickable soil.

- BekaPole K 18 76 45

PS.E9. INSTRUMENTATION

General

All instrumentation to be included in this section of the works is described here.

Ultrasonic Level Detectors for flow measurement

Ultrasonic level sensors shall be used for the Inflow at the Inlet Works, for the Reactor basin outflow from the A-Recycle pumps, and for the Final effluent discharge from the Works.

The transducers in all three installations shall be mounted on sturdy stainless steel brackets fixed to the concrete structures of the channels, over a Parshall flume upstream of the screen at the Inlet Works, over the outlet weir at the Aeration basin, and over the outlet weir at the Chlorine Contact channel.
The flume at the Inlet Works as well as the weirs at the A-Recycle and Chlorine contact channels shall be supplied and installed as part of the Mechanical contract.

All transducers shall be supplied complete with integral cable of length as shown in the Field Instrumentation List.

The transmitters shall be calibrated to the flume and the weirs respectively in order to display volume flow, this shall form part of the Electrical installation cost.

The transmitters in all three instances shall be mounted in an FIE, on a HDG stand adjacent to the flume at the Inlet Works, against the Aeration basin wall for the A-Recycle flow installation, and again on a HDG stand at the Chlorine Contact channel.

- Endress & Hauser FMU90 or approved equivalent

Ultrasonic Differential Level for Screen control

An Ultrasonic level will be used for initiating a screening cycle. Each screening channel shall be equipped with its own individual ultrasonic control (the second only installed in future).

Two transducers shall be installed in the screenings channel, one upstream and one downstream of the screen, mounted on suitable stainless steel brackets over the channel.
All transducers shall be supplied complete with integral cable of length as shown in the Field Instrumentation List.

The transmitter shall be capable of accepting the input from both transducers, with settings for providing a signal on the differential level between the two transducers.

The transmitter shall be mounted in an FIE adjacent to the screen, mounted to the same HDG stand on which the USR Transmitter for Inlet flow is mounted.

- Endress & Hauser FMU90 or approved equivalent

Ultrasonic Level Detector for Level control

Ultrasonic level sensors shall be used for level control at both the Return Activated Sludge (RAS) pump sump and the Scum pump sump for level control of the respective pumps.

The transducers in both instances shall be mounted on stainless steel brackets against the wall of the respective sumps. All transducers shall be supplied complete with integral cable of length as shown in the Field Instrumentation List.

The transmitter for the Raw Sewage pump station shall be mounted inside the pump room of the pump station building, and the transmitter for the RAS pump station in an FIE mounted to a HDG stand.

- Endress & Hauser FMU90 or approved equivalent

Magnetic Flowmeters

Magnetic flowmeters will be provided on the RAS return lines from the RAS pump station to the Existing Biological reactor as well as the Sludge Dewatering facility for RAS flow.

The sensing element shall be fully waterproof, suitable for operation under submerged conditions (IP68) to a depth of 1 m for 24 hours. The sensing unit electronics section shall be resin-filled after connection of the integral communications cable of at least 5 m length.

The flowmeter shall be equipped with a remote transmitter with at least IP67 rating.

- Endress & Hauser Promag 50W or approved equivalent

Analytical Instruments

Dissolved Oxygen levels and Suspended Solids concentration shall be monitored in both the Aeration basins of the Existing Biological reactor, as well as the New Biological reactor. The transducers for the monitoring shall be mounted towards the end of the Aeration basin.

These transducers shall be installed mounted with a screwed connection at the end of an 1800 mm stainless steel pipe of 40 mm diameter, bent to an angle of 45° at the pipe end. This vertical section of the suspension assembly shall be mounted to the walkway safety railing by means of a swivel attachment, allowing an operator to lift the sensor out of the liquid and swing it onto the walkway for inspection and maintenance. The probes shall be supplied complete with 10 m integral cables, which shall run inside the stainless steel pipe to the transmitter.

The analytical instruments shall be offered with an individual transmitter for each of Dissolved Oxygen as well as Suspended Solids measurement. These transmitters shall both be housed in a single Field Instrument Enclosure.

An alternate price shall be provided for a single dual transmitter, capable of measuring, displaying, and re-transmitting both the Dissolved Oxygen as well as Suspended Solids measurements.

- Endress & Hauser Oxymax COS61 or approved equivalent for Dissolved Oxygen transducer
- Endress & Hauser Turbimax CUS51 or approved equivalent for Suspended Solids transducer
- Endress & Hauser Liquiline CM442 or approved equivalent for Transmitter (Individual or Combined)

Float switches for Level control

Float switches are generally used as backup devices for Ultrasonic level sensors on level control. The Voltage of Float switch circuits shall not exceed 24 V DC.

Float switches shall be fitted with a microswitch of at least 10 A rating (resistive, at 250 V), of IP68 rating, manufactured from a material suitable to withstand immersion in raw and treated sewage and supplied with an integral cable of length as shown in the Field Instrumentation List.

Float switches shall be installed with a suitable weight at the end of a strong nylon rope, with the Float switch cables cable-tied to the rope at intervals to prevent stress on the cables.

The Float switches shall be suspended from stainless steel brackets fixed to the wall of the respective sumps.

Proximity switches for No-Flow

Inductive proximity switches shall be mounted on suitable stainless steel brackets for sensing of pipework Non-Return Valve counterweights. The valve and weight shall be provided under the Mechanical Contract, the proximity switch and mounting bracket under the Electrical Contract.

The proximity switch shall have an operating Voltage of between 15 and 30 V DC, and a minimum switching range of 20 mm.

Proximity switches shall be of stainless-steel construction, supplied with an integral cable.

PS.E10. PLC HARDWARE

General

A PLC shall be used for the automation and control of the Works. The main PLC shall be installed in the MCC for the new Biological reactor basin, with Remote I/O for the MCC for the Existing Biological reactor basin.

Another dedicated PLC shall be installed for the control and operation of the Dewatering plant, with a Remote I/O in the Inlet Works MCC.

All PLCs shall be linked by means of Optic-fibre cable.

Generic Specification

PLC and HMI hardware shall be of a recognised reputable type and from a major international supplier, with a comprehensive and established South African based technical and logistical support operation. The hardware shall be approved by the Engineer.

The PLC shall comprise the following:

- Central Processing Unit (CPU)
- Dedicated Power Supply Unit (PSU)
- Digital and analogue hard-wired input / output (I/O) cards
- Remotely connected digital and analogue I/O cards
- Data communications cards and/or ports on the CPU

The PLC shall interface with other devices and systems as follows:

- Control circuit components, equipment, instrumentation and plant devices
- Industrial Ethernet communications to Level 2 visualization and operation equipment
- An open fieldbus communication to Level 0 equipment
- Other process controllers (e.g. variable speed drives, electronic controllers, dedicated equipment control systems or other PLCs)
- Remote terminal units (RTUs), and telemetry systems

The hardwired I/O and network communication cards, together with the processor and power supply cards, shall all be housed in racks of one or more chassis units. Where chassis units are provided with spare slots for hardware expansion, these shall be protected by proprietary blanking plates. Any spare communications ports shall likewise be protected with dust covers or plugs.

The processor memory shall be sufficient to operate the as-installed programme with 20 % spare capacity, and the installed I/O cards shall be sufficient to operate the as-installed programme plus 10 % spare capacity of each I/O type used.

Once the program has been entered into the processor memory, it shall remain resident and unaltered, including under power down conditions, until it is deliberately modified by use of a programming unit. The processor shall contain a readily replaceable memory backup battery and indication of battery status.

The PLC shall be programmable using a standard portable notebook computer with suitable software, and shall be provided with all interfacing hardware and software. The PLC shall allow changes to the programme whilst running, without interruption to the operation of the plant or the works being controlled.

The processor shall incorporate the following indications as a minimum:

- Running
- Processor watchdog healthy (alarm on CPU failure which shall be displayed on the associated HMI / SCADA or telemetry)
- I/O manipulation status

PLC I/O

I/O cards shall be provided with voltages and signal loop currents (or voltages) as required.

The I/O cards shall be keyed or otherwise configured to prevent maloperation if placed in the wrong position in a PLC rack, and each I/O card shall be capable of being individually removed or replaced without disturbing the wiring to adjacent cards.

Each I/O card shall be provided with an individually fused power supply feed, and an I/O card malfunction or power supply failure shall be recognised by the PLC hardware and software and raise an alarm on the CPU, relevant HMI or SCADA.

Conventional PLC I/O cards shall be limited to a maximum of 16 channels per card, and each I/O point shall be provided with an I/O status indicator.

The I/O wiring shall be segregated between input and output cards, and all I/O (including spare I/O) shall be loomed from the PLC card down to knife-edge (‘swinging blade’) disconnect type marshalling terminals from where these shall be marshalled to the field wiring.

PLC Remote I/O

Where Remote I/O is required, the I/O cards shall preferable be of the same type and range as those offered for the main PLC with centralised I/O.

Data communications from the PLC / PCS to Remote I/O shall be via a dedicated data communications medium and protocol specifically design for Remote I/O and the Data Communications medium from the PLC to HMI, SCADA or Field instrumentation may not be used for this purpose.

PLC I/O circuits

Digital input circuits, whether hard-wired to conventional I/O or connected via remote I/O, shall consist of volt-free contacts from control circuit components, equipment, and plant devices. These circuits shall be energised from the PLC end, and shall be “fail safe” in design.

Digital outputs shall be provided with integral changeover relay contact suitably rated for the required switching duty, and shall be provided with suppression devices when switching DC loads. Alternatively, transistor output cards may be used in which case suitably rated interposing relays shall be included for each digital output in the Assembly.

Analogue input and output cards be capable of a minimum analogue to digital conversion resolution of 12 bits and shall include open circuit and short circuit monitoring. The inputs shall be powered either from the field instrument they connect to (in the event of self-powered instruments)

or from a fused 24 V DC power supply at the PLC side where the instrument is loop powered. Each instrument loop circuit shall be designed for a loop impedance not exceeding 250 ohms.

Analogue outputs shall be powered from a fused 24 V DC supply via the analogue output card, and shall be able to drive into an impedance of up to 750 ohms. Analogue outputs shall provide a direct connection to the load.

Digital Inputs and Outputs shall be galvanically isolated in groups on no more than eight. Analog Inputs and Outputs shall be individually galvanically isolated.

PS.E11. HMI

General

HMIs shall be installed in the MCC for the New Biological reactor, Dewatering plant MCC and the Inlet Works MCC.

The HMI in the MCC for the New Biological reactor will function as a master viewer node of the overall works, with screen views representative of each individual process area.

The Dewatering plant and Inlet Works HMIs will only serve as displays for the local process areas, i.e. the Dewatering plant and the Inlet Works respectively.

Generic Specification

The HMI (Human-Machine Interface) shall be of the same manufacturer, supplier and model range as the PLC, and be fully compatible with the software and programming protocols of the PLC.

The HMI shall have a colour TFT touch screen of 9” minimum screen size, or as close to this size as the nearest standard screen size of the particular manufacturer.

The HMI shall be flush-mounted on the front door of the control and instrumentation cubicle of the MCC, and connected to the PLC via a proprietary communication cable.

The HMI shall allow data download via a USB port for the historic trends saved in the HMI or PLC memory in terms of operational parameters of the WWTW.

PS.E12. PLC SOFTWARE

General

PLC application software shall be written to meet the requirements of the plant or works Control Philosophy and the PLC processor shall be capable of being programmed using ladder logic, control system flow chart or statement list in accordance with SANS 61131-3. The software shall be laid out in a modular manner and structured in program and function blocks, such that similar tasks are of a similar structure and functionality to facilitate efficiency and ease of programming and maintenance.

Standard software Function Blocks shall be built up using the Client’s standard suite of function (when available), or the PLC manufacturer’s recommended standard Function Blocks.

Each line of code shall be fully documented and annotated, using mnemonics directly related to the associated item of plant. Function blocks shall be provided with descriptors e.g. analogue handling block, PID block, motor start block, etc. All data areas used shall be documented and a full memory map provided.

The PLC application software and operating data shall be held in appropriate memory locations; secured against power failure, and shall be provided with the facility for password protection against unauthorised access.

A sudden interruption of the power supply to the PLC shall result in the programme failing to a safe condition, and the PLC system shall not require manual attendance following a supply failure or restoration. The software control routines shall provide safe power-on and poweroff sequences to ensure that the process is in a safe and controlled condition at all times.

PLC software structure

The PLC application software controlling the plant shall be structured so as to provide, as a minimum requirement, the software routines for each key functional area as detailed in the following clauses:

Plant initiation
This key functional area shall contain routines developed to control plant start-up and restart, plant reset, and phased plant starting, after a power supply re-energisation; including a return to the control mode selected prior to powering down. Plant trips, when reset by the operator, shall reinstate normal automatic operation without the need for further operator intervention.

Plant automatic control
This key functional area shall contain all software necessary to provide automatic control of the plant process(es) and shall include alarm generation and exception handling, together with the starting-up and scheduling of any associated standby plant.

Plant shutdown
This key functional area shall contain routines developed to control plant shutdown, including under operational, power failure, and unplanned / emergency conditions.
Operator and remote interface(s)
This key functional area shall contain all software necessary to provide interfaces to the local HMI, and to SCADA or telemetry (where required). All digital points to / from the HMI, to / from the SCADA system, or to the telemetry system, shall be held within separate integer registers or memory areas, and all analogue points to / from the HMI, to / from the SCADA system, or to the telemetry system, shall be held within separate floating-point registers or memory areas.

Interlocks
The PLC programming shall provide for two types of interlocks namely process and safety interlocks.

Process Interlocks:

- These are dictated by the physical flow of material through the plant and are typically programmed between motor, valve, actuator and controller software blocks.
- Equipment being prevented from start-up by a process interlock shall clearly indicate this condition on the SCADA system.

Safety Interlocks:

- These are typically hardwired into the motor, valve or actuators control circuit, latched and reset in the MCC whilst monitored by the PLC and shall indicate as faults on the HMI or SCADA system.

PLC software control routines

The development of the PLC application software shall include as a minimum, the routines detailed as follows:

- For all plant items, the selection of automatic control via the auto-available input signal shall be recognised by the PLC and displayed at the associated HMI, SCADA (and where appropriate, at a remote telemetry SCADA terminal). When an item of plant is selected for hand control, facilities for the rescheduling of any standby plant shall be provided.
- Direct operator control via the PLC of each plant item (where that plant item is selected for automatic control) shall be provided from the associated HMI (and where appropriate, at a remote SCADA terminal). The selection of direct control shall leave the plant item state unchanged until a new control command is issued, at which time the rescheduling of any standby plant item shall take place.
- Where duty / standby (or assist) plant is provided, the software control regime shall provide scheduling of these plant items through rotation of the duty / standby (or assist) functions. The duty rotation shall be dependent either upon the hours run for that item of plant selected for duty, or upon the issue of a manual duty rotate command. The required duty hours (between zero and 999) shall be entered by the operator at the associated HMI (or where appropriate, at a remote SCADA terminal). An entered value of zero duty hours shall

inhibit the duty function within the associated plant item's duty rotation cycle. For those areas of plant where an apportioned wear pattern is required, an operator warning message shall be issued if the duty cycle hours entered for each item does not provide an uneven wear pattern. Where the operation of plant items is determined by upper and lower process limits, the automatic changeover of duty status shall be delayed until an appropriate point within the operating cycle.

PLC monitoring software

Monitoring software shall be provided to confirm the running of plant items in response to any start command, and shall use separately configurable time delays for each item of plant. If an item of plant fails to start within its configured time, the item of plant shall be deemed to have failed and an alarm shall be generated. The monitoring software shall also provide the accumulated run hours for all motor driven and proprietary items of plant.

When an item of plant fails, the control system shall automatically reschedule any standby plant item in place of the duty plant, and execute the appropriate shut-down sequence for the failed plant item.
The standby plant item shall continue to operate in place of the failed duty plant item, until the plant item failure condition has been reset by the operator. Once the plant item failure condition has been cleared by the operator, the restored duty plant item shall operate and the standby plant item shall return to its standby status.

Monitoring software shall be provided to confirm the position of all valve(s) and penstock(s) in response to any open or close request, and shall use separately configurable time delays for each valve or penstock. If a valve or penstock fails to achieve the requested position, within its configured time, the valve or penstock shall be deemed to have failed and an alarm shall be generated.

Monitoring software shall be provided for the associated HMI, SCADA (and where appropriate, at a remote telemetry SCADA terminal), to generate operator message prompts where there is a need to manually exercise control over items of plant which remain in a static operating position or dormant state for extended periods of time. Where applicable, such plant will be identified in the Project Specification and / or Control Philosophy.

The PLC application software shall check all analogue input signals for validity. An analogue input signal shall be converted to a digital value at the I/O card, i.e. the current loop signal shall be converted to 0 - 4095 bits. The PLC software shall periodically check for a conversion which indicates under-range or over-range. If either of these two states is set, the software shall initiate an 'out of range' alarm.

In order to prevent the operator being presented with excessive spurious alarm messages, the PLC application software shall include routines, that on the initiation of a specific event alarm, shall prevent cascade alarms from being raised i.e. a 'mains failure' alarm will mask the 'not available' alarms from individual motor starters, valves, etc.

The PLC application software shall generate totalized quantities for individual items of equipment and instrumentation, whereby a pulsed digital signal shall be received and a set amount added to a totalizer register. The set amount used to increment the totalizer shall be adjustable and stored in a register. The totalizer shall be capable of the range 0 to 999999, and the totalizer shall automatically rolling over to zero when the maximum figure has been reached. The totalizer figures shall be displayed on the associated HMI display, SCADA (and where appropriate, at a remote telemetry SCADA terminal).

Functional Specification

Prior to programming the PLC, the Contractor shall provide the Engineer with a Control System Functional Design Specification describing how the Plant or Works Control Philosophy will be implemented in the Control System Software (PLC/ PCS).

The Functional Specification shall include at least the following:

- Control System Overview
- Final Approved plant or works Control Philosophy

- Equipment, Motor and Instrumentation Lists
- PLC IO lists
- List of Interlock signals
- List of Alarms
- List of all PID control Loops
- List of all Sequence and / or Duty/ Standby control
- Detail description of PLC configuration and software building blocks (Function Blocks)
- Function Block Parameters tables

PS.E13. CONTROL NARRATIVE

General

These descriptions of the control narratives are summarized versions, and are indicative only.

Note that the successful Tenderer shall be required to develop an equipment specific control narrative (based on the proposal below) and submit it to the Engineer for approval.

PS.E13.1 Inlet works:

Front rake screens

The Fine screen operates on a timed sequence in “Auto”, with a level override, starting a screening sequence when a high level is detected by the USR relay.

The screen will operate for at least 3 cycles when a high level is detected by the USR, or for 3 cycles every 10 minutes. Both the number of cycles as well as the interval between operations shall be readily adjustable by the operator.

When the screen motor detects an overtorque caused by a blockage, the rake shall stop and reverse for a cycle, and then restart in the forward direction. If three consecutive overtorque conditions are sensed, the screen will lock out, and raise an alarm. The operator will have to reset this condition manually.

The operator shall be able to start and stop the screen from the MCC or via the FCS in forward or reverse.

Screening screw conveyor

The screenings screw conveyor starts when the screen starts a raking cycle, and runs for as long as the rake screen is operating.

The screenings screw conveyor runs on for a set period (typically 30 seconds) after the screen has stopped.

The screenings screw conveyor will stop if the Over-Torque protection has been activated, and must be reset on the MCC.

Screenings Washer / Compactor

The washer / compactor will start when the front raked screen starts, with the Washwater solenoid opening as soon as the washer starts.

After the screenings screw conveyor has stopped, the Washer runs in the forward direction for a further set period (typically 30 seconds), stops, and runs in the reverse direction for a set period (typically 30 seconds), and then stops. The Washwater solenoid only closes once the Washer press has completed the reverse cycle and has stopped.

If an Over-Torque condition is detected, the Washer press will stop for a set period (typically 10 seconds), run in the reverse direction for a set period (typically 30 seconds), stop, and the restart in the forward direction. If the condition presents itself more than 3 times I an operations cycle, the

Washer press will trip out on over-torque, and the condition will have to be reset manually on the MCC.

Washwater system

A Washwater system comprising a Washwater holding tank and 2 x Washwater pumps is provided for service Washwater at the inlet works.
The Washwater holding tank is filled by potable Municipal water supply via a simple ball float valve on the tank inlet. The tank is equipped with two float level switches, the top one being a pump start enable, the lower a low-level pump cut-out for dry running protection.

The two pumps operate in a duty / standby configuration, with the Duty pump starting when Washwater is required by the screenings screw conveyor, wash press, or Grit removal system. The duty pump will start first, and the Washwater solenoid valve on the relevant equipment will only open after a set period (typically 30 seconds) after the pump is running.

The duty pump stops in a set period (typically 30 seconds) after the last solenoid valve on the relevant equipment has closed.

Vortex Degritters

The degritter is equipped with a paddle drive which runs continuously when the degritter is in service.

Only one Degritter can perform a degritting cycle at any given time, the sequence of which is as follows.

Initiation of a degritting sequence starts the Washwater pump, and after a set period (typically 30 seconds), the Washwater solenoid valve on Degritter No.1 opens. The Degritter is agitated with Washwater for a set period (typically 60 seconds), after which Grit pump No.1 starts, and the Washwater solenoid closes. Grit pump No.1 runs for a set period (typically 120 seconds), before stopping.

Degritter No.2 then goes into a similar degritting cycle, and both Degritters remain in standby mode until the degritting sequence is repeated (typically every 10 minutes). The Operator can also initiate a degritting sequence by manual intervention, although the sequence of events will still continue in automatic mode.

Waste Skip dolley

A mechanically-driven Skip dolley shall be provided for collection of the compacted screenings from the Washer / Compacter screw conveyor.

The Skip dolley shall only be operable from the Field Control station, allowing local forward and reverse operation. The forward and reverse start buttons shall be non-latching, requiring the Operator to maintain continuous pressure for operation of the skip dolley.

The Skip drive shall be equipped with over-torque protection, which shall require a manual reset on the MCC by the Operator if activated.

PS.E13.2 New Biological reactor

Vertical shaft mixers

The mixers run continuously when set to “Auto”. The control shall be latching in the event of a power failure, with the Mixers starting on return of power, if set to “Auto”.

The operator can start and stop the mixers from the MCC or via the FCS.

Surface Aerators

Primary control of each of the Aerators shall be by means of a 24 hour, 7-day time clock.

In “Auto” the aerators will run off the time clocks. It shall be possible to set the running time as well as the intervals between running individually for each Aerator.

In manual, the operator can start and stop the aerators from the MCC or via the FCS.

Each Aerator is equipped with a Variable Speed Drive, which shall adjust speed according to the Dissolved Oxygen saturation in the Aeration basin. The speed of the Aerator shall also be adjustable via a potentiometer on the door of the drive in Manual.

The Aerator speed is only controllable from the drive cubicle in the MCC, and not from the FCS.

Mixed Liquor (A-)recycle pumps

In “Auto” the Mixed Liquor recycle pumps operate continuously. These pumps operate in a Duty/Standby configuration.

The pumps will duty cycle every 24 hours, at 09:00, and shall be equipped with a duty fail circuit, starting the standby pump if the duty pump fails.

The operator can start and stop the MLR pumps from the MCC or via the FCS.

Waste Activated Sludge pumps

In “Auto” the Waste Activated Sludge (WAS) pumps operate continuously. These pumps operate in a Duty/Standby configuration.

The pumps will duty cycle every 24 hours, at 09:00, and shall be equipped with a duty fail circuit, starting the standby pump if the duty pump fails.

The WAS pumps are equipped with Variable Speed Drives, the speed shall be automatically adjusted as required for sludge feed to the Belt press. The speed shall also be adjustable via a potentiometer on the drive cubicle door in the MCC in manual, and not on the FCS.

PS.E13.3 Existing Biological reactor

Vertical shaft mixers

The mixers run continuously when set to “Auto”. The control shall be latching in the event of a power failure, with the Mixers starting on return of power, if set to “Auto”.

The operator can start and stop the mixers from the MCC or via the FCS.

Surface Aerators

Primary control of each of the Aerators shall be by means of a 24 hour, 7-day time clock.

In “Auto” the aerators will run off the time clocks. It shall be possible to set the running time as well as the intervals between running individually for each Aerator.

In manual, the operator can start and stop the aerators from the MCC or via the FCS.

Each Aerator is equipped with a Variable Speed Drive, which shall adjust speed according to the Dissolved Oxygen saturation in the Aeration basin. The speed of the Aerator shall also be adjustable via a potentiometer on the door of the drive in Manual.

The Aerator speed is only controllable from the drive cubicle in the MCC, and not from the FCS.

Fine bubble diffused Aeration Blowers

The Blowers for the Fine bubble diffused Aeration zone will be controlled from the OEM Fine bubble aeration system.

A second Blower unit will be added to the existing.

Mixed Liquor (A-)recycle pumps

In “Auto” the Mixed Liquor recycle pumps operate continuously. These pumps operate in a Duty/Standby configuration.

The pumps will duty cycle every 24 hours, at 09:00, and shall be equipped with a duty fail circuit, starting the standby pump if the duty pump fails.

The operator can start and stop the MLR pumps from the MCC or via the FCS.

Waste Activated Sludge pumps

In “Auto” the Waste Activated Sludge (WAS) pumps operate continuously. These pumps operate in a Duty/Standby configuration.

The pumps will duty cycle every 24 hours, at 09:00, and shall be equipped with a duty fail circuit, starting the standby pump if the duty pump fails.

The WAS pumps are equipped with Variable Speed Drives, the speed shall be automatically adjusted as required for sludge feed to the Belt press. The speed shall also be adjustable via a potentiometer on the drive cubicle door in the MCC in manual, and not on the FCS.

PS.E13.4 Secondary Settling tanks

Both Secondary Settling Tanks (SSTs) operates continuously. Each SST will be equipped with a spray bar system for breaking up of surface scum. The solenoid valve on the sprayer bar shall open when the SST peripheral drive runs, and only close when the SST drive stops.

When the SST motor detects an overtorque, the SST will trip, and raise an alarm. The operator will have to reset this condition manually.

The operator can start and stop the SST from the MCC or via the FCS.

PS.E13.5 Return Activated Sludge (RAS) pumps

There are two sets of RAS pumps, one set for each Settling tank sludge draw-off.

Each set of pumps operate on a Duty / Standby principle, and are controlled by the level in the Return Activated Sludge (RAS) sump, with the speed of the duty pump controlled by the sludge feed required by the Belt press.

The pumps will function in a Duty/Standby cycle, with the duty pump rotating to standby after each cycle. Should the pumps run in a continuous operation due to maintained high flows into the sump, the duty will rotate on a 24-hour basis, at 09:00 each morning.

Should a duty pump fail or trip due to an alarm condition, the other duty pump shall start and continue as the duty pump until the failed pump condition has been reset by an operator.

In the event that the USR fails, the control will be performed by the Float Switches. The duty pump will start on the High level float and continue to run until the level drops to the low level float.

Each pump will be equipped with No-Flow protection, activated by a proximity switch on the pipework Non-Return valve. An override timer shall provide a time delay on pump startup. The No-flow alarm and condition shall be reset manually by the operator.

Each pump circuit shall be provided with a “pump-down” facility, whereby an operator can manually run the pump below the control stop and low levels by holding in the Start button on the Field Control Station. This operation shall be non-latching.

In manual, the operator can start and stop each pump from the MCC, but it shall not be possible to run two pumps simultaneously, either in auto or in manual.

PS.E13.6 Scum pumps

The scum pumps operate on a Duty / Standby principle, and are controlled by the level in the Scum sump, primarily by USR level, with High and Low level Float switches as backup control.

The pumps will function in a Duty/Standby cycle, with the duty pump rotating to standby after each cycle. Should the pumps run in a continuous operation due to maintained high flows into the sump, the duty will rotate on a 24-hour basis, at 09:00 each morning.

Should a duty pump fail or trip due to an alarm condition, the other duty pump shall start and continue as the duty pump until the failed pump condition has been reset by an operator.

In the event that the USR fails, the control will be performed by the Float Switches. The duty pump will start on the High level float and continue to run until the level drops to the low level float.

Each pump will be equipped with No-Flow protection, activated by a proximity switch on the pipework Non-Return valve. An override timer shall provide a time delay on pump startup. The No-flow alarm and condition shall be reset manually by the operator.

Each pump circuit shall be provided with a "pump-down" facility, whereby an operator can manually run the pump below the control stop and low levels by holding in the Start button on the Field Control Station. This operation shall be non-latching.

In manual, the operator can start and stop each pump from the MCC, but it shall not be possible to run two pumps simultaneously, either in auto or in manual.

PS.E13.7 Dewatering facility

Belt Press

The sludge dewatering Belt Press will be offered as a complete, OEM package unit, and shall include all equipment, drives, instrumentation, automation and control to be fully functional in a proprietary format.

An appropriately-sized power supply will be made available to the electrical motor control centre supplied with the Belt press.

The Belt press control shall be linked to the rest of the site PLCs by Optic-Fibre cable, and shall communicate with the control of the RAS and WAS pumps at the Existing and New Biological reactors in terms of the sludge feed rate required (by adjusting the speed of the RAS and WAS pumps accordingly).

The parameters and setpoints for Operator-interface and control of the Belt press shall be available on the HMI provided in the MCC supplying the Belt press OEM control panel.

Poly-electrolyte Make-up and Dosing

The complete Poly-electrolyte Make-up and Dosing system shall be supplied as an OEM package, including all pump sets, storage tanks, instrumentation, and control.

An electrical power supply will be made available for the control panel for the Poly systems, with the Operator-interface information and parameter settings available via the Dewatering HMI located in the MCC supplying the Dewatering plant.

Washwater system

The complete Washwater system shall be supplied as an OEM package, including all pump sets, storage tanks, instrumentation, and control.

An electrical power supply will be made available for the control panel for the Washwater system, with the Operator-interface information and parameter settings available via the Dewatering HMI located in the MCC supplying the Dewatering plant.

Sludge Outloading conveyors

Three sets of centreless screw conveyors shall be provided.

A Primary horizontal screw conveyor will start as soon as the Belt press starts, and will run on for a set period (typically 60 seconds) after the Belt press has stopped.

The Primary horizontal conveyor will dump sludge on the Inclined screw conveyor, which will start as soon as the Primary horizontal conveyor starts, and run on for a set period (typically 60 seconds) after the Primary horizontal conveyor has stopped.

The Inclined conveyor dumps sludge onto three Secondary Horizontal screw conveyors, which start simultaneously when the Inclined conveyor starts, and all three run on for a set period (typically 60 seconds) after the Inclined conveyor has stopped.

All five screw conveyors are equipped with over-torque protective devices, which will trip the respective conveyor when triggered. The over-torque alarm must be reset by the operator on the MCC before the conveyor can be restarted.

Tripping of any conveyor in the sequence, will cause the preceding conveyor to stop, also stopping the conveyor preceding that one. Tripping of a single Secondary horizontal conveyor will not cause the preceding Inclined conveyor to stop, as long as there is still one Secondary horizontal conveyor in operation. Tripping of the Inclined conveyor, will stop the preceding Primary horizontal conveyor, as well as the three Secondary horizontal conveyors.

SECTION E-1

SWITCHBOARD MATRIX

EQUIPMENT	QTY	kW	STARTER	PROTECTION	CONTROL
MCC-Reactor 1 (Existing Biological Reactor)					
Mixers	3	7.5	DOL	Overload	I/O: Continuous
Aerators	4	45	VSD	Electronic	I/O: Time clock rpm: DO 1/1
WAS pumps	2	7.5	VSD	Electronic Seal fail Overheat (Klixon)	I/O: Level (USR / F/S) rpm: Belt Press
A-recycle pumps	2	7.5	DOL	Overload	I/O: Continuous C/over: 24-hour cycle
Fine bubble Blowers	2	22	DOL	Overload	I/O: Time clock
Existing clarifier	1	0.37	DOL	Overload Over-torque	I/O: Continuous
MCC-Reactor 2 (New Biological Reactor)					
Mixers	3	11	DOL	Overload	I/O: Continuous
Aerators	4	45	VSD	Electronic	I/O: Time clock rpm: DO 2/1
WAS pumps	2	7.5	VSD	Electronic Seal fail Overheat (Klixon)	I/O: Level (USR / F/S) rpm: Belt Press
A-recycle pumps	2	10	DOL	Overload	I/O: Continuous C/over: 24-hour cycle
New clarifier	1	0.37	DOL	Overload Over-torque	I/O: Continuous
RAS pumps (Set 1)	2	15	VSD	Electronic No-Flow	I/O: Level (USR / F/S) rpm: Belt Press
RAS pumps (Set 2)	2	15	VSD	Electronic No-Flow	I/O: Level (USR / F/S) rpm: Belt Press
Scum pumps	2	2.2	DOL	Overload	I/O: Continuous C/over: 24-hour cycle
MCC-Inlet Works					
Coarse screen No.1	1	1.1	F/R	Overload Over-torque	I/O: Pri USR (Level); Sec Timer Seq: PLC
Coarse screen (Future)	1	---	---	Spare space only	Spare space only
Fine screen No.1	1	1.1	F/R	Overload Over-torque	I/O: Pri USR (Level); Sec Timer Seq: PLC
Fine screen (Future)	1	---	---	Spare space only	Spare space only

Screw conveyor (Coarse)	1	1.1	F/R	Overload Over-torque	I/O: Coarse screen
Screw conveyor (Fine)	1	1.1	F/R	Overload Over-torque	I/O: Fine screen
Screenings Washer / Comp	1	2.2	F/R	Overload Over-torque	I/O: Screw conveyor (Coarse); Screw conveyor (Fine) Washwater Solenoid valve
Grit paddle drives	2	2.2	DOL	Overload	I/O: Continuous
Grit pumps	2	3.0	DOL	Overload No-flow	I/O: Degritting sequence Washwater Solenoid valve
Washwater pumps	2	1.1	DOL	Overload No-flow	I/O: Washer/Compactor; Degritting sequence
Skip Dolley	1	1.1	F/R	Overload Over-torque	I/O: Manual only
MCC-Dewatering					
Supply to Belt Press CP	1	---	---	Circuit Breaker	Power supply only
Supply to Poly System	1	---	---	Circuit Breaker	Power supply only
Supply to Washwater system	1	---	---	Circuit Breaker	Power supply only
Primary Hor. Sludge conveyor	1	5.5	F/R	Overload Over-torque	I/O: Belt press
Inclined Sludge conveyor	1	5.5	F/R	Overload Over-torque	I/O: Primary Horizontal conveyor
Sec. Hor. Sludge conveyor	3	5.5	F/R	Overload Over-torque	I/O: Inclined conveyor
Belt Press Control Panel (OEM complete with:)					
Belt drives			VSD		Proportional speed control (Sludge feed vs Poly dosing vs Washwater dilution etc)
Alignment control					
Poly-electrolyte system Control Panel (OEM complete with:)					
Poly make-up pumps and Mixers			DOL		Make-up water; Addition of poly; Stirring and Maturation of product
Poly storage					Storage of product
Poly dosing pumps			VSD		Proportional dosing controlled by Belt Press
Washwater system Control Panel (OEM complete with:)					
Washwater pumps			VSD		Dilution of poly; Cleaning of Belt Press

SECTION E-2

FIELD INSTRUMENTATION

TAG	ELEMENT	LOCATION	SPECIFICATION		OUTPUT		EVENT				CONTROL / ALARM DESCRIPTION / INSTALLATION / COMMENT
			RANGE	UNIT	ANALOGUE	DX	INITIATOR	FUNCTION	1st LIMIT	2nd LIMIT	
INLET WORKS:											
LE01	**Ultrasonic Level for Screen control**										
LS01/1	USR Sensor	Inlet channel	5	m	-	-	-	-	-	-	Upstream of Screen 1
LS01/2	USR Sensor	Inlet channel	5	m	-	-	-	-	-	-	Downstream of Screen 1
LT01	Transmitter	FIE01	-	-	4-20 mA	2	L	C	H	-	Initiate screening cycle
FM01	**Ultrasonic for Inflow measurement**										
FE01	USR Sensor	Inlet channel	5	m	-	-	-	-	-	-	Calibrated for Flume
FT01	Transmitter	FIE02	-	-	4-20 mA	-	F	I	-	-	Indication of Inflow
FS01	**Float level switch for Washwater tank High level**										
FS01	Float switch	Washwater tank	5	m	None	1	L	S	H	H	Start enable pumps
FS02	**Float level switch for Washwater tank Low level**										
FS02	Float switch	Washwater tank	5	m	None	1	L	S	L	L	Stop running pumps
EXISTING BIOLOGICAL REACTOR (No.1):											
ANA01	**Analytical measurement (Dissolved Oxygen & Suspended Solids)**										
DOS01	DO Probe	Reactor basin No.1	0.8-4	mg/l	OEM	-	O	C	-	-	Speed control of AERs
TBS01	S/solids probe	Reactor basin No.1	0-6000	mg/l	OEM	-	-	-	-	-	
ANT01	Dual TX	FIE03			4-20 mA	-	-	-	-	-	
NEW BIOLOGICAL REACTOR (No.2):											
ANA02	**Analytical measurement (Dissolved Oxygen & Suspended Solids)**										
DOS02	DO Probe	Reactor basin No.1	0.8-4	mg/l	OEM	-	O	C	-	-	Speed control of AERs
TBS02	S/solids probe	Reactor basin No.1	0-6000	mg/l	OEM	-	-	-	-	-	
ANT02	Dual TX	FIE04			4-20 mA	-	-	-	-	-	
RAS PUMP STATION											
FM02	**Flow meter for Pump set No.1**										
FE02	DN250 Sensor	RAS return to BR1	0-50	l/s	OEM	-	-	-	-	-	Magnetic flow sensor
FT02	Magflow TX	FIE05	-	-	4-20 mA	-	F	I	-	-	Flow measurement
FM03	**Flow meter for Pump set No.2**										
FE03	DN250 Sensor	RAS to Belt press	0-70	l/s	OEM	-	-	-	-	-	Magnetic flow sensor
FT03	Magflow TX	FIE05	-	-	4-20 mA	-	F	I	-	-	Flow measurement

LE02	**Ultrasonic Level for RAS sump control**										
LS02	USR Sensor	RAS Sump	5	m	OEM	-	-	-	-	-	Bracket over sump
LT02	Transmitter	FIE06	-	-	4-20 mA	4	L	S	H	H	High level Alarm
							L	S	H		Start enable pumps
							L	S	L		Stop running pumps
FS03	**Float level switch for RAS sump High level**										
FS03	Float switch	RAS Sump	5	m	None	1	L	S	H	H	Start enable pumps
FS04	**Float level switch for RAS sump Low level**										
FS04	Float switch	RAS Sump	5	m	None	1	L	S	L	L	Stop running pumps
SCUM PUMP STATION											
LE03	**Ultrasonic Level for Scum sump control**										
LS03	USR Sensor	Scum Sump	5	m	OEM	-	-	-	-	-	Bracket over sump
LT03	Transmitter	FIE07	-	-	4-20 mA	4	L	S	H	H	High level Alarm
							L	S	H		Start enable pumps
							L	S	L		Stop running pumps
FS05	**Float level switch for Scum sump High level**										
FS05	Float switch	Scum Sump	5	m	None	1	L	S	H	H	Start enable pumps
FS06	**Float level switch for Scum sump Low level**										
FS06	Float switch	Scum Sump	5	m	None	1	L	S	L	L	Stop running pumps

SECTION E-3

PLC I/O SCHEDULE

TAG	DESCRIPTION	AI	AO	DI	DO
PLC-1 (MCC-2)		**8**	**16**	**128**	**64**
SPARE		2	6	12	7
MX01	Vertical Shaft Mixer 1	0	0	5	3
MX02	Vertical Shaft Mixer 2	0	0	5	3
MX03	Vertical Shaft Mixer 3	0	0	5	3
MX04	Vertical Shaft Mixer 4	0	0	5	3
AER01	Surface Aerator 1	0	1	5	3
AER02	Surface Aerator 2	0	1	5	3
AER03	Surface Aerator 3	0	1	5	3
AER04	Surface Aerator 4	0	1	5	3
WAS01	WAS pump 1	0	1	7	3
WAS02	WAS pump 2	0	1	7	3
ARP01	A-recycle pump 1	0	0	5	3
ARP02	A-recycle pump 2	0	0	5	3
SCP01	Scum pump 1	0	0	5	3
SCP02	Scum pump 2	0	0	5	3
RAS01/1	RAS pump 1 of Set 1	0	1	6	3
RAS01/2	RAS pump 2 of Set 1	0	1	6	3
RAS02/1	RAS pump 1 of Set 2	0	1	6	3
RAS02/2	RAS pump 2 of Set 2	0	1	6	3
SST02	Secondary Settling tank 2	0	0	6	3
ANA02	Analytical probe for Dissolved Oxygen and Suspended Solids	2	0	0	0
FM02	RAS Flow meter (Pump set 1)	1	0	0	0
FM03	RAS Flow meter (Pump set 2)	1	0	0	0
LE02	RAS Sump Ultrasonic level	1	0	4	0
FS03	RAS Sump High level Float switch	0	0	1	0
FS04	RAS Sump Low level Float switch	0	0	1	0
LE03	Scum sump Ultrasonic level	1	0	4	0
FS05	Scum sump High level Float switch	0	0	1	0
FS06	Scum sump Low level Float switch	0	0	1	0

TAG	DESCRIPTION	AI	AO	DI	DO
Remote I/O for PLC-1 (MCC-1)		**4**	**8**	**96**	**64**
SPARE		2	0	16	19
MX01	Vertical Shaft Mixer 1	0	0	5	3
MX02	Vertical Shaft Mixer 2	0	0	5	3
MX03	Vertical Shaft Mixer 3	0	0	5	3
MX04	Vertical Shaft Mixer 4	0	0	5	3
AER01	Surface Aerator 1	0	1	5	3
AER02	Surface Aerator 2	0	1	5	3
AER03	Surface Aerator 3	0	1	5	3
AER04	Surface Aerator 4	0	1	5	3
FBB01	Fine Bubble diffused Blower 1	0	1	5	3
FBB02	Fine Bubble diffused Blower 2	0	1	5	3
WAS01	WAS pump 1	0	1	7	3
WAS02	WAS pump 2	0	1	7	3
ARP01	A-recycle pump 1	0	0	5	3
ARP02	A-recycle pump 2	0	0	5	3
SST01	Secondary Settling tank 1	0	0	6	3
ANA01	Analytical probe for Dissolved Oxygen and Suspended Solids	2	0	0	0
TAG	DESCRIPTION	AI	AO	DI	DO
PLC-2 (MCC-Dewatering)		**8**	**8**	**96**	**48**
SPARE		3	1	16	7
BP01	Belt press	2	2	16	8
PES01	Poly-electrolyte system	2	4	24	12
WWS01	Washwater System	1	1	10	6
PHC01	Primary Horizontal conveyor	0	0	6	3
ICC01	Inclined conveyor	0	0	6	3
SHC01	Secondary Horizontal conveyor 1	0	0	6	3
SHC02	Secondary Horizontal conveyor 2	0	0	6	3
SHC03	Secondary Horizontal conveyor 3	0	0	6	3

TAG	DESCRIPTION	AI	AO	DI	DO
Remote I/O for PLC-2 (MCC-Inlet)		**4**	**4**	**64**	**40**
SPARE		2	3	8	8
SCC01	Coarse screen 1	0	0	7	4
SCV01	Screw conveyor for Coarse screen	0	0	7	4
SCF01	Fine screen 1	0	0	7	4
SCV02	Screw conveyor for Fine screen	0	0	7	4
WC01	Washer / Compactor 1	0	0	7	4
WWP01	Washwater pump 1	0	0	5	3
WWP02	Washwater pump 2	0	0	5	3
SDD01	Skip Dolley drive	0	0	7	4
LE01	Ultrasonic differential for screen control	1	1	2	2
FM01	Inflow measurement	1	0	0	0
LS01	Washwater tank High level float	0	0	1	0
LS02	Washwater tank Low level float	0	0	1	0

SECTION E-4

HMI ADJUSTABLE PARAMETERS

PROCESS AREA / EQUIPMENT ID	PARAMETER	OPERATION	VARIABLE
HMI for MCC-1			
Reactor 1, Aerator 1	Daily operating time	ON / OFF	hh:mm
Reactor 1, Aerator 2	Daily operating time	ON / OFF	hh:mm
Reactor 1, Aerator 3	Daily operating time	ON / OFF	hh:mm
Reactor 1, Aerator 4	Daily operating time	ON / OFF	hh:mm
Reactor 1, Aerators 1 – 4	Rotational speed	Proportional to DO measurement	%
Reactor 1, WAS pumps 1 – 2	Flow rate of recycle Activated sludge to Reactor 1	Proportional to Reactor 1 inflow	%
Reactor 1, RAS pumps 1/1 – 1/2 (set 1)	Flow rate of RAS (1) to Belt press	Proportional to Belt press reqs	%
Reactor 2, Aerator 1	Daily operating time	ON / OFF	hh:mm
Reactor 2, Aerator 2	Daily operating time	ON / OFF	hh:mm
Reactor 3, Aerator 3	Daily operating time	ON / OFF	hh:mm
Reactor 4, Aerator 4	Daily operating time	ON / OFF	hh:mm
Reactor 2, Aerators 1 – 4	Rotational speed	Proportional to DO measurement	%
Reactor 2, WAS pumps 1 – 2	Flow rate of recycle Activated sludge to Belt Press	Proportional to Reactor 1 inflow	%
Reactor 1, RAS pumps 2/1 – 2/2 (set 2)	Flow rate of RAS (2) to Belt press	Proportional to Belt press reqs	%
RAS sump level USR	Setpoint levels of RAS sump	I/O Setpoints	m

PROCESS AREA / EQUIPMENT ID	PARAMETER	OPERATION	VARIABLE
HMI for MCC-Dewatering			
Belt press	Belt linear speed	Speed	m/s
Poly-electrolyte dosing	Concentration of Poly	Proportional to Sludge flow rate	%
WAS pumps	Sludge feed rate from Reactor 2	Flow	l/s
RAS pumps (1st set)	Sludge feed rate from RAS (1)	Flow	l/s
RAS pumps (2nd set)	Sludge feed rate from RAS (2)	Flow	l/s
Inlet Coarse screen start cycle	Timer cycle override	Interval	seconds
Inlet Coarse screen reverse	Reverse timer when over-torque	Time	seconds
Coarse screen screenings conveyor	Run-on delay	Time	seconds
Inlet Fine screen start cycle	Timer cycle override	Interval	seconds
Inlet Fine screen reverse	Reverse timer when over-torque	Time	seconds
Fine screen screenings conveyor	Run-on delay	Time	seconds
Screenings washer Compactor	Run-on delay	Time	seconds
Screenings washer Compactor	Washwater solenoid	Time	seconds
Grit pumps	Agitation period	Time	seconds
Degritting solenoid	Sparging period	Time	seconds
Degritting	Degritting sequence interval	Time	seconds

SECTION E-5

TECHNICAL DATA SHEETS

MOTOR CONTROL CENTRES / SWITCHBOARDS	
Switchboard manufacturer:	Company
	Address
	Contact name
	Telephone No.
Switchboard electrical details:	
MCC-1 (Existing Biological Reactor)	TTA / PTTA
Busbar rating / Fault level	A kA
MCC-2 (New Biological Reactor)	
Busbar rating / Fault level	A kA
MCC-Dewatering (Belt Press)	TTA / PTTA
Busbar rating / Fault level	A kA
MCC-Inlet Works	TTA / PTTA
Busbar rating / Fault level	A kA
Field Control Station Supplier	
Junction Box Supplier	

SWITCHGEAR	
Circuit Breakers	
Contactors	
Relays	
Timers / Control devices	
Indicator lights (Manufacturer and Type)	
Pushbuttons	

CABLES AND CABLE SUPPORT SYSTEMS	
Armoured LV (400 V) Power Cables	
Armoured Control Cables	
Armoured Signal Cables	
Optic-Fibre cables	
Cable tray and Accessories	

BUILDING SERVICES GENERAL POWER & LIGHTING	
Switches and Socket Outlets Manufacturer / Supplier:	
Light switches	
Light switches (IP65)	
16 A, 230 V SSO	
16 A, 230 V SSO (IP65)	
3-Phase, 32 A, 5-pin SSO (IP65)	
Luminaire Manufacturer / Supplier:	
Type A1: Wall-mounted floodlight Corrosion protection 150 W HPS	
Type A1: Pole – Glassfibre: 5.5 m Mounting height	
Type B1: Wall mounted industrial bulkhead 80 W HPS	
Type B2: Wall mounted industrial bulkhead 100 W HPS	
Type B3: Wall mounted industrial bulkhead 150 W HPS	
Type F1: Corrosion protection fluorescent: 2 x 58 W fluorescent	

INSTRUMENTATION	
Magnetic Flow meters:	
Manufacturer	
Sensor Type / Model No.	
Transmitter Type / Model No.	

Ultrasonic Level detectors:	
Manufacturer	
Sensor Type / Model No.	
Transmitter Type / Model No.	
DO (Dissolved Oxygen) meters:	
Manufacturer	
Sensor Type / Model No.	
Transmitter Type / Model No.	
Concentration (Solids Density) meters:	
Manufacturer	
Sensor Type / Model No.	
Transmitter Type / Model No.	
Pressure transmitters:	
Manufacturer	
Type / Model No.	
Limit switches (Metal rod):	
Manufacturer	
Type / Model No.	
Limit switches (Proximity):	
Manufacturer	
Type / Model No.	
Flow switches:	
Manufacturer	
Type / Model No.	
Float switches:	
Manufacturer	
Type / Model No.	

AUTOMATION	
PLC:	
Manufacturer	
Type / Model No.	
Digital I/O	
Analogue I/O	
HMI:	
Manufacturer	
Type / Model No.	
Fibre Optic converters:	
Manufacturer	
Type / Model No.	
UPS:	
Manufacturer	
Type / Model No.	

C3.5 MANAGEMENT

CONTENTS

3.5.1. FORMS FOR CONTRACT ADMINISTRATION
3.5.2 PARTICIPATION OF TARGETED LABOUR
3.5.3. PARTICIPATION OF TARGETED ENTERPRISES
3.5.4 PARTICIPATION OF TARGETED ENTERPRISES
3.5.6 HEALTH AND SAFETY
3.5.5 ENVIRONMENTAL MANAGEMENT PLAN

3.5.1 FORMS FOR CONTRACT ADMINISTRATION

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

a) Monthly Project Labour Report (Annex 3)
b) B-BBEE Sub-contract Expenditure Report (Annex 4)
c) Joint Venture Expenditure Report (Annex 5)
d) Targeted Labour Contract Participation Expenditure Report (Annex 6)
e) Asset Register (Form will be provided to successful bidder)

The Monthly Project Labour Report must include details of all labour (including that of sub-contractors) that are South African citizens earning less than R300.00 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 employment contracts entered into with such labour, together with copies of identification documents 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.

Monthly Project Labour Reports shall be completed and submitted in accordance with the instructions therein.

The B-BBEE Sub-contract Expenditure Report is required for monitoring the prime contactor's compliance with condition 2 of Section 2 of Schedule 18 Preferencing Schedule where preferences are granted in respect of B-BBEE contribution, in Part T.2.2 Returnable Schedules, where the Tenderer/Contractor has declared in Section 5 of Returnable Schedule 18 that "I/we **DO NOT** intend sub-contracting more than 25% of the value of the contract to sub-contractor's that do not qualify for at least the points that I/we as prime contractor qualify for".

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 of Clause 2.6 below.

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

The Unbundling Asset Register of all the new equipment must be provided to the Employer. The Unbundling Asset Register form will be provided by to die Employer at the end of the project.

In respect of Annexes 4 and 5, the Employer shall, in addition to any other sanctions available to it, apply the financial penalties applicable to breach of preferencing conditions in Returnable Schedule 18 Preferencing Schedule in Part T2.2 Returnable Schedules. In the case of joint ventures (Annex 5), the contractor shall prove his compliance with item 6) in Section 2 of the Preferencing 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 the alleviation of poverty through the creation of employment opportunities, 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 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 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 the contract, failing which, penalties as described will be applied.

The specified minimum targeted labour contract participation goal (CPG_L) is **100 %**

The minimum CPG_L 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 CPG_L.

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 of LANGEBERG.

"Targeted labour contract participation goal (CPG_L)" 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 R300.00 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 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 though 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 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:

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

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.

3.5.2.7 Community Liaison Officer

It is a requirement of this Contract that a Community Liaison Officer (CLO) shall be appointed by the Contractor. The primary functions of the CLO shall be to assist the Contractor with the selection and recruitment of targeted labour, to represent the local community in matters concerning the use of targeted labour (and/or enterprises) on the works, and to assist with and facilitate communication between the Contractor, the Engineer and the local communities.

The identification of suitable candidates (maximum 5; minimum 3) for the CLO position shall be resolved by the relevant Ward Councillor/s. Should suitable candidates not be identified within two weeks of the date of request, the Contractor shall be allowed to seek candidates from the relevant Sub-Council Job-Seekers Database. The final selection and appointment of the CLO in terms of the contract shall be the responsibility of the Contractor.

The period of appointment of the CLO shall be as stated in the Contract for Temporary Employment as a Community Liaison Officer referred to below. The date of commencement of temporary employment of the CLO shall be as agreed with the Engineer.

It is required, therefore, that the Contractor enter into a contract of temporary employment with the selected CLO, the contracting parties being the Contractor and the CLO. To this end, a specimen Form of Contract of Temporary Employment as Community Liaison Officer is included in this document (Part C1.8: Agreement and Contract Data). This Form of Contract sets out, inter alia, the agreement between the parties, the duties and conditions of employment of the CLO (including the rate of remuneration to be paid). As said contract will be between the Contractor and the CLO, all costs involved shall be borne by the Contractor and the tender shall be deemed to include for this

3.5.3 PARTICIPATION OF TARGETED ENTERPRISES

Not a requirement of this contract

3.5.4 HEALTH AND SAFETY

The Construction Health and Safety Specification is attached as Annexure 1 to this document

3.5.5 ENVIRONMENTAL MANAGEMENT PLAN

The Construction Environmental Management Plan is attached as Annexure 2 to this document.

C3.6 ANNEXES

CONTENTS

Annex 1: Construction Health and Safety Specification
Annex 2: Construction Environmental Management Plan
Annex 3: Monthly Project Labour Report
Annex 4: B-BBEE Sub-contract Expenditure Report
Annex 5: Joint Venture Expenditure Report
Annex 6: Targeted Labour Contract Participation Expenditure Report
Annex 7: Schedule of Plant and Materials
Annex 8: Mechanical Data Sheets
Annex 9: Mechanical Standard Specifications

ANNEX 1: CONSTRUCTION HEALTH AND SAFETY SPECIFICATION

safe working practice
OCCUPATIONAL HEALTH AND SAFETY GROUP

Project Health and Safety Specification

In terms of Construction Regulations 2014

Project Client

LANGEBERG MUNICIPALITY

Description of Project Works

UPGRADING OF ROBERTSON WASTE WATER TREATMENT WORKS

Project Location

ROBERTSON

Preparation Date

JUNE 2022

Project Health and Safety Specification developed by:

Mark Winter PrCHSA, (SACPCMP)
Safe Working Practice (Cape Town) Pty Ltd
Cell: 071 603 2213
Tel: 021 701 0470
Email: markw@safepractice.co.za

PROJECT HEALTH AND SAFETY SPECIFICATION

TABLE OF CONTENTS

1. Specific Project Information

1.1 Introduction and Definitions
1.2 Background to the Health and Safety Specification
1.3 Purpose of the Health and Safety Specification
1.4 Implementation of the Health and Safety Specification
1.5 Project Directory
1.6 Project Details
1.7 Existing Environment
1.8 Available Drawings
1.9 Project Health and Safety Requirements
1.10 Interface and Restrictions by Client
1.11 Project Close Out
1.12 Safety File Return to Client

2. Further Requirements

2.1 Duties of Principal Contractor / Contractor in terms of Construction Regulations 2014
2.2 Management and Supervision of Construction Work
2.3 Notification of Intention to Commence Construction Work
2.4 Construction Work Permit
2.5 Assignment of Contractor's Responsible Persons to Manage Health and Safety on Site
2.6 Competency for Contractor's Responsible Persons
2.7 Compensation of Occupational Injuries Act 130 of 1993 (COIDA)
2.8 Occupational Health and Safety Policy
2.9 Health and Safety Organogram
2.10 Risk Assessments
2.11 Health and Safety Representative(s)
2.12 Health and Safety Committee
2.13 Medical Certificate of Fitness
2.14 Health and Safety Training
2.14.1 Induction
2.14.2 Awareness
2.15 Competency
2.16 General Record Keeping
2.17 General Inspection, Monitoring and Reporting
2.18 Emergency Procedures
2.19 First Aid Box and First Aid Equipment
2.20 Accident / Incident Reporting and Investigation
2.21 Hazards and Potential Situations
2.22 Occupational Health and Safety Signage
2.23 Management of Contractors by Principal Contractor
2.24 Stacking of Materials
2.25 Housekeeping and General Safeguarding on Construction Sites
2.26 Construction Vehicles and Mobile Plant
2.27 Electrical Installations and Machinery on Construction Sites
2.28 Use and Temporary Storage of Flammable Liquids on Construction Sites
2.29 Water Environments

2.30 Fire Precautions on Construction Sites
2.31 Construction Employees' Facilities
2.32 Fall Protection
2.33 Temporary Works
2.34 Excavation
2.35 Demolition Work
2.36 Tunnelling
2.37 Scaffolding
2.38 Bulk Mixing Plant
2.39 Rope Access Work
2.40 Hazardous Chemical Substances (HCS)
2.41 Noise Induced Hearing Loss
2.42 Explosives and Blasting
2.43 Personal Protective Equipment (PPE)
2.44 Asbestos
2.45 Pressure Vessels (Including Gas Bottles)
2.46 Fire Extinguishers and Fire Fighting Equipment
2.47 Lifting Machinery and Tackle
2.48 Ladders and Ladder Work
2.49 General Machinery
2.50 Portable Electrical Tools
2.51 High Voltage Electrical Equipment
2.52 Public Health and Safety
2.53 Night Work
2.54 Environmental Conditions and Flora and Fauna
2.55 Occupational Health
2.56 Suspended Platforms
2.57 Material Hoists
2.58 Explosive Actuating Fastening Devices
2.59 Confined Spaces
2.60 Alcohol and Drugs
2.61 COVID-19
2.62 General Practices when Working at Heights
2.63 Traffic Management
2.64 Ventilation and Lighting in the Work Place
2.65 Nuclear Density Gauge (Troxler)
2.66 Ergonomics Regulation of 2019

Annexure A Requirements for the Safety Plan Assessment

Annexure B Legal Appointments

Annexure C Baseline Risk Assessment

Annexure D Baseline Risk Assessment for Project – COVID-19

Annexure E Safety Specification and Baseline Risk Assessment Issue Register

1.0 SPECIFIC PROJECT INFORMATION

1. 1 INTRODUCTION AND DEFINITIONS

THE REQUIREMENTS OF THE CONSTRUCTION REGULATIONS 2014 (AND GUIDANCE NOTES OF 2017) HAVE BEEN IN EFFECT SINCE 7TH AUGUST 2014. THE REGULATIONS PLACE LEGAL DUTIES UPON PRINCIPAL CONTRACTORS AND CONTRACTORS. ALTHOUGH THIS HEALTH AND SAFETY SPECIFICATION INCLUDES MUCH OF THE CONTENT OF THE REGULATIONS, THE CONTRACTOR WILL BE DEEMED TO BE FAMILIAR WITH THE REQUIREMENTS OF THESE REGULATIONS, AND OTHER ASSOCIATED HEALTH AND SAFETY REGULATIONS, AND TO HAVE FACTORED IN ALL THE DUTIES PLACED UPON CONTRACTORS AND PRINCIPAL CONTRACTORS IN THE TENDER. A COPY OF THE REGULATIONS CAN BE VIEWED ON THE DEPARTMENT OF LABOUR'S WEBSITE.

PLEASE NOTE THAT THE TERMS "CONTRACTOR" AND "PRINCIPAL CONTRACTOR" HAVE THE SAME MEANING AS THAT IN THE CONSTRUCTION REGULATIONS AND ARE USED INTERCHANGEABLY IN THIS DOCUMENT, I.E., REFERENCES TO "CONTRACTOR" REFER TO PRINCIPAL CONTRACTOR AND/OR CONTRACTOR AS THE REGULATIONS PERTAIN TO THEIR FUNCTIONS.

This Health and Safety Specification contains clauses that are generally applicable to construction activities, as well as imposing pro-active controls associated with activities that impact on Health and Safety as it relates to work on site. Compliance to the requirements of the Occupational Health and Safety Act 1993 is an additional requirement of this Health and Safety Specification and is part of the Contractor's responsibility. The Client, and/or their agents, will monitor that all Contractors comply with the requirements of such legislation.

ALL REFERENCES TO CLIENT IN THIS HEALTH AND SAFETY SPECIFICATION ALSO REFER TO SAFETY AGENT, WHERE SO APPOINTED.

Definitions (as per the Construction Regulations 2014) applicable to this Health and Safety Specification:

"agent" means a competent person who acts as a representative for a Client;

"angle of repose" means the steepest angle of a surface at which a mass of loose or fragmented material will remain stationary in a pile on the surface, rather than sliding or crumbling away;

"bulk mixing plant" means machinery, appliances or other similar devices that are assembled in such a manner so as to be able to mix materials in bulk for the purposes of using the mixed product for construction work;

"client" means any person for whom construction work is being performed;

"competent person" means a person who has, in respect of the work or task to be performed, the required knowledge, training and experience and, where applicable, qualifications, specific to that work or task: Provided that where appropriate qualifications and training are registered in terms of the provisions of the National Qualification Framework Act, 2000 (Act No.67 of 2000), those qualifications and that training must be regarded as the required qualifications and training; and is familiar with the Act and with the applicable regulations made under the Act;

"construction manager" means a competent person responsible for the management of the physical construction processes and the coordination, administration, and management of resources on a construction site;

"construction site" means a workplace where construction work is being performed;

"construction supervisor" means a competent person responsible for supervising construction activities on a construction site;

"construction vehicle" means a vehicle used as a means of conveyance for transporting persons or material, or persons and material, on and off the construction site for the purposes of performing construction work;
"construction work" means any work in connection with -

- the construction, erection, alteration, renovation, repair, demolition or dismantling of or addition to a building or any similar structure; or
- the construction, erection, maintenance, demolition or dismantling of any bridge, dam, canal, road, railway, runway, sewer or water reticulation system; or the moving of earth, clearing of land, the making of excavation, piling, or any similar civil engineering structure or type of work;

"construction work permit" means a document issued in terms of regulation 3;

"contractor" means an employer who performs construction work;

Note:
a) Includes organisations and or self-employed person that contracts with a client, principal contractor, or a contractor to carry out construction work.

"demolition work" means a method to dismantle, wreck, break, pull down or knock down of a structure or part thereof by way of manual labour, machinery, or the use of explosives;

"design" in relation to any structure, includes drawings, calculations, design details and specifications;

"designer" means a competent person who-

- prepares a design;
- checks and approves a design;
- arranges for a person at work under his or her control to prepare a design, including an employee of that person where he or she is the employer; or
- designs temporary work, including its components;
- an architect or engineer contributing to, or having overall responsibility for a design;
- a building services engineer designing details for fixed plant;
- a surveyor specifying articles or drawing up specifications;
- a contractor carrying out design work as part of a design and building project; or
- an interior designer, shop-fitter, or landscape architect;

"ergonomics" means the scientific discipline concerned with the fundamental understanding of interactions among humans and other elements of a system, and the profession that applies theory, principles, data, and methods to design in order to optimise human well-being and overall system performance;

"excavation work" means the making of any man-made cavity, trench, pit or depression formed by cutting, digging or scooping;

"explosive actuated fastening device" means a tool that is activated by an explosive charge and that is used for driving bolts, nails, and similar objects for the purpose of providing fixing;
"fall arrest equipment" means equipment used to arrest a person in a fall, including personal equipment, a body harness, lanyards, deceleration devices, lifelines, or similar equipment;

"falsework" means a combined system of formwork and support work;

"formwork" means temporary or permanent shutters used to form wet concrete into elements of a structure, and includes both horizontally and vertically placed shutters;

"fall prevention equipment" means equipment used to prevent persons from falling from a fall risk position, including personal equipment, a body harness, lanyards, lifelines or physical equipment such as guard-rails, screens, barricades, anchorages or similar equipment;

"fall protection plan" means a documented plan, which includes and provides for -

- all risks relating to working from a fall risk position, considering the nature of work undertaken;
- the procedures and methods to be applied in order to eliminate the risk of falling; and
- a rescue plan and procedures;

"fall risk" means any potential exposure to falling either from, off or into;
"health and safety file" means a file, or other record containing the information in writing required by these Regulations;

"health and safety plan" means a site, activity or project specific documented plan in accordance with the Client's health and safety specification;

"health and safety specification" means a site, activity or project specific document prepared by the Client pertaining to all health and safety requirements related to construction work;
"material hoist" means a hoist used to lower or raise material and equipment, excluding passengers;

"medical certificate of fitness" means a certificate contemplated in regulation 7(8);

"mobile plant" means any machinery, appliance or other similar device that is able to move independently, and is used for the purpose of performing construction work on a construction site;

"National Building Regulations" means the National Building Regulations made under the National Building Regulations and Building Standards Act, 1977 (Act No. 103 of 1977), and promulgated by Government Notice No. R. 2378 of 30 July 1990, as amended by Government Notices No's R. 432 of 8 March 1991, R. 919 of 30 July 1999 and R. 547 of 30 May 2008;

"person day" means one normal working shift of carrying out construction work by a person on a construction site;

"principal contractor" means an employer appointed by the Client to perform construction work;

"Professional Engineer or Professional Certificated Engineer" means a person holding registration as either a Professional Engineer or Professional Certificated Engineer in terms of the Engineering Profession Act, 2000 (Act No. 46 of 2000);

"Professional Technologist" means a person holding registration as a Professional Engineering Technologist in terms of the Engineering Profession Act, 2000;

"provincial director" means the provincial director as defined in regulation 1 of the General Administrative Regulations, 2003;

"scaffold" means a temporary elevated platform and supporting structure used for providing access to and supporting workmen or materials or both;

"shoring" means a system used to support the sides of an excavation and which is intended to prevent the cave-in or the collapse of the sides of an excavation;

"structure" means-

- any building, steel or reinforced concrete structure (not being a building), railway line or siding, bridge, waterworks, reservoir, pipe or pipeline, cable, sewer, sewage works, fixed vessels, road, drainage works, earthworks, dam, wall, mast, tower, tower crane, bulk mixing plant, pylon, surface and underground tanks, earth retaining structure or any structure designed to preserve or alter any natural feature, and any other similar structure;
- any falsework, scaffold or other structure designed or used to provide support or means of access during construction work; or
- any fixed plant in respect of construction work which includes installation, commissioning, decommissioning, or dismantling and where any construction work involves a risk of a person falling;

"support work" means the temporary structure erected to support the formwork before the casting of a concrete element of a structure.

"suspended platform" means a working platform suspended from supports by means of one or more separate ropes from each support;

"temporary works" means any falsework, formwork, support work, scaffold, shoring or other temporary structure designed to provide support or means of access during construction work;

"the Act" means the Occupational Health and Safety Act, 1993 (Act No. 85 of 1993);

"tunnelling" means the construction of any tunnel beneath the natural surface of the earth for a purpose other than the searching for or winning of a mineral.

Reference should be made to the following documentation in conjunction with this Safety Specification (including existing surveys, drawings, and reports):

- Tender documents
- Drawings

IMPORTANT NOTE:
This Health and Safety Specification has been prepared to comply with the requirements of the Construction Regulations 2014.

1.2 BACKGROUND TO THE HEALTH AND SAFETY SPECIFICATION

Historically, the Construction Industry has had a poor health and safety record. Due to the complex and potentially dangerous operations being undertaken, there is a high risk of incidents, accidents, and injuries. In many instances poor adherence to the Act and Regulations has resulted in severe consequences for Health and Safety performance. The Client is determined that the highest Health and Safety standards will prevail throughout the Contract and that there will be full commitment from all parties involved.

To achieve this goal the Client has arranged for the preparation of this Health and Safety Specification. The Health and Safety Specification sets out guidelines and minimum levels of awareness and guidance for Health and Safety requirements for the project. Contractual responsibility for adhering to these requirements rests with the Contractors. All employees are encouraged to be pro-active in compliance.

The Client is committed to ensuring the highest Health and Safety standards for all work undertaken within the Contract.

Contractors as employers are fully responsible and accountable for compliance with all Health and Safety requirements.

IMPORTANT NOTE:

Compliance with the Occupational Health and Safety Act and Regulations shall not be limited to this Health and Safety Specification and definitions contained in this document.

Contractors shall be conversant with the requirements and effects of Health and Safety legislation upon their activities, in particular the Construction Regulations, 2014, and the Occupational Health and Safety Act, 1993, and to have made adequate resource in their tender submission to comply with all legislative requirements.

Failure to comply with the requirements of this Safety Specification will result in severe sanction and the severity of the sanction will depend on the severity of the noncompliance.

The Contractor's personnel will be responsible for the auditing of the implementation of the Health and Safety Specification and maintaining the document control and record systems associated with the Health and Safety Specification. The Client will arrange for Health and Safety audits to be conducted on site on their behalf to monitor health and safety compliance by contractors.

1.3 PURPOSE OF THE HEALTH AND SAFETY SPECIFICATION

The purpose of this site-specific Health and Safety Specification is to comply with legal requirements and to provide health and safety information about specific project risks known by the Client, Designer and Safety Agent to be applicable to this project. This document also provides minimum health and safety requirements, standards, and expectations that the contractor must adhere to.

The Contractor must take into account all information in this specification and ensure that their tenders include adequate resource and competence to deal with the matters detailed herein so that all relevant contents are dealt with in a way which is in compliance with legislation and the ethical concerns for the safeguarding of employees, contractors and other persons affected by the construction activities. Please note that a detailed OHS bill of quantities must be provided by the contractor on all Construction Work Permit projects. The Bill of Quantities will form part of the Construction Work Permit appellation presented to Department of Labour for approval.

The Health and Safety Specification will be implemented during construction of the works and any construction activity that the Client has control over.

This will also assist in ensuring that all the costs related to the compliance with Occupational Health Act 85 of 1993 and the Construction Regulations 2014, as well as this Health and Safety Specification, are taken into consideration at Tender stage.

No advice, approval of any document required by the Health and Safety Specification such as hazard identification and risk assessment action plans or any other form shall be construed as an acceptance by the Client of any obligation that absolves the Contractor from achieving the required level of performance and compliance with legal requirements.

Further, there is no acceptance of liability by the Client which may result from the Contractor failing to comply with the Health and Safety Specification unless the Client has issued an instruction to any requirement, i.e. the Contractor remains responsible for achieving the required performance levels.

1.4 IMPLEMENTATION OF THE HEALTH AND SAFETY SPECIFICATION

This Health and Safety Specification forms an integral part of the Contract, and Contractors shall make it an integral part of their Contracts with other Contractors and Suppliers. Contractors employed by the Client are to ensure that the provisions of the Health and Safety Specification are applied both on the site and in respect of all off site activities relating to the project, in particular in transport activities and project dedicated off site fabrication works.

The Contractor shall enforce the provisions of the Health and Safety Specification amongst all Contractors and suppliers for the project.

The Contractor shall sign the acknowledgment on the last page of this safety specification that he/she has familiarized him/herself with the content of the Health and Safety Specification and shall comply with all obligations in respect thereof.
The successful Contractor will be required to compile a Health and Safety Plan based on the requirements of the Occupational Health Act 85 of 1993 and these Specifications, which will need to be approved by Client (or their appointed safety agent) prior to commencement with construction work.

1.4.1 Client Duties

In terms of the Construction Regulations 2014 the Client (or their Agent, where appointed) has legal duties. Where an Agent (refer to "definitions" section of this document) is appointed in terms of this project, these Health and Safety duties assigned will also apply.

All references to "Client" will apply to their appointed "Safety Agent", where so appointed, in this Health and Safety Specification.

The Client must:

- Prepare a baseline risk assessment for the construction work
- Prepare a suitable, sufficiently documented, and coherent site specific Health and Safety specification for the intended construction work, based on the baseline risk assessment
- Include the health and safety specification in the tender documents
- Ensure that potential principal contractors submitting tenders have made adequate provision for the cost of health and safety measures
- Ensure that the principal contractor to be appointed has the necessary competencies and resources to carry out the construction work safely
- Take reasonable steps to ensure co-operation between all contractors appointed by the Client to enable each of those contractors to comply with the regulations
- Ensure, before work commences, that every principal contractor is registered and in good standing with the compensation fund, or with a licensed compensation insurer as contemplated in the Compensation for Occupational injuries and Diseases Act, 1993 (Act no 130 of 1993)
- Appoint each principal contractor in writing for the project, or part thereof
- Discuss and negotiate with the principal contractor the contents of the principal contractor's safety plan and thereafter finally approve that plan for implementation
- Ensure that a copy of the principal contractor's health and safety plan is implemented and maintained
- Ensure that periodic health and safety audits and document verification are conducted at intervals mutually agreed upon between the principal contractor and any contractor, but at least once every 30 days
- Ensure that a copy of the health and safety audit report is provided to the principal contractor within 7 days after the audit
- Stop any contractor from executing a construction activity which poses a threat to the health and safety of persons which is not in accordance with the principal contractor's health and safety plan for site
- Where changes are brought about to the design or construction work, make sufficient health and safety information and appropriate resources available to the principal contractor to execute the work safely
- Ensure that the health and safety file is kept and maintained by the principal contractor.
- Where the Client requires additional work to be performed as a result of a design change or error in construction due to the actions of the Client, the Client must ensure that sufficient safety information and appropriate additional resources are available to execute the required work safely.
- Where more than one principal contractor is appointed, the Client must take reasonable steps to ensure co-operation between all principal contractors and contractors to ensure compliance with the Regulations
- Where the Client has appointed a Safety Agent for the project, their details for this project are contained in the Project Directory section of this health and safety specification.

1.4.2 Designer Duties

It must be noted that the Designer also has Health and Safety duties assigned in terms of the Construction Regulations. Where the contractor fulfils a design function in terms of this project (refer to "definitions" section of this document), these duties will also apply. Please refer to Regulation 6 of the Construction Regulations 2014.

Please note that the designer of temporary works must ensure that:

- all temporary works are adequately designed so that it will be capable of supporting all anticipated vertical and lateral loads that may be applied;
- the designs of temporary works are done with close reference to the structural design drawings issued by the contractor, and in the event of any uncertainty consult the contractor;
- all drawings and calculations pertaining to the design of temporary works are kept at the office of the temporary works designer and are made available on request by an inspector; and
- the loads caused by the temporary works and any imposed loads are clearly indicated in the design.

1.5 PROJECT DIRECTORY		
Project Client **Contact Person**	Langeberg Municipality Maynard Johnson	**Tel:** 082 771 6613 **Email:** mjohnson@langeberg.gov.za
Project Manager **Contact Person**	WEC-Consult Francois Harris	**Tel:** 021 886 6895 **Cell:** 072 580 2729 **Email:** harris@wec-consult.co.za
Civil Engineer **Contact Person**	WEC-Consult Francois Harris	**Tel:** 021 886 6895 **Cell:** 072 580 2729 **Email:** harris@wec-consult.co.za
Structural Engineer **Contact Person**	WEC-Consult Francois Harris	**Tel:** 021 886 6895 **Cell:** 072 580 2729 **Email:** harris@wec-consult.co.za
Mechanical Engineer **Contact Person**	WEC-Consult Francois Harris	**Tel:** 021 886 6895 **Cell:** 072 580 2729 **Email:** harris@wec-consult.co.za

1.5 PROJECT DIRECTORY		
Electrical Engineer	WEC-Consult	**Tel:** 021 886 6895 **Cell:** 082 899 1499
Contact Person	Gordon Jacobs	**Email:** gordon@eng-x.co.za
Construction Safety Agent	Safe Working Practice	**Tel:** 021 701 0470 **Cell:** 071 603 2213
Contact Person	Mark Winter	**Email:** markw@safepractice.co.za

OTHER PARTIES DIRECTORY	
Department of Labour WESTERN CAPE – Fezeka Ngalo	**Tel:** 021 441 8158 **e-mail:** fezeka.ngalo@labour.gov.za **Cell:** 083 365 0681
Telecommunications, Water, Gas and Electricity Contractor to apply for and refer to wayleave information from service providers for the nature and location of services. Refer all queries Project Manager.	
COVID-19 Hotlines **National Coronavirus Hotline** **Provincial Coronavirus Hotline**	 **Tel:** 0800 029 999 **Tel:** 021 928 4102

1.6 PROJECT DETAILS

Description of Works

Upgrading of Robertson WWTW, including:

- Construction of a new Inlet Works Complete with all related mechanical and electrical equipment
- Construction of a new MLE reactor with all related mechanical and electrical equipment
- Construction of a new SST's Division box with sluice gates
- Construction of a new RAS Pump Station with all related mechanical and electrical equipment
- Construction of a 24m diam. secondary settling tank with rotating bridges and all related mechanical and electrical equipment
- Construction of new Dewatering Building with office building complete with all related mechanical and electrical equipment

- Construction of a new MCC and Generator building with a new generator and with all related mechanical and electrical equipment
- Demolishing of existing structures
- Supply and installation of all related Mechanical and Electrical Equipment to all new structures
- All interconnecting pipework
- Construction of Roadworks and Stormwater
- Construction of Various small structures
- Construction of New Security Fence

This description of the works is not necessarily complete and shall not limit the work to be carried out by the Contractor under this Contract.

Anticipated Construction Duration
30 months

Provisional Start Date
Provisionally September 2022

Provisional Completion Date
Provisionally May 2025

Construction Work Permit Required for the Project?
Yes

1.7 EXISTING ENVIRONMENT

Hazards particular to this project by virtue of location:

Live services present on site – Overhead and underground services.
Municipal operational staff may be present in the old plant area.
Snakes may be present on site
Site is adjacent to existing WWTW with raw sewage present.
Asbestos not known to be an existing risk – contractor to report presence of asbestos exposure if encountered
Work next to sewage containing structures.
Existing chlorine gas contained in existing pipeline – possible exposure risk to chlorine gas.

Overhead, Above Ground and Underground Services crossing the site:

Overhead: Electrical ESKOM cables present.

Underground: Existing water pipeline and electrical cable.

Ground level: Principal Contractor to check site area and take precautions against causing damage to such services or prevent risk of injury to staff through inadvertent contact with live services..

Service Drawings available: Yes.

Wayleaves required: No

Permits required: TBA, will be required at least if working in vicinity of overhead electrical cables.

Isolations required: yes, for connection with raw sewage. Refer to project manager is required for mechanical and electrical commissioning.

Existing structures on site and surrounding land use (with a significant impact on Health & Safety):

Site located adjacent to an existing wastewater treatment works.
Existing WWTW Premises are fenced and gated, no access control.
Existing WWTW is manned by municipal staff on site.
Typical WWTW structures located on site.
Surrounding land use is rural.

Existing ground conditions and ground survey report:

- No Geotechnical investigation report available.
- Geotechnical queries to be referred to project manager.

Existing Traffic Systems

Condition: Existing two way gravel road access to WWTW.

Restrictions to access: None known.

Speed restrictions: 20kph max on site.

1.8 AVAILABLE DRAWINGS

Refer to tender documentation.

1.9 PROJECT HEALTH AND SAFETY REQUIREMENTS

Significant health and safety hazards identified by Designer and Safety Agent:

Use of delivery or support trucks used for the delivery and removal of material and equipment on open roadways – plant must be effectively separated from members of public and unauthorised personnel. Flag persons wearing high visibility clothing to be in place as required. Exclusion zone to be in operation when the support vehicles are in use next to the roadways.

Any **plant** that will be moving in or around the road must be made visible at all times. Parking of this plant must be strictly monitored by the contractor at all times. Use flag persons as applicable. Plant must be effectively separated from members of public and unauthorised personnel.

Members of the public – Municipal operational staff may be present in the site area interface. It must be noted that the health and safety of clients personnel and other members of public and road users must be a priority at all times and all necessary steps must be taken to prevent unauthorised entry to site and to protect members of the public from any dangers associated with the construction works being undertaken. Note that separation of municipal employees from construction works may be required. The contractor is required to make all reasonable efforts to ensure that municipal employees working in construction areas are inducted, wear PPE and escorted if they work or visit the construction works area.

Please note that 1.8m fencing panels will be required to be installed by the contractor for the unfenced areas (New inlet works fall outside existing fence line).

Existing roads will remain open during works. This is a critical hazard to traffic/members of public and to workers in the road who must have high visibility clothing on at all times. Safety of road users and workers is crucial and must be managed by Principal Contractor. The Principal Contractor is responsible

for the directional signage to divert pedestrian members of the public and road users.

Crime and security – Contractor must take appropriate precautions against possibility of crime, theft, protest action or intimidation by members of the public.

Contact with sewage (including working with raw sewage on the switchover) **–** hepatitis and tetanus inoculations required. Good level of ablutions to be provided for workers, including water reservoir with soap in ablution facilities. Adequate and suitable PPE to be provided. Contractor to liaise with client and professional team re provision of shower facilities in event of substantial contact with sewage.

Working at height up to 8m and use of scaffolding – all access equipment to be built and maintained in a safe condition by competent and trained personnel. All scaffold and formwork structures must be built as per the SANS Regulations. This must be assessed by the contractor and method statements for these activities to be submitted for approval prior to work commencement. A Fall Protection Plan and Rescue Plan will be required for approval prior to commencement of any activities at height. All workers must have Fall Protection Plan training in the form of a toolbox talk with a signed register of attendance. Workers working at height must have appropriate and sufficient safety equipment. Safety harnesses with securely attached lanyards must be worn in areas where safety while working at height cannot be assured by other means. Edge protection in the form of guard rails and toe boards must be in place to prevent materials and people from falling.

Demolition - must be undertaken by competent workers under supervision. A method statement will be required for the works. Dust and noise will be an important factor. PPE to be worn.

Temporary works – all temporary work must be designed by competent temporary works designers and constructed and inspected by competent personnel at the appropriate intervals as required by legislation and good practice and site circumstances. Results to be entered into register on site. All temporary works structures must be adequately erected, supported, braced and maintained by a competent person so that they are capable of supporting all anticipated vertical and lateral loads that may be applied to them. No loads to be imposed onto the structure that the structure is not designed to withstand.

Noise and Dust control: Measures to be put in place by the appointed contractor to minimize the dust and noise on site. Contractor must take sufficient steps to reduce the production of noise and dust.

Warning Notices: Construction warning signage must be prominently displayed to avoid access to site areas by unauthorised persons.

Risk of fires caused by construction works and / or Smoking – ensure correct measures are in place for fire control to ensure no fires will break out. Fire extinguishing equipment to be readily available at all times especially during high risk activities. The smoking of cigarettes is also to be monitored and adequate smoking areas and smoking control measures to be put in place.

Live services – Existing overhead and underground services present in the works areas. All necessary precautions must be taken to prevent accidental contact with these services. All services to be treated as live. There will be mechanical and electrical works carried out on the project. Commissioning of electrical equipment will be required. Electrical work may only be undertaken after the requisite isolations and permits have been obtained and all required safety measures are in place. All required personal protective equipment must be worn. Live commissioning may only be undertaken by trained and competent Contractor's personnel who are authorised and supervised by competent personnel provided by the Contractor, and, if so identified, the project client and professional team. There is a risk of electrocution if adequate control measures are not in place by the contractor.

Hot works – All hot works will require a method statement. A permit to use equipment is required after it has been inspected and found to be in good condition and task specific documents are be in

place. All hot works will require a fire extinguisher at less than 20 meters on hand.

Use of hazardous substances – MSDS to be available. Contractor must exercise caution as there is always a potential for fires. Suitable fire extinguisher to be in place at all times. Gloves and suitable respiratory protection must be provided and worn as well as other appropriate personal protective equipment (PPE) required by risk assessments.

Note that there may be exposure to chlorine gas during the works. The contractor must provide proof of purging the of existing system or alternate means of safeguarding workforce from risk to chlorine gas exposure.

Lifting Operations – all operators must provide copies of their up to date competency and medical certificates and driver's license. Loads must be slung by person with appropriate training and competence. Daily plant inspection registers to be completed and records kept in the safety file. Valid load test certificates and record of inspections by competent personnel must be available and maintained throughout the project. Rotating amber lights and reverse alarms to be active when operating all plant on site. Plant must be effectively separated from members of public and unauthorised personnel. Use trained flag persons as applicable. Exclusion zone under lifting operations to be enforced as applicable. Particular attention must be paid to lifting operations in windy conditions.

Excavations – Max depth 5m. **Shoring or battering (sloping of excavation sides) to be used –** method statement to be in place. All workers must receive induction prior to commencement of works. Excavations must be adequately supported, braced and maintained by a competent person so that they are capable of supporting all anticipated vertical and lateral loads that may be applied to them. Support mechanisms to be of sufficient design, durability and strength to prevent any excavation edges from collapsing. **Excavations must be backfilled by end of each shift as far as is reasonably practicable**. If this cannot be done then appropriate safety measures must be put in place by the contractor to prevent unauthorised entry to excavations, including barriers and warning signage. Ensure there is a safe distance between employees and plant when digging excavations.

- ALL EXCAVATIONS MUST HAVE PROPER BARRIERS IN PLACE.
- Red & white danger tape is not permitted for securing excavated areas.
- Excavated soil is to be placed at a sufficiently safe distance from the excavation itself.

Confined spaces (manholes) – there will be working in manholes and similar confined spaces **–** confined space work must be monitored by a competent appointed person. Prior to entry, ensure that confined space is sufficiently ventilated. Oxygen levels to be tested in confined space to ensure that it is safe for entry. Personal protective equipment to be worn (such as proper masks) if air supply insufficient or not of sufficient quality. Emergency procedures to be in place. Sufficient training must take place in use of equipment prior to any works commencing in such confined space. Permit system to be in place to declare confined space safe for entry. Please note that a lock out system must be in place, with chains on the sluice gates to prevent water from entering the sumps while personnel are working inside.

COVID-19 – The Principal Contractor is to review and implement measures for the safety management, hygiene & health procedures, protocols and practices, informing employees, monitoring and compliance with all Governmental Decrees regarding the management of the COVID-19 situation.

Strict COVID 19 control measures by the Principal Contractor is to be implemented.

Other construction hazards that the contractor can reasonably expect are as follows:
Flammable Liquids / Gas
Hot Works
Snakes
Compacting and Filling
Compactor Operations

Cutting Off Disc
Electric Tools and Electrical Installations
Hand tools
Manhole Rings and Pipes Storage
Manual Handling of General Items
Site Strip
Troxler Use
Working at Height (excluding scaffold)

NOTE: Please refer to end of this Health and Safety Specification for the baseline risk assessment for these hazards and risks.

ACTIVITIES REQUIRING APPROVED METHOD STATEMENTS (FOR HEALTH AND SAFETY & COVID-19)

Pre-Construction Phase Method Statements

- Site establishment

Construction Phase Method Statements

- Confined Space working
- Work at heights
- Demolition
- Working in deep excavations

Other method statements required will be asked for during the project by the professional team, as applicable.

ACTIVITIES REQUIRING PERMITS (FOR HEALTH AND SAFETY PURPOSES)

Permit to Dig: Where applicable, Principal Contractor to approach service providers.

Permit to Enter Excavations: The Principal Contractor is to formally manage all excavation work.

Road Works Permit: The Principal Contractor to liaise with the professional team.

Permit to Work with Electricity: The Principal Contractor to liaise with the professional team.

Confined Space Permit: The Principal Contractor is to formally manage all confined space work.

Hot Works Permit: The Principal Contractor is to formally manage all hot work.

Permit to Work under Power Lines: The Principal Contractor is to formally manage all works under power lines.

Blasting: not thought to be applicable.

Temporary Works: The Principal Contractor is to formally manage all temporary work.

CONTRACTOR SAFETY OFFICER PROVISION

Records of safety audits undertaken by the Contractor's Safety Officer must be kept on site in the safety file and nonconformances reported by the Safety Officer to the Contractor's management team. All nonconformances identified by the Safety Officer and client's safety agent must be investigated and corrective action taken by the Contractor to prevent re-occurrence.

Please note that as from 7th August 2018 the safety officer must be professionally registered with the SACPCMP. Proof of registration with the SACPCMP must be provided.

If registered as a Candidate proof of mentorship and weekly visits by mentor must be available on site.

The requirement for this site is that a full time Safety Officer be appointed by the Contractor for the duration of the project.

MEDICAL CERTIFICATE OF FITNESS (ANNEXURE 3)

The contractor must ensure that their employees on site have a valid medical certificate of fitness, specific to the construction work being performed, issued by an occupational health practitioner in the form of an Annexure 3 template.

MANAGEMENT AND SUPERVISION OF CONSTRUCTION WORK

A principal contractor must, in writing, appoint one full-time competent person as the construction manager with the duty of managing all the construction work on a single site, including the duty of ensuring occupational health and safety compliance, and in the absence of the construction manager an alternate competent person must be appointed by the principal contractor. Proof of an all-inclusive assessment by the Principal Contractor of the Construction Manager's Competency in construction management and health and safety competency must be available in the Safety File.

The Construction Manager, Alternate Construction Managers, Assistant Construction Managers, and designated construction supervisor/s must, as a minimum, have training in Legal Liability, Construction Regulation 2014 and the OHS Act and Regulations.

TRAFFIC MANAGEMENT AND TRAFFIC SAFETY OFFICER PROVISION

No traffic management plan or TSO will be required for the works.

ENVIRONMENTAL CONDITIONS

Contractor must take into account adverse weather conditions on site activities and implement control measures to mitigate risk. This includes risk of exposure to excessive heat, cold, rain, lightning and wind.
The open nature of the site works will not preclude any of the above.

ARRANGEMENTS FOR ACCESS, PARKING, DELIVERIES, ETC.

Off existing roads. Residents must have access to their properties at all times as well as emergency vehicles.

All service providers must sign a 37.2 Mandatory Agreement and must be inducted before they can be allowed on site.

ARRANGEMENTS FOR SITE CAMP, ABLUTIONS AND YARD, INCLUDING FOR COVID-19

Site camp location and set up

- **Restrictions / requirements:**
- **Storage areas:**
- **Security:**

} Contractor to advise in consultation with Engineer / Professional Team

Ablutions and Welfare Arrangements

Contractor to supply ablutions and facilities in line with the Construction Regulations 2014, refer to section 2.31 of this health and safety specification regarding the below. Toilets should be provided with built in facilities for hand washing. Please note further that COVID-19 control measures form an important part of ablutions provision on site ref soap and water/hand sanitiser, signage, etc:

- **Toilets:** } Contractor to provide as per Regulations
- **Washing facilities:** }
- **Drinking Water:** }
- **Shelter:** } Contractor to provide as per Regulations
- **Showers:** }

Mobile site facilities requirements:

A mobile toilet will be required for sites that cannot facilitate a permanent location for ablution units and must be available for each gender per location.

The use of a mobile toilet must be prepared and setup correctly with additional anchors and available toiletries prior to each working day and to be first priority when changing location of works along a set working path.

Teams are to ensure that the toilets are cleaned correctly and suitable for easy and hygienic uses and recorded on a daily register.

PROTECTION OF SITE AGAINST UNAUTHORISED ACCESS BY PUBLIC (INCLUDING FOR COVID 19)

Excavation Fencing: Note that excavations accessible to public, or adjacent to public roads / thoroughfares, must have (1) barrier / fence of at least 1m in height, and (2) warning illuminants at night or when visibility is poor, or have other suitable precautionary measures if of both these are not practicable.

- Orange plastic barrier mesh fencing is to be used at the minimum during excavation, full fencing may be required at particularly hazardous public/construction work interfaces.
- Excavations next to roads must be suitably barricaded off.
- Excavations are to be sufficiently fenced off if they are to be left open. Wherever possible, all excavations are to be backfilled at the end of each shift.

General Fencing of Site: Note that construction sites in built up areas adjacent to public walkway must be fenced off and have controlled access points with the correct signs to indicate the site office for any relevant enquiries.

- Site camp / site yard is to be fenced off with 1.8m fence panels and be access controlled.
- Work areas to be protected against unauthorised access.
- 1.8m fencing panels will be required to be installed by the contractor for the unfenced areas (New inlet works fall outside existing fence line)

Warning Notices: Construction warning signage must be prominently displayed to avoid unauthorised access to site and to warn of dangers associated with construction works.

Look Outs: TBA

PERSONAL PROTECTIVE EQUIPMENT (PPE)
The Client requires the Contractor to ensure that employees (and others under his/her control) wear the following minimum PPE:

Overalls: Yes.

Safety Harnesses: yes, for working at height.

Hard Hats: Yes, as per risk assessment.

Reflective Vests: Yes.

Goggles / gloves / ear defenders / respiratory protection: Yes, as per risk assessment.

Safety Footwear: Yes.

Specialist Equipment (e.g. for confined Spaces): yes, oxygen meters and other equipment for confined space working. Life belts or buoys and/or jackets may be required when working next to sewage containing structures with a risk of drowning.

COVID-19 PPE:

Respiratory Protection (i.e. any face mask endorsed by Department of Labour): As per COVID 19 Risk Assessment and/or Government Regulations.

HAZARDOUS SUBSTANCES

The following materials and substances have, or may have, to be used in the works and are identified as potentially posing special health and / or safety hazards during the project. Appropriate measures will need to be specified for their control:

Cement – Fuels (Petrol & Diesel) – Oils - Chlorine

1.10 INTERFACE AND RESTRICTIONS BY CLIENT

Contractor must note that the following Client activities will continue during construction:

- Clients employees may be present at the existing WWTW – their safety may not be compromised by the construction works.

The following Client safety rules and/or requirements are to be observed:
All workers are to receive induction prior to commencement of work on site.
Other safety rules and requirements to be advised at induction.
Please also refer to tender document.

The following are to be noted:

- PPE to be worn at all times.
- Public safety to be a priority at all times.
- Toilets to be utilized for urinating. Not against poles, structures, in bushes etc. (Fines to be issued for non-compliance)

Restrictions on times, access or other restrictions by Client
Please refer to tender document.
Other restrictions may be advised at induction.

1.11 Project Close Out

The Health and Safety files for the Principal Contractors and all Contractors require closure and handover to the Client at the completion of the project in the form of a consolidated safety file. The

following list is an example of what should be included but is not exhaustive. The Safety Agent or the Client may require further information at the time of completion and the Principal Contractor is to ensure that all instructions are responded to. Documentation would include all health and safety related records from the start of the project. All records to be in hard copy or electronic format and submitted to the Safety Agent for approval in adequately formatted lists and folders. Layout should be logical and in the same order as in the site files.

Consolidated Health and Safety close out file requirements include:

- Health and safety specification (most recent version)
- Principal Contractor's health and safety plan/s
- Site safety organograms
- Legal appointments
- Notification to Department of Labour of commencement of work / Construction Work Permit
- Workman's Compensation Letters of Good Standing for the project
- Full safety files for all contractors as well as their close out reports
- List of all contractors who worked on site
- Letters of safety plan approval of contractors by the Principal Contractor
- Mandatory agreements (section 37.2 agreements)
- Incident and accident records / Occupational Disease records
- Contractor Nonconformance records
- Safety agent's audit reports
- Safety Officer reports
- Method Statements
- Risk assessments
- Safe work procedures
- Medical surveillance certificates of fitness. Medical records are to be kept according to the Occupational Health and Safety Act, as amended.
- All temporary works drawings (suspended beams/scaffolds, etc.)
- Copies of test results, policies, and procedures for environmental monitoring (silica, noise, dusts, etc.)
- Detailed registers of all material used
- Copies of all Checklists completed

1.12 SAFETY FILE RETURN TO CLIENT

The consolidated Health and Safety Files for the Project is to be handed over by the Principal Contractor to the Client upon Project Completion in either hard copy or electronic format.

2.0 FURTHER REQUIREMENTS

2.1 Duties of Principal Contractor / Contractor in terms of Construction Regulations 2014

A Principal Contractor must:

- provide and demonstrate to the Client a suitable, sufficiently documented and coherent site specific health and safety plan, based on the Client's documented health and safety specifications, *which* plan must be applied from the date of commencement of and for the duration of the construction work and which must be reviewed and updated by the Principal Contractor as work progresses;

- open and keep on site a health and safety file, which must include all documentation required in terms of the Act and these Regulations, which must be made available on request to an inspector, the Client, the Client's Safety Agent, or a Contractor; and

- on appointing any other Contractor, in order to ensure compliance with the provisions of the Act –

    - provide Contractors who are tendering to perform construction work for the Principal Contractor, with the relevant sections of the health and safety specifications pertaining to the construction work which has to be performed;

    - ensure that potential Contractors submitting tenders have made sufficient provision for health and safety measures during the construction process;

    - ensure that no Contractor is appointed to perform construction work unless the Principal Contractor is reasonably satisfied that the Contractor that he or she intends to appoint, has the necessary competencies and resources to perform the construction work safely;

    - ensure prior to work commencing on the site that every Contractor is registered and in good standing with the compensation fund or with a licensed compensation insurer as contemplated in the Compensation for Occupational Injuries and Diseases Act, 1993;

    - appoint each Contractor in writing for the part of the project on the construction site

    - take reasonable steps to ensure that each Contractor's health and safety plan is implemented and maintained on the construction site;

    - ensure that the periodic site audits and document verification are conducted at intervals mutually agreed upon between the Principal Contractor and any Contractor, but at least once every 30 days;

    - stop any Contractor from executing construction work which is not in accordance with the Client's health and safety specifications and the Principal Contractor's health and safety plan for the site or which poses a threat to the health and safety of persons;

- where changes are brought about to the design and construction, make available sufficient health and safety information and appropriate resources to the Contractor to execute the work safely;

- discuss and negotiate with the Contractor the contents of their health and safety plan and finally approve that plan for implementation;

- ensure that a copy of both the Principal Contractor and Contractor's health and safety plan is available on request to an employee, an inspector, a Contractor, the Client, or the Client's Safety Agent;

- hand over a consolidated health and safety file to the Client upon completion of the construction work, to include a record of all drawings, designs, materials used and other similar information concerning the completed structure;

- in addition to the documentation required in the health and safety file include and make available a comprehensive and updated list of all the Contractors on site accountable to the Principal Contractor, the agreements between the parties and the type of work being done;

- ensure that all his or her employees have a valid medical certificate of fitness specific to the construction work to be performed and issued by an occupational health practitioner in the form of Annexure 3.

A Contractor must prior to performing any construction work-

- provide and demonstrate to the Principal Contractor a suitable and sufficiently documented health and safety plan, based on the relevant sections of the Client's health and safety specification and provided by the Principal Contractor, which plan must be applied from the date of commencement of and for the duration of the construction work and which must be reviewed and updated by the Contractor as work progresses;

- open and keep on site a health and safety file, which must include all documentation required in terms of the Act and these Regulations, and which must be made available on request to an inspector, the Client, the Client's Safety Agent or the Principal Contractor;

- before appointing another Contractor to perform construction work be reasonably satisfied that the Contractor that he or she intends to appoint has the necessary competencies and resources to perform the construction work safely;

- co-operate with the Principal Contractor as far as is necessary to enable each of them to comply with the provisions of the Act;

- as far as is reasonably practicable, promptly provide the Principal Contractor with any information which might affect the health and safety of any person at work carrying out construction work on the site, any person who might be affected by the work of such a person at work, or which might justify a review of the health and safety plan.

Where a Contractor appoints another Contractor to perform construction work, the duties that apply to the Principal Contractor will apply to the Contractor as if he or she were the Principal Contractor.

A Principal Contractor must take reasonable steps to ensure co-operation between all Contractors appointed by the Principal Contractor to enable each of those Contractors to comply with these Regulations.

No Contractor may allow or permit any employee or person to enter any site unless that employee or person has undergone health and safety induction training pertaining to the hazards prevalent on the site at the time of entry.

A Contractor must ensure that all visitors to a construction site undergo health and safety induction pertaining to the hazards prevalent on the site and must ensure that such visitors have the necessary personal protective equipment.

A Contractor must at all times keep on his or her construction site records of the health and safety induction training and such records must be made available on request to an inspector, the Client, the Client's Safety Agent or the Principal Contractor.

A Contractor must ensure that all his or her employees have a valid medical certificate of fitness specific to the construction work to be performed and issued by an occupational health practitioner in the form of Annexure 3 (a template of which can be found in the Construction Regulations, 2014).

2.2 Management and Supervision of Construction Work

A Principal Contractor must, in writing, appoint one full-time competent person as the construction manager with the duty of managing all the construction work on a single site, including the duty of ensuring occupational health and safety compliance, and in the absence of the construction manager an alternate must be appointed by the Principal Contractor. Proof of all-inclusive assessment of the Construction Manager's Competency in construction management and H & S competency must be available in the Safety File. The Construction Manager must, as a minimum, have a Construction Regulation course. No Contractors may be left unsupervised on site by the Principal Contractor.

A Principal Contractor must upon having considered the size of the project, in writing appoint one or more assistant construction managers for different sections thereof: Provided that the designation of any

such person does not relieve the construction manager of any personal accountability for failing in his or her management duties in terms of this regulation.

Where the construction manager has not appointed assistant construction managers, or, in the opinion of an inspector, a sufficient number of such assistant construction managers have not been appointed, that inspector must direct the construction manager in writing to appoint the number of assistant construction managers indicated by the inspector, and those assistant construction managers must be regarded as having been appointed.

No construction manager appointed in terms of the Regulations 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.

A Contractor must, after consultation with the Client and 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 to assist in the control of all health and safety related aspects on the site: Provided that, where the question arises as to whether a construction health and safety officer is necessary, the decision of an inspector is decisive.

No Contractor may appoint a construction health and safety officer to assist in the control of health and safety related aspects on the site unless he or she is reasonably satisfied that the construction health and safety officer that he or she intends to appoint is registered with a statutory body approved by the Chief Inspector and has necessary competencies and resources to assist the Contractor

A construction manager must in writing appoint construction supervisors responsible for construction activities and ensuring occupational health and safety compliance on the construction site. Proof of all-inclusive assessment of the Construction Supervisor's competency in construction supervision and H&S competency must be available in the Safety File. The Construction Supervisor must, as a minimum, have a supervision course as per Unit Standard 262845 (Civil Engineering), 119080 (Building Construction) and 262884 (Civil Engineering).

A Contractor must, upon having considered the size of the project, in writing appoint one or more competent employees for different sections thereof to assist the construction supervisor, and every such employee has, to the extent clearly defined by the Contractor in the letter of appointment, the same duties as the construction supervisor: Provided that the designation of such employee does not relieve the construction supervisor of any personal accountability for failing in his or her supervisory duties.

Where the Contractor has not appointed such an employee, or, in the opinion of an inspector, a sufficient number of such employees have not been appointed, that inspector must instruct the Employer to appoint the number of employees indicated by the inspector.

No construction supervisor appointed may supervise any construction work on or in any construction site other than the site in respect of which he or she has been appointed: Provided that if a sufficient number of competent employees have been appropriately designated on all the relevant construction sites, the appointed construction supervisor may supervise more than one site.

2.3 Notification of Intention to Commence Construction Work

Not thought to be applicable to this project.

2.4 Construction Work Permit

A client who intends to have construction work carried out, must at least 30 days before that work is to be carried out apply to the provincial director in writing for a construction work permit to perform construction work on projects that will –

1. exceed 365 days and will involve more than 3600 person days of construction work; or

2. the tender value limit is grade 7, 8 or 9 of the Construction Industry Development Board (CIDB) grading.

- Grade 7 = R60 000 000
- Grade 8 = R 200 000 000
- Grade 9 = No limit

A client may appoint a Construction Health and Safety Agent or Construction Health and Safety Manager to apply for this permit from the Provincial Director and construction work may not commence until the permit has been issued by the Provincial Director.

A copy of this permit will be required to be kept in the Principal Contractor's safety file, and the site specific number issued by the Provincial Director must be displayed at the site entrance.

A client may appoint a Construction Health and Safety Agent, or Construction Health and Safety Manager based on the scope and risk profile of construction work to represent him/her on matters of health and safety. Provided that, where the question arises as to whether a Construction Health Safety Agent or a Construction Health and Safety Manager is necessary, the decision of an inspector is decisive.

The following minimum documentation will be required during the permit application process:

- Principal Contractor's Health and Safety Plan CR 5(1)(m)
- Baseline Risk Assessment CR 5(1)(a)
- Appointed Principal Contractor's Letter for Good Standing as per CR 5(1)(j)
- Issue Register signed by Designer CR 5 (1)(c)
- Issue Register signed by Principal Contractor
- Declaration signed by Designer CR 5(1)(d) and CV
- Principal Contractor made adequate provision for the cost of health and safety measures (Bill of Quantities) CR 5(1)(g)
- Proof of Principal Contractor's competency and resources to carry out the construction work safely CR 5(1)(h)
- Appointment Letter for Construction Manager, CV, Certificates and List of projects
- Appointment Letter of Safety Officer & Safety Officer's Registration for SACPCMP
- Principal Contractor's Appointment Letter CR 5(1)(k), Company Profile and CIDB grading

After approval of the Construction Work Permit any changes made to the appointed persons on the annexure 1 must be submitted to Department of Labour for approval before the appointed persons are allowed to commence with their tasks.

PLEASE NOTE THAT THE CONSTRUCTION MANAGER (8(1)) NAMED ON THE CONSTRUCTION WORK PERMIT MUST BE THE SAME PERSON THAT ACTS AS THE CONSTRUCTION MANAGER ON SITE. IF THIS WILL NOT BE THE CASE FOR SOME REASON THEN THE SAFETY AGENT MUST BE NOTIFIED OF THE CHANGE BY THE PRINCIPAL CONTRACTOR AT LEAST 7 DAYS BEFORE THE CHANGE IS MADE SO THAT THE SAFETY AGENT CAN AMEND THE CONSTRUCTION WORK PERMIT APPLICATION AND ADVISE THE DEPARTMENT OF EMPLOYMENT AND LABOUR ACCORDINGLY.

2.5 Assignment of Contractor's Responsible Persons to Manage Health and Safety on Site

The Contractor shall submit management and supervisory appointments as well as any relevant appointments in writing (as stipulated by the Construction Regulations 2014 and the Occupational Safety and Health Act 1993), prior to commencement of work (refer to **Annexure B** at the end of this Health and Safety Specification).

2.6 Competency for Contractor's Responsible Persons

The Contractor's responsible persons shall be competent in health and safety and be familiar with the Occupational Health and Safety Act 1993, and applicable regulations. Valid proof of pertinent health and safety courses attended by such persons will be required to be presented to the Client.

2.7 Compensation of Occupational Injuries and Diseases Act 130 of 1993 (COIDA)

The successful Contractor shall submit to the Client a valid letter of good standing with the Compensation Insurer prior to appointment.

2.8 Occupational Health and Safety Policy

The Contractor shall submit their Health and Safety Policy, prior to construction commencement, signed by the Chief Executive Officer. The Policy must outline objectives and how they will be achieved and implemented within the company operations. The Policy must be communicated to all employees and proof thereof must be available in the Safety File.

2.9 Health and Safety Organogram

The Contractor shall submit an organogram, prior to construction commencement, outlining the Health and Safety Site Team that will be assigned to the project, if successful with the tender. In cases where appointments have not been made, the organogram shall reflect the position. The organogram shall be updated when there is a change in the site team.

2.10 Risk Assessments

Baseline Risk Assessment

The Client shall cause a baseline risk assessment to be conducted by a competent person before the design process and tender process commence, and the assessed risks shall form part of the health and safety specifications.

The Contractor must, before commencement of any construction work, and during construction work, have risk assessments performed by a competent person appointed in writing, which risk assessments form part of the health and safety plan to be applied on the site and must include:

- The identification of the risks and hazards to which persons may be exposed to;
- An analysis and evaluation of the risks and hazards identified; based on a documented method
- A documented plan and applicable safe work procedures to mitigate, reduce or control the risks and hazards that have been identified;
- A monitoring plan; and
- A review plan

The Contractor must ensure that, as far as is reasonably practicable, ergonomic related hazards are analysed, evaluated, and addressed in a risk assessment.

The Contractor must ensure that all employees under his control are informed, instructed and trained by a competent person regarding any hazard and the related work procedures and/or control measures **before any work commences** and thereafter **at the times determined in the risk assessment monitoring and review plan of the relevant site.**

The Principal Contractor must ensure that all Contractors are informed regarding any hazard that is stipulated in the risk assessment **before any work commences** and thereafter **at the times determined in the risk assessment monitoring and review plan of the relevant site.**

The Contractor must consult with the health and safety committee or with a representative trade union or representative group of employees if no health and safety committee exists, on the monitoring and review of the risk assessments for the site.

The Contractor must ensure that copies of risk assessment for this site are available on site for inspection purposes by interested parties (inspector, the Client, Client's Safety Agent, any Contractor, any employee, a representative trade union, a health and safety representative or safety committee member.

A Contractor must review the relevant risk assessment where changes are effected to the design and/or construction that result in a change to the risk profile, or when an incident has occurred.

Preventative measures must first address the elimination of the hazard or risk. Should PPE be required to reduce risk, the equipment or clothing to be used must be SABS approved.

In general, the Contractor must ensure that the Risk Assessment involves identifying the hazards present in a work activity on site. This is followed by an evaluation of the extent of the risk involved taking into account those precautions already being taken.
The following general principle should be followed when conducting a risk assessment:

- All relevant risks and/or hazards should be systematically addressed;
- The risk assessment should address what actually happens in the workplace during the work activity;
- All employees and those who may be affected must be considered, including maintenance staff, security guards, visitors, and Contractors;
- The risk assessment should highlight those groups and individuals who may be required to work alone or who have disabilities;
- The risk assessment process should take into account the existing safety measures and controls.
- The level of detail on a risk assessment should be appropriate to the level of risk.

2.11 Health and Safety Representative(s)

The Contractor shall ensure that Health and Safety Representative(s) is/are elected and trained to carry out his / her functions. The Safety Representative(s) must be democratically nominated, elected, and appointed in writing. The Health and Safety Representative(s) shall carry out regular inspections, keep records and report to the supervisor to take appropriate action. The Safety Representative(s) shall attend Health and Safety Committee Meetings. The Health and Safety Representative shall be part of the team that will investigate incidents, accidents, and non-conformances. The Safety Representative(s) must be (a) full time employee(s) who is/are acquainted with conditions and activities at that workplace or section thereof. The Safety Representatives must have Safety Representative training and must be capable of performing their duties.

2.12 Health and Safety Committee

Where two or more health and safety representatives have been appointed on site, the Contractor shall ensure that monthly health and safety meetings are held with such representatives and minutes are kept on record. Meetings must be organized and chaired by the Contractor's Health and Safety Committee Chairperson. Minutes of these meetings must be available for the employees of the Contractor to refer to.

PLEASE NOTE THAT THE SAFETY AGENT MAY REQUIRE THAT THE PRINCIPAL CONTRACTOR CONVENES A SAFETY COMMITTEE MEETING ON SITE IN THE INTERESTS OF HEALTH AND SAFETY ON SITE. SUCH COMMITTEE MEETING MAY REQUIRE ATTENDANCE OF CONTRACTORS SAFETY OFFICERS/SAFETY REPRESENTATIVES, CONSTRUCTION SUPERVISION AND THE SAFETY AGENT.

2.13 Medical Certificate of Fitness

The Contractor must ensure that their employees on site have a valid medical certificate of fitness, specific to the construction work being performed, issued by an occupational health practitioner in the form of an Annexure 3 template (refer to the Construction Regulations 2014 on the Department of Labour website for a sample of this form).

Employees required to perform work at heights or from fall risk position must be medically fit to perform such work, such employee's medicals must specify "Fall Risk" or "Working at heights" in the exposure section of the annexure 3 template.

2.14 Health and Safety Training

The Contractor shall quarterly conduct a training needs analysis to ascertain what health and safety training is required. A plan of action should be devised and forwarded to the Client for records. Once the identified people have attended the training, the Contractor must provide the Client with copies of certificates obtained.

2.14.1 Induction

No Contractor may allow or permit any employee or person to enter site unless they have undergone health and safety induction training pertaining to the hazards prevalent on site at the time of entry. This includes visitors to site. The Contractor must ensure that visitors to site have the necessary protective equipment (PPE). A copy of attendance registers of all employees who attend inductions shall be kept.

2.14.2 Awareness

The Contractor shall conduct periodic toolbox talks on site, weekly or before any hazardous work takes place. The talks shall cover the relevant activity and an attendance register must be signed by all attendees. This record of who attended and the content of the topic will be kept on the site health a safety file as evidence of training.

2.15 Competency

After the Contractor has identified the training to be conducted as part of the competency requirement, and based on Risk Assessment, he shall send the relevant persons on appropriate courses and keep certificates of training for reference. Familiarity with the Health and Safety Act and Regulations is an integral part of the definition of competence. All training must be conducted by an accredited training provider and the certificates must display the applicable unit standards and the expiry dates thereof.

2.16 General Record Keeping

The Contractor shall keep and maintain Health and Safety records to demonstrate compliance with the Health and Safety Specification and the Occupational Health and Safety Act. The Contractor shall ensure that all records of incidents, spot fines, training, etc. are kept on site. All documents shall be available for inspection by the Client, or the Department of Labour's Inspectors.

2.17 General Inspection, Monitoring and Reporting

The Contractor shall carry out inspections as required by this Health and Safety Specification, as well as by health and safety legislation.

2.18 Emergency Procedures

The Contractor shall submit a detailed Emergency Procedure for approval by the Client prior to commencement on site. The procedure shall detail the response plan including the following:

- List of key personnel;
- Details of emergency services;
- Actions or steps to be taken in the event of the emergency; and
- Information on hazardous materials / situations, including each material's hazardous potential impact or risk on the environment or human and measures to be taken in the event of an accident.

Emergency procedure(s) shall include, but shall not be limited to, fire, spills, accidents to employees, use of hazardous substances, dangers as a result of riot / service delivery protests / intimidation, etc. The Contractor shall advise the Client in writing of any on-site emergencies, together with a record of action taken, within 24 hours of the emergency occurring. A contact list of all service providers (Fire Department, Ambulance, Police, Medical and Hospital, etc.) must be maintained and available to site personnel.

2.19 First Aid Box and First Aid Equipment

The Contractor shall provide first aid box/es and appoint, in writing, First Aider(s) for this project in line with the results of the Contractor's risk assessment for the project, this health and safety specification as well as the provisions of the General Safety Regulations. The appointed First Aider(s) are to be sent for accredited first aid training before starting on site. Valid certificates are to be kept on site.

- First Aid box/es must be adequately stocked at all times, accessible and be controlled by a qualified First Aider.
- Perishables to be checked and replaced when expired.
- Stock per content list as per the General Safety Regulations Annexure.
- Signage to be in place.
- To be numbered and sealed with name of first aider on or above the First aid box.
- Dressing logbook to be available in the first aid box.
- If more than 5 employees are present, there must be a first aid box available.
- Register to be checked by a Competent person.

If required by the Client, the Contractor shall have a stretcher on site to be used in case of a serious incident.

2.20 Accident / Incident Reporting and Investigation

The Contractor shall, in addition to the prescribed requirements of the Occupational Health and Safety Act and General Safety Regulations, investigate, record, and report all Section 24 reportable incidents to the Client within 24 hours of the incident occurring. Incident investigations shall be conducted by the Contractor's appointed Accident Investigator – this Investigator must be a competent person or persons who have sufficient knowledge to carry out an investigation.

In the event of a fatality or a permanent disabling injury the Contractor must submit proof of reporting of incident to Department of Labour as well as proof of preventative measures to the Client. The Client reserves the right to conduct investigations into any incidents that they deem fit and the Contractor is required to provide full co-operation in this regard.

2.21 Hazards and Potential Situations

The Contractor shall immediately notify other Contractors of any hazardous or potentially hazardous situations, which may arise during performance of the activities.

2.22 Occupational Health and Safety Signage

The Contractor shall ascertain and provide adequate on site health and safety signage. This signage shall include, but shall not be limited to, Hard Hat / Helmet Area; Safety Shoes to be worn on site; Dust Masks to be worn in areas where there might be exposure to excessive dust; Ear Plugs / Muffs to be worn where there might be noise exposure over 85 dB; Gloves; Safety Goggles; Safety Harness, Workers in Excavation, traffic management, etc. The Contractor shall be responsible to maintain the quality and replacement of signage. Signage must comply with the requirements of SABS.

2.23 Management of Contractors by Principal Contractor

The Principal Contractor shall ensure that all Contractors under his control are complying with the respective Health and Safety Plans, as well as Health and Safety Legislation.

2.24 Stacking of Materials

In addition to the provisions for the stacking of articles in the General Safety Regulations, 2003, the Contractor must ensure that –

- a competent person is appointed in writing with the duty of supervising all stacking and storage on a construction site;
- adequate storage areas are provided;
- there are demarcated storage areas; and
- storage areas are kept neat and under control.

2.25 Housekeeping and General Safeguarding on Construction Sites

A Contractor must, in addition to compliance with the Environmental Regulations for Workplaces, 1987, promulgated by Government Notice No. R. 2281 of 16 October 1987, ensure that suitable housekeeping is continuously implemented on each construction site, including-

- the proper storage of materials and equipment;
- the removal of scrap, waste and debris at appropriate intervals;
- ensuring that materials required for use, are not placed on the site so as to obstruct means of access to and egress from workplaces and passageways;
- ensuring that materials which are no longer required for use, do not accumulate on and are removed from the site at appropriate intervals;
- ensuring that waste and debris are not disposed of from a high place with a chute, unless the chute complies with the requirements set out in the regulations;
- ensuring that construction sites in built-up areas adjacent to a public way are suitably and sufficiently fenced off and provided with controlled access points to prevent the entry of unauthorized persons; and
- ensuring that a catch platform or net is erected above an entrance or passageway or above a place where persons work or pass under or fencing off the danger area if work is being performed above such entrance, passageway, or place so as to ensure that all persons are kept safe in the case of danger or possibility of persons being struck by falling objects.

2.26 Construction Vehicles and Mobile Plant

A Contractor must ensure that all construction vehicles and mobile plant-

- are of an acceptable design and construction;
- are maintained in a good working order;
- are used in accordance with their design and the intention for which they were designed, having due regard to safety and health;
- are operated by a person who-
  - has received appropriate training, is certified competent and in possession of proof of competency and is authorised in writing to operate those construction vehicles and mobile

plant;
  - has a medical certificate of fitness to operate those construction vehicles and mobile plant, issued by an occupational health practitioner in the form of Annexure 3.
- have safe and suitable means of access and egress;
- are properly organized and controlled in any work situation by providing adequate signalling or other control arrangements to guard against the dangers relating to the movement of vehicles and plant, in order to ensure their continued safe operation;
- are prevented from falling into excavations, water, or any other area lower than the working surface by installing adequate edge protection, which may include guard-rails and crash barriers;
- are fitted with structures designed to protect the operator from falling material or from being crushed should the vehicle or mobile plant overturn;
- are equipped with an acoustic warning device which can be activated by the operator;
- are equipped with an automatic acoustic reversing alarm;
- are equipped with fire extinguishers (2.5 – 4.5 kg); and
- are inspected by the authorised operator or driver on a daily basis using a relevant checklist prior to use and that the findings of such inspection are recorded in a register kept in the construction vehicle or mobile plant.

A Contractor must ensure that-

- no person rides or is required or permitted to ride on a construction vehicle or mobile plant otherwise than in a safe place provided thereon for that purpose;
- every construction site is organized in such a way that, as far as is reasonably practicable, pedestrians and vehicles can move safely and without risks to health;
- the traffic routes are suitable for the persons, construction vehicles or mobile plant using them, are sufficient in number, in suitable positions and of sufficient size;
- every traffic route is, where necessary, indicated by suitable signs;
- all construction vehicles and mobile plant left unattended at night, adjacent to a public road in normal use or adjacent to construction areas where work is in progress, have appropriate lights or reflectors, or barricades equipped with appropriate lights or reflectors, in order to identify the location of the vehicles or plant;
- all construction vehicles or mobile plant when not in use, have buckets, booms, or similar appendages, fully lowered, or blocked, controls in a neutral position, motors stopped, wheels chocked, brakes set, and ignition secured;
- whenever visibility conditions warrant additional lighting, all mobile plant are equipped with at least two headlights and two taillights when in operation;
- tools, material, and equipment are secured and separated by means of a physical barrier in order to prevent movement when transported in the same compartment with employees;
- vehicles used to transport employees have seats firmly secured and adequate for the number of employees to be carried; and
- all construction vehicles or mobile plant travelling, working, or operating on public roads comply with the requirements of the National Road Traffic Act, 1996.
- all plant and vehicles are be fitted with amber rotating beacons and reverse alarms.
- ALL construction site vehicles must be inspected daily especially if it has dangerous "items" (fuel, explosives, etc.) on vehicle, completed inspection registers must also be available for inspection.
- the vehicles must resemble the original manufacturer's product. Levers, alarms, and amber lights to be fitted to construction vehicle for notification of vehicle.
- fire extinguishers, signage, and licence disc to be correctly mounted and displayed.
- when the vehicle is stationary no key to be left in or on vehicle or plant.
- Drip tray must be present when stationary.

2.27 Electrical Installations and Machinery on Construction Sites

A Contractor must, in addition to compliance with the Electrical Installation Regulations and the Electrical Machinery Regulations, ensure that –

- before construction commences and during the progress thereof, adequate steps are taken to ascertain the presence of and guard against danger to workers from any electrical cable or apparatus which is under, over or on the site;
- all parts of electrical installations and machinery are of adequate strength to withstand the working conditions on construction sites;
- the control of all temporary electrical installations on the construction site is designated to a competent person who has been appointed in writing for that purpose;
- all temporary electrical installations used by the Contractor are inspected at least once a week by a competent person and the inspection findings are recorded in a register kept on the construction site; and
- all electrical machinery is inspected by the authorized operator or user on a daily basis using a relevant checklist prior to use and the inspection findings are recorded in a register kept on the construction site.

2.28 Use and Temporary Storage of Flammable Liquids on Construction Sites

A contactor must, in addition to compliance with the provisions for the use and storage of flammable liquids in the General Safety Regulations, 2003, ensure that –

- where flammable liquids are being used, applied, or stored at the workplace concerned, it is done in a manner that does not cause a fire or explosion hazard, and that the workplace is effectively ventilated;
- no person smokes in any place in which flammable liquid is used or stored, and the Contractor must affix a suitable and conspicuous notice at all entrances to any such areas prohibiting such smoking;
- an adequate amount of efficient fire-fighting equipment is installed in suitable locations around the flammable liquids store with the recognized symbolic signs;
- only the quantity of flammable liquid needed for work on one day is taken out of the store for use;
- all containers holding flammable liquids are kept tightly closed when not in actual use and, after their contents have been used up, are removed from the construction site and safely disposed of;
- where flammable liquids are decanted, the metal containers are bonded and earthed; and
- no flammable material, including cotton waste, paper, cleaning rags or similar material is stored together with flammable liquids
- proper containers are to be used for fuel. Marked and labelled as per the content.
- diesel on site; more than 800 litres must have a certificate, fire safe certificate. Locked in a ventilated, secure area with a drip tray and have a designated, responsible person to use it.

2.29 Water environments (sewage containing WWTW structures)

A Contractor must ensure that where construction work is done over or in close proximity to water, provision is made for –

- preventing persons from falling into water; and
- the rescuing of persons in danger of drowning.

A Contractor must ensure that where a person is exposed to the risk of drowning by falling into the water, the person is provided with and wears a lifejacket.

2.30 Fire precautions on Construction Sites

A Contractor must, in addition to compliance with the Environmental Regulations for Workplaces, 1987, ensure that –

- all appropriate measures are taken to avoid the risk of fire;
- sufficient and suitable storage is provided for flammable liquids, solids, and gases;
- smoking is prohibited and notices in this regard are prominently displayed in all places containing readily combustible or flammable materials;
- in confined spaces and other places in which flammable gases, vapours or dust can cause danger-

    - only suitably protected electrical installations and equipment, including portable lights, are used;
    - there are no flames or similar means of ignition;
    - there are conspicuous notices prohibiting smoking;
    - oily rags, waste, and other substances liable to ignite are without delay removed to a safe place; and
    - adequate ventilation is provided;
- combustible materials do not accumulate on the construction site;
- welding, flame cutting, and other hot work are done only after appropriate precautions have been taken to reduce the risk of fire;
- suitable and sufficient fire-extinguishing equipment is placed at strategic locations or as may be recommended by the Fire Chief or local authority concerned, and that such equipment is maintained in a good working order;
- the fire equipment contemplated above is inspected by a competent person, who has been appointed in writing for that purpose, in the manner indicated by the manufacturer thereof;
- a sufficient number of workers are trained in the use of fire-extinguishing equipment;
- where appropriate, suitable visual signs are provided to clearly indicate the escape routes in the case of a fire;
- the means of escape is kept clear at all times;
- there is an effective evacuation plan providing for all -
    - persons to be evacuated speedily without panic;
    - persons to be accounted for; and
    - plant and processes to be shut down; and
- a siren is installed and sounded in the event of a fire.

2.31 Construction Employees' Facilities

A Contractor must, in terms of the Construction Regulations 2014, provide:

- Shower facilities after consultation with the employees or employees' representatives, or at least one shower facility for every 15 persons;
- at least one sanitary facility for each sex and for every 30 workers;
- Toilets to be within walking distance
- Hygiene registers to be completed
- Proof of safe disposal of effulgent waste disposal certificates to be obtained
- changing facilities for each sex;
- and sheltered/shaded eating area.
- Protection from the Elements and raised off the ground.
- Every Employer shall provide sanitary facilities at the workplace in accordance with the provisions of Parts F, P and Q of the National Building Regulations.
- Sufficient clean water for all employees. 500ml to each employee every hour.

A Contractor must provide reasonable and suitable living accommodation for the workers at construction sites who are far removed from their homes and where adequate transportation between the site and their homes, or other suitable living accommodation, is not available.

2.32 Fall protection

The Contractor must:

- designate a competent person to be responsible for the preparation of a fall protection plan
- ensure that the fall protection plan contemplated above is implemented, amended where and when necessary and maintained as required; and
- take steps to ensure continued adherence to the fall protection plan.

A fall protection plan contemplated above must include-

- a risk assessment of all work carried out from a fall risk position and the procedures and methods used to address all the risks identified per location;

- the processes for the evaluation of the employees' medical fitness necessary to work at a fall risk position and the records thereof;
- a programme for the training of employees working from a fall risk position and the records thereof;
- the procedure addressing the inspection, testing, and maintenance of all fall protection equipment; and
- a rescue plan detailing the necessary procedure, personnel and suitable equipment required to affect a rescue of a person in the event of a fall incident to ensure that the rescue procedure is implemented immediately following the incident.

A Contractor must ensure that a construction manager appointed under regulation 8(1) is in possession of the most recently updated version of the fall protection plan.

A Contractor must ensure that all unprotected openings in floors, edges, slabs, hatchways, and stairways are adequately guarded, fenced, or barricaded or that similar means are used to safeguard any person from falling through such openings;

Also that no person is required to work in a fall risk position, unless such work is performed safely as contemplated in above and fall prevention and fall arrest equipment are approved as suitable and of sufficient strength for the purpose for which they are being used, having regard to the work being carried out and the load, including any person, they are intended to bear; and securely attached to a structure or plant, and the structure of plant and the means of attachment thereto are suitable and of sufficient strength and stability for the purpose of safely supporting the equipment and person who could fall, and fall arrest equipment is used only where it is not reasonably practicable to use fall prevention equipment.

2.33 Temporary works

A Contractor must appoint a temporary works designer in writing to design, inspect and approve the erected temporary works on site before use.

A Contractor must ensure that all temporary works operations are carried out under the supervision of a competent person who has been appointed in writing for that purpose.

A Contractor must ensure that-

- all temporary works structures are adequately erected, supported, braced and maintained by a competent person so that they are capable of supporting all anticipated vertical and lateral loads that may be applied to them, and that no loads are imposed onto the structure that the structure is not designed to withstand;
- all temporary works structures are done with close reference to the structural design drawings, and where any uncertainty exists the structural designer should be consulted;
- detailed activity specific drawings pertaining to the design of temporary works structures are kept on the site and are available on request to an inspector, other Contractors, the Client, the Client's Safety Agent, or any employee;
- all persons required to erect, move, or dismantle temporary works structures are provided with adequate training and instruction to perform those operations safely;
- all equipment used in temporary works structure are carefully examined and checked for suitability by a competent person, before being used;
- all temporary works structures are inspected by a competent person immediately before, during and after the placement of concrete, after inclement weather or any other imposed load and at least on a daily basis until the temporary works structure has been removed and the results have been recorded in a register and made available on site;
- no person may cast concrete, until authorization in writing has been given by the competent person contemplated above*;*
- if, after erection, any temporary works structure is found to be damaged or weakened to such a degree that its integrity is affected, it is safely removed or reinforced immediately;
- adequate precautionary measures are taken in order to-
  - secure any deck panels against displacement; and

- prevent any person from slipping on temporary works due to the application of release agents;
- as far as is reasonably practicable, the health of any person is not affected through the use of solvents or oils or any other similar substances;
- upon casting concrete, the temporary works structure is left in place until the concrete has acquired sufficient strength to safely support its own weight and any imposed load, and is not removed until authorization in writing has been given by the competent person
- the foundation conditions are suitable to withstand the loads caused by the temporary works structure and any imposed load in accordance with the temporary works design.
- provision is made for safe access by means of secured ladders or staircases for all work to be carried out above the foundation bearing level;
- a temporary works drawing, or any other relevant document includes construction sequences and methods statements;
- the temporary works designer has been issued with the latest revision of any relevant structural design drawing;
- a temporary works design and drawing is used only for its intended purpose and for a specific portion of a construction site; and
- the temporary works drawings are approved by the temporary works designer before the erection of any temporary works.

No Contractor may use a temporary works design and drawing for any work other than its intended purpose.

2.34 Excavation

A Contractor must-

- ensure that all excavation work is carried out under the supervision of a competent person who has been appointed in writing for that purpose; and
- evaluate, as far as is reasonably practicable, the stability of the ground before excavation work begins.

A Contractor who performs excavation work-

- must take reasonable and sufficient steps in order to prevent, as far as is reasonably practicable, any person from being buried or trapped by a fall or dislodgement of material in an excavation;
- may not require or permit any person to work in an excavation which has not been adequately shored or braced: Provided that shoring and bracing may not be necessary where-
  - the sides of the excavation are sloped to at least the maximum angle of repose measured relative to the horizontal plane; or
  - such an excavation is in stable material: Provided that-
    - permission has been given in writing by the appointed competent person contemplated above upon evaluation by him or her of the site conditions; and
    - where any uncertainty pertaining to the stability of the soil still exists, the decision from a professional engineer or a professional technologist competent in excavations is decisive and such a decision must be noted in writing and signed by both the competent person and the professional engineer or technologist, as the case may be;
- must take steps to ensure that the shoring or bracing contemplated above is designed and constructed in a manner that renders it strong enough to support the sides of the excavation in question;
- must ensure that no load, material, plant or equipment is placed or moved near the edge of any excavation where it may cause its collapse and consequently endangers the safety of any person, unless precautions such as the provision of sufficient and suitable shoring or bracing are taken to prevent the sides from collapsing;
- must ensure that where the stability of an adjoining building, structure or road is likely to be affected by the making of an excavation, steps are taken to ensure the stability of such building, structure or road and the safety of persons;

- must cause convenient and safe means of access to be provided to every excavation in which persons are required to work, and such access may not be further than six metres from the point where any worker within the excavation is working;
- must ascertain, as far as is reasonably practicable, the location and nature of electricity, water, gas or other similar services which may in any way be affected by the work to be performed, and must before the commencement of excavation work that may affect any such service, take the steps that are necessary to render the circumstances safe for all persons involved;
- must ensure that every excavation, including all bracing and shoring, is inspected-
    - daily, prior to the commencement of each shift;
    - after every blasting operation;
    - after an unexpected fall of ground;
    - after damage to supports; and
    - after rain,

  by the competent person, in order to ensure the safety of the excavation and of persons, and those results must be recorded in a register kept on site and made available on request to an inspector, the Client, the Client's Safety Agent, any other Contractor or any employee;
- must cause every excavation which is accessible to the public or which is adjacent to public roads or thoroughfares, or whereby the safety of persons may be endangered, to be –
    - adequately protected by a barrier or fence of at least one metre in height and as close to the excavation as is practicable; and
    - provided with warning illuminants or any other clearly visible boundary indicators at night or when visibility is poor, or have resort to any other suitable and sufficient precautionary measure where this is not practicable;
- must ensure that all precautionary measures stipulated for confined spaces as determined in the General Safety Regulations, 2003, are complied with by any person entering any excavation;
- must, where the excavation work involves the use of explosives, appoint a competent person in the use of explosives for excavation, and must ensure that a method statement is developed by that person in accordance with the applicable explosive's legislation; and
- must cause warning signs to be positioned next to an excavation within which or where persons are working or carrying out inspections or tests.

2.35 Demolition Work

A Contractor must appoint a competent person in writing to supervise and control all demolition work on site.

A Contractor must ensure that before any demolition work is carried out, and in order to ascertain the method of demolition to be used, a detailed structural engineering survey of the structure to be demolished is carried out by a competent person and that a method statement on the procedure to be followed in demolishing the structure is developed by that person.

During a demolition, the competent person contemplated in above must check the structural integrity of the structure at intervals determined in the method statement contemplated in above, in order to avoid any premature collapses.

A Contractor who performs demolition work must with regard to a structure being demolished, take steps to ensure that-

- no floor, roof or other part of the structure is overloaded with debris or material in a manner which would render it unsafe;
- all reasonably practicable precautions are taken to avoid the danger of the structure collapsing when any part of the framing of a framed or partly framed building is removed, or when reinforced concrete is cut; and
- precautions are taken in the form of adequate shoring or other means that may be necessary to prevent the accidental collapse of any part of the structure or adjoining structure;

- ensure that no person works under overhanging material or a structure which has not been adequately supported, shored, or braced;
- ensure that any support, shoring, or bracing contemplated above, is designed and constructed so that it is strong enough to support the overhanging material;
- where the stability of an adjoining building, structure or road is likely to be affected by demolition work on a structure, take steps to ensure the stability of such structure or road and the safety of persons;
- ascertain as far as is reasonably practicable the location and nature of electricity, water, gas or other similar services which may in any way be affected by the work to be performed, and must before the commencement of demolition work that may affect any such service, take the steps that are necessary to render circumstances safe for all persons involved;
- cause every stairwell used and every floor where work is being performed in a building being demolished, to be adequately illuminated by either natural or artificial means;
- cause convenient and safe means of access to be provided to every part of the demolition site in which persons are required to work; and
- erect a catch platform or net above an entrance or passageway or above a place where persons work or pass under or fence off the danger areas if work is being performed above such entrance, passageway, or place so as to ensure that all persons are kept safe where there is a danger or possibility of persons being struck by falling objects.

A Contractor must ensure that no material is dropped to any point, which falls outside the exterior walls of the structure, unless the area is effectively protected.

A Contractor must ensure that no equipment is used on floors or working surfaces unless such floors or surfaces are of sufficient strength to support the imposed loads.

A Contractor must ensure that all waste and debris are as soon as reasonably practicable removed and disposed of from the site in accordance with the applicable legislation.

2.36 Tunnelling

Not thought to be applicable to this project.

2.37 Scaffolding

A Contractor must appoint a competent person in writing who must ensure that all scaffolding work operations are carried out under his or her supervision and that all scaffold erectors, team leaders and inspectors are competent to carry out their work as per the SANS 10085 of 2004.

A Contractor using access scaffolding must ensure that such scaffolding, when in use, complies with the safety standards incorporated for this purpose into these Regulations under section 44 of the Act and SANS 10085. Scaffold must be;

- Level and balanced upon the correct footing such as base jacks, U-Jacks, and mobile wheels
- Have the correct Ledgers and bracing methods to secure the frames and Standards
- To be fully boarded with the correct edge protection on both the 0.500m and 1 metre height per working platforms.
- Working platforms to be in accordance with the Tables 4 and 5 of the SANS 10085 for weight restrictions
- Have the correct access that is fitted within the scaffold and grants access to the working platforms and must be fitted with a trap door system.
- Secured with fastening methods such Reveal and fixed ties according to table 7 of SANS 10085. Buttresses to be used when required.
- signage must be displayed to indicate if the scaffold is safe or unsafe to use.
- Trestles to be built in accordance to section 10.16.1 of the SANS 10085 and safety requirements to be met by the scaffolding inspector and scaffold supervisors on site.

2.38 Bulk mixing plant

Not thought to be applicable to the project.

2.39 Rope Access Work

Not thought to be applicable to the project.

2.40 Hazardous Chemical Substances (HCS)

In addition to the requirements in the HCS Regulations, the Principal Contractor must provide proof in the Health and Safety Plan that:

- Material Safety Data Sheets (MSDS's) of the relevant materials / hazardous chemical substances are available prior to use by the Contractor. All MSDS's shall be available for inspection by the agent at all times.
- Risk assessments are done at least once every 6 months.
- Exposure monitoring is done according to OESSM and by an Approved Inspection Authority (AIA) and that the medical surveillance programme is based on the outcomes of the exposure monitoring.
- How the relevant HCS's are being/going to be controlled by referring to:
  - Limiting the amount of HCS
  - Limiting the number of employees
  - Limiting the period of exposure
  - Substituting the HCS
  - Using engineering controls
  - Using appropriate written work procedures
- The correct PPE is being used.
- HCS are stored and transported according to SABS 072 and 0228.
- Training with regards to these regulations was given.

The Health and Safety plan should make reference to the disposal of hazardous waste on classified sites and the location thereof (where applicable).

The First Aider must be made aware of the MSDS and trained in how to treat HCS incidents appropriately.

2.41 Noise Induced Hearing Loss

Where noise is identified as a hazard the requirements of the NIHL regulations must be complied with and the following must be included / referred to in the Health and Safety Plan:

- Proof of training with regards to these regulations.
- Risk assessment done within 1 month of commencement of work.
- That monitoring carried out by an AIA and done according to SABS 083.
- Medical surveillance programme established and maintained for the necessary employees.
- Control of noise by referring to:
- Engineering methods considered
- Admin control (number of employees exposed) considered
- Personal protective equipment considered/decided on
- Describe how records are going to be kept for 40 years.

2.42 Explosives and Blasting

Not thought to be applicable to the project.

2.43 Personal Protective Equipment (PPE)

The Contractor shall carry out PPE or clothing needs analysis in accordance with his risk assessment, to determine the necessary PPE or clothing to be used during construction. The Contractor shall make provision to keep adequate quantities of appropriate, SABS approved PPE or clothing on site at all times.

The Contractor must ensure that personnel are trained in the correct use of PPE to be used.

The Contractor must ensure that lost, stolen, worn out or damaged PPE is replaced as required and receipt signed for by employees on site.

2.44 Asbestos

Not thought to be applicable to the project.

2.45 Pressure Vessels (Including Gas Bottles)

The Contractor shall comply with Pressure Vessel Regulations, including:

- Providing competency and awareness training to the operators;
- Providing PPE or clothing;
- Providing and maintain appropriate signage in areas where pressure vessels are used, as applicable;
- Inspect equipment regularly and keep records of inspections;
- Providing appropriate firefighting equipment (Fire Extinguishers).
- Under pressure vessels to have the following in place;
  - Service date
  - Seals on valves with no leaks and not broken
  - flash arrestors
  - Should be stored and chained together
  - Oxygen / Acetylene bottles to have clips
  - Signage to be visible
  - Gauges in working condition and be visible
  - Permits for use
  - Pressure equip Regs 6. (1) The user shall ensure that the pressure equipment is operated and maintained within its design and operating parameters.

2.46 Fire Extinguishers and Fire Fighting Equipment

The Contractor shall provide adequate, regularly serviced fire extinguishers located at strategic points on site. The Contractor shall keep spare serviced portable fire extinguishers. The Contractor shall have adequate persons trained or competent to use the Fire Fighting Equipment.

Safety signage shall be posted up in all areas where fire extinguishers are located.

2.47 Lifting Machinery and Tackle

The Contractor shall ensure that lifting machinery and tackle is inspected before use and on a monthly basis. The Contractor shall have lifting machinery and tackle inspector who will inspect the equipment at intervals required by the Driven Machinery Regulations, taking into account that:

- All lifting machinery and tackle have a safe working load clearly indicated
- Regular inspection and servicing is carried out
- Records are kept of inspections and of service certificates
- Thorough examinations are carried out by competent personnel at the frequencies required by legislation

- There is proper supervision in terms of guiding the loads which includes a trained banks man to direct and check lifting tackle if it is safe for use
- Forklift to be inspected every year and lift plan every 2 years
- Load test certificate to be no older than 6 months
- Sufficient props to be used and max weight to be displayed
- Slings to be checked with regard to integrity, chains, serial numbers, checked for tears, cuts links and all other materials
- Hooks to be oiled, not in a fixed position and closed to prevent materials from slipping/falling off
- Lifting equipment must be used for the scope of work carried out

2.48 Ladders and Ladder work

The Contractor shall ensure that all ladders are numbered and inspected regularly keeping record of inspections. It should be noted that Aluminium ladders are preferred to wooden ladders.

2.49 General Machinery

The Contractor shall comply with the Driven Machinery Regulations, which include inspecting machinery regularly, appointing a competent person to inspect and ensure maintenance, issuing PPE or clothing and training those that use machinery and enforce compliance.

2.50 Portable Electrical Tools

The Contractor shall ensure that use and storage of all explosive actuating fastening devices and portable electrical tools are in compliance with relevant legislation.

The Contractor shall consider that:

- A competent person undertakes routine inspections;
- Only authorised persons use the tools;
- There are safe working procedures applied;
- Awareness training is carried out and compliance is enforced at all times; and
- PPE and clothing is provided and maintained.

2.51 High Voltage Electrical Equipment

The Contractor shall ensure that, where the work is under, on or near high-voltage electrical equipment the Electrical Installation Regulations, together with safety instructions (Regulations of the Owner of the Equipment) are complied with. Such equipment includes:

- Eskom and the Local Authority equipment
- The Contractor's own power supply; and
- Electrical equipment being installed but not yet taken over from a Contractor by The Client.

2.52 Public Health and Safety

The Contractor shall ensure that each person working on or visiting a site, and the surrounding community, shall be made aware of the dangers likely to arise from onsite activities and the precautions to be observed to avoid or minimize those dangers. Appropriate health and safety signage shall be posted at all times.

2.53 Night Work

The Contractor shall not undertake any night work without prior arrangement and a written permit from the Client. The Contractor shall ensure that adequate lighting is provided for all night work and failure to do so shall result in work being stopped.

2.54 Environmental Conditions and Flora and Fauna

The Contractor must be mindful of adverse weather conditions upon the health and safety of the workforce. This includes inclement weather, strong wind, heat stress, extreme cold, etc. The Contractor's risk assessment process must take into account the risks associated with such weather conditions. The same is true when working in an environment where there is a risk to employees' health and safety from presence of poisonous flora, or wildlife (including bees, snakes, etc). The Contractor's risk assessment process must take these risks into account.

2.55 Occupational Health

Exposure of workers to occupational health hazards and risks are quite common in any work environment, especially in construction. Occupational health hazards and risks exposure is a major problem and all Contractors are to ensure that proper health and hygiene measures are put in place to prevent exposure to these hazards and risks.

The occupational hazards and risks may enter the body in three ways:

- Inhalation through breathing e.g. cement dust;
- Ingestion through swallowing maybe through food intake;
- Absorption through the skin (pores) e.g. painting or use of thinners.

The Contractor is required to ensure that all his personnel are medically fit prior to being allowed onto the work site.

All Contractors should ensure that Occupational Hygiene surveys are conducted as per the Occupational Health and Safety Act to ensure employees are not exposed to hazards. Risk Assessments should identify areas where surveys are to be conducted.

2.56 Suspended Platforms

Not thought to be applicable to the project.

2.57 Material Hoists

Not thought to be applicable to the project.

2.58 Explosive Actuated Fastening Device

Not thought to be applicable to the project.

2.59 Confined Spaces

Confined space work must be closely monitored by a competent person appointed by the Contractor, to include, but not restricted to, ensuring that the confined space is sufficiently ventilated prior to entry. Oxygen levels to be tested in confined space to ensure that it is safe for entry. Permit system to be in place to declare confined space safe for entry prior to entry. PPE must be worn (such as proper masks) if air supply is insufficient or not of sufficient quality.

Sufficient training must take place in use of all confined space monitoring and access equipment prior to any works commencing in such confined space. It is strongly recommended that a tripod and winch system be in place to afford easy access and egress and for emergency evacuation from the confined space (manholes and chambers). Please also refer to GSR5 on safety requirements for Work in Confined Spaces.

General safety Regulations 5.
(1) An Employer or a user of machinery shall take steps to ensure that a confined space is entered by an employee or other person only after the air therein has been tested and evaluated by a person who is competent to pronounce on the safety thereof, and who has certified in writing that the confined space is safe and will remain safe while any person is in the confined space, taking into account the nature and duration of the work to be performed therein.

(2) Where the provisions of sub regulation (1) cannot be complied with the Employer or user of machinery, as the case may be, shall take steps to ensure that any confined space in which there exists or is likely to exist a hazardous gas, vapour, dust or fumes, or which has or is likely to have, an oxygen content of less than 20 per cent by volume, is entered by an employee or other person only when-- (a) subject to the provisions of sub regulation (3), the confined space is purged and ventilated to provide a safe atmosphere therein and measures necessary to maintain a safe atmosphere therein have been taken; and (b) the confined space has been isolated from all pipes, ducts and other communicating openings by means of effective blanking other than the shutting or locking of a valve or a cock, or, if this is not practicable, only when all valves and cocks which are a potential source of danger have been locked and securely fastened by means of chains and padlocks.
(3) Where the provisions of sub regulation (2)(a) cannot be complied with, the Employer or user of machinery shall take steps to ensure that the confined space in question is entered only when the employee or person entering is using breathing apparatus of a type approved by the chief inspector and, further, that—
(a) the provisions of sub regulation (2) (b) are complied with;
(b) any employee or person entering the confined space is using a safety harness or other similar equipment, to which a rope is securely attached which reaches beyond the access to the confined space, and the free end of which is attended to by a person referred to in paragraph (c);
(c) at least one other person trained in resuscitation is and remains in attendance immediately outside the entrance of the confined space in order to assist or remove any or persons from the confined space, if necessary; and
(d) effective apparatus for breathing and resuscitation of a type approved by the chief inspector is available immediately outside the confined space.

(4) An Employer or user of machinery shall take steps to ensure that all persons vacate a confined space on completion of any work therein.

(5) Where the hazardous gas, vapour, dust or fumes contemplated in sub regulation (2) are of an explosive or flammable nature, an Employer or user of machinery shall further take steps to ensure that such a confined space is entered only if –
(a) the concentration of the gas, vapour, dust or fumes does not exceed 25 per cent of the lower explosive limit of the gas, vapour, dust or fumes concerned where the work to be performed is of such a nature that it does not create a source of ignition; or
(b) such concentration does not exceed 10 per cent of the lower explosive limit of the gas, vapour, dust or fumes where other work is performed.

2.60 Alcohol and drugs (GSR 2)

A 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 site.

No employee shall be under the influence of or have in his or her possession or partake of or offer any other person intoxicating liquor or drugs.

An Employer or a user, as the case may be, shall, in the case where a person is taking medicines, only allow such person to perform duties at the site if the side effects of such medicine do not constitute a threat to the health or safety of the person concerned or other persons at such site.

2.61 COVID-19 (PLEASE NOTE THAT THIS SECTION IS CONSTANTLY UNDER REVIEW)

Disaster Management Act: Regulations: Transitional measures

Mandatory protocols when in a public place (as updated on 4 April 2022)

67. (1) For the purposes of these Regulations, a 'face mask' means a cloth face mask or a homemade item that covers the nose and mouth, or another appropriate item to cover the nose and mouth.
(2) The wearing of a face mask is mandatory for every person when in an indoor public place, excluding a child under the age of six years.
(3) No person will be allowed to-
(a) use, operate, perform any service on any form of public transport; or
(b) enter or be in a building, place or premises, including government buildings, places or premises, used by the public to obtain goods or services, if he or she is not wearing a face mask.
(4) (a) All persons in an open public space need not wear a face mask but must maintain a distance of at least one metre from another person.
(b) The school environment is excluded from the requirement of maintaining a distance of at least one metre from another person.
(5) An employer may not allow any employee to perform any duties or enter the employment premises if the employee is not wearing a face mask while performing his or her duties.

2.62 General Practices when Working at Heights

- No Homemade structures or ladders will be permitted on the project.
- Trestle tables are not to be fully extended and must be fully boarded, no drums to be used.
- Surroundings to be clear of rubble.
- Fall protection, fall prevention, and fall rescue plans to be in place and communicated to site employees.
- Ladders to be structurally sound and not broken and in accordance to GSR 13A.
- Only competent persons may be allowed to work at heights
- Correct personal protective equipment to be used (safety harness and lanyard) and edge protection / life lines to be used.
- Anchor points to be in place and determined by an engineer. Anchor points must be pull tested prior to use.
- GSR (6) 6. No Employer shall require or permit any person to work in an elevated position and no person shall work in an elevated position, unless such work is performed safely from a ladder or scaffolding, or from a position where such person has been made as safe as if they were working from scaffolding.
- Construction regulation 10 of 2014 to be implemented when working at heights and to prevent any person from falling from heights.
- Employees required to perform work at heights or from fall risk position must be medically fit to perform such work, such employee's medicals must specify "Fall Risk" or "Working at heights" in the exposure section of the annexure 3 template.

2.63 Traffic Accommodation

Not thought to be applicable to the project.

2.64 **Ventilation and Lighting in the Work Place**

Every Employer shall cause every workplace in his undertaking to be lighted in accordance with the illuminance values specified in the Schedule to the General Safety Regulations:

Provided that where specialised lighting is necessary for the performance of any particular type of work, irrespective of whether that type of work is listed in the Schedule or not, the Employer of those

employees who perform such work shall ensure that such specialised lighting is available to and is used by such employees.

The Contractor must ensure that:
- the average illuminance at any floor level in a workplace within five meters of a task is not less than one fifth of the average illuminance on that task;
- glare in any workplace is reduced to a level that does not impair vision;
- lighting on rotating machinery in such that the hazard of stroboscopic effects is eliminated; and
- luminaires and lamps are kept clean and, when defective, are replaced or repaired forthwith.

With a view to the emergency evacuation of indoor workplaces without natural lighting or in which persons habitually work at night, every Employer shall, in such workplaces, provide emergency sources of lighting which are such that, when activated, an illuminance of not less than 0.3 lux is obtained at floor level to enable employees to evacuate such workplaces: Provided that where it is necessary to stop machinery or shut down plant or processes before evacuating the workplace, or where dangerous materials are present or dangerous processes are carried out, the illuminance shall be not less than 20 lux.

The Contractor must ensure that the emergency sources of lighting prescribed above:
- are capable of being activated within 15 seconds of the failure of the lighting prescribed by subregulation (1);
- will last long enough to ensure the safe evacuation of all indoor workplaces;
- are kept in good working order and tested for efficient operation at intervals of not more than three months; and
- where directional luminaires are installed, these are mounted at a height of not less than two meters above floor level and are not aimed between 10° above and 45° below the horizontal line on which they are installed.

The Contractor must ensure that all rooms, stairways, passageways, gangways, basements, and other places where danger may exist through lack of natural light, to be lighted such that it will be safe.

The Contractor must ensure that every workplace in his undertaking is ventilated either by natural or mechanical means in such a way that –

- the air breathed by employees does not endanger their safety;
- the time-weighted average concentration of carbon dioxide therein, taken over an eight-hour period, does not exceed one half per cent by volume of air;
- the carbon dioxide content thereof does not at any time exceed three per cent by volume of air;
- the prescribed exposure limits for airborne substances therein are not exceeded; and
- the concentration therein of any explosive or flammable gas, vapour or dust does not exceed the lower explosive limit of that gas, vapour, or dust.

2.65 Nuclear Density Gauge (Troxler)

The use of a Troxler on site must be in line with the SANS 3001 of March 2014. The SANS consists of 5 sections

The in-situ density of road construction materials is only determined in civil engineering using indirect methods such as the nuclear density gauge and sand replacement methods.
This method forms part of a set of methods used to operate nuclear gauges, and includes the following:
a) administration, handling, and maintenance (see SANS 3001-NG1);
b) validation of standard calibration blocks (see SANS 3001-NG2);
c) calibration of a nuclear gauge (see SANS 3001-NG3);
d) verification of a nuclear gauge (see SANS 3001-NG4):
e) in situ density determination using a nuclear gauge (see SANS 3001-NG5)

When used Troxlers must be:

- Stored in a dedicated, lockable area and must have a warning signage displayed.
- Must only be transported in a dedicated vehicle with the required signage displayed and by an authorised employee that has been appointed in writing.
- Must have a Troxler Calibration Certificate in place.
- Must have a Troxler Technician Appointment on file and signed and proof of competency within the safety file.

2.66 Ergonomics Regulation of 2019

"competent person" in relation to ergonomics, means a person who– *(a)* has in respect of the work or task to be performed the required knowledge, training and experience in ergonomics and, where applicable, qualifications specific to ergonomics: provided that where appropriate qualifications and training are registered in terms of the provisions of the National Qualifications Framework Act, 2008 (Act No. 67 of 2008), those qualifications and that training must be regarded as the required qualifications and training; and *(b)* is familiar with the Act and the applicable regulations made under the Act;

"ergonomic risk" means a characteristic or action in the workplace, workplace conditions, or a combination thereof that may impair overall system performance and human well-being;

"ergonomic risk assessment" means a programme, process, or investigation to identify, analyse, valuate and prioritise any risk from exposure to ergonomic risks associated with the workplace;

"ergonomics" means the scientific discipline concerned with the fundamental understanding of interactions among humans and other elements of a system, and the profession that applies theory, principles, data and methods to design in order to optimise human well-being and overall system performance;

The ergonomics regulations will apply to any Employer or self-employed person who carries out work at the workplace who may expose any person to an ergonomic risk in the work place and any designer, manufacturer, importer or supplier of machinery, plant, or work systems for the work place.

An Employer must, before the commencement of any work that may expose employees to ergonomic risks, have an ergonomic risk assessment performed by a competent person.

The ergonomic risk assessment must be done at intervals not exceeding two years and must include the following;

- a complete hazard identification and all persons who may be affected by the ergonomic risk.
- how employees may be affected by the ergonomic risks;
- the analysis and evaluation of the ergonomic risks;
- the prioritisation of ergonomic risks.

An Employer must review the relevant ergonomic risk assessment if:

- such assessment is no longer valid;
- control measures are no longer effective;
- technological or scientific advances allow for more effective control methods;
- there has been a change in –
  - the work methods;
  - the type of work carried out; or
  - the type of equipment used to control the exposure; and
  - an incident occurs or medical surveillance reveals an adverse health effect, where ergonomic risks are identified as a contributing factor.

An Employer must ensure that an employee is placed under medical surveillance, which is overseen by an occupational medicine practitioner, if–

- the ergonomic risk assessment referred to in regulation 6 indicates the need for the employee to be placed under medical surveillance; or
- an occupational health practitioner recommends that relevant employees must be under Medical surveillance, in which case the Employer may call upon an occupational medicine practitioner to ratify the appropriateness of such recommendation.

An Employer must ensure that the medical surveillance consists of–

- in the case of a new employee, an initial health examination before the employee commences employment or within 30 days of commencement of such employment;
- a periodic health examination informed by the ergonomic risk assessment, at intervals specified by an occupational medicine practitioner, but not exceeding two years; and
- an exit health examination informed by the ergonomic risk assessment.

♦ ♦ ♦ ♦ ♦ ♦ ♦ ♦ ♦ ♦ ♦

Both the Client and the Contractor have a duty in terms of health and safety legislation to do all that is reasonably practicable to make members of the public and others being affected by the construction processes aware of possible risks and put preventative measures in place to mitigate the risks. The public and/or visitors shall go through a brief health and safety induction detailing hazards and risks they may be exposed to and what measures are in place to control these hazards and risks.

OTHER HEALTH AND SAFETY SPECIFICATION REQUIREMENTS

The Contractor must be aware of the following additional requirements:

What	When	Output
Awareness training (Toolbox Talks)	At least weekly and before hazardous work is carried out	Attendance Register
Health and Safety Committee Meetings	Monthly	Minutes signed by the Employer (Contractor) covering: a) Health and Safety Representative Checklist b) Safety report from Safety Officer and Safety Agent
Health and Safety Reports	Monthly	Report covering: a) Incidents/Accidents and Investigations b) Non-conformance c) Health and Safety Training d) HIRA Updates e) Internal and External Audits
General Inspections	As per Health and Safety Specification and OHSA	Report on Health and Safety Specification and OHSA compliance: a) Scaffolding b) Lifting Machinery c) Excavation
General Inspections	Monthly	Covering: a) Firefighting Equipment b) Portable Electrical Equipment c) Ladders
Record keeping	Ongoing	Covering: a) General complaints b) Fines c) General incidents d) MSDS e) Surveillance Medicals f) Inspection Register g) Dept of Labour Notices
Permits	Before commencement with certain activities	As stipulated by the Health and Safety Specification and the OHSA / Construction Regulations

Key:

OHSA – Occupational Health and Safety Act, 1993

ANNEXURE A – REQUIREMENTS FOR THE SAFETY PLAN ASSESSMENT (INCLUDING COVID 19 REQUIREMENTS)

The Contractor must note that the information below is pertinent to the compilation of their safety plan response to this site-specific safety specification and it would be preferred if the Safety Plan is written in the order of the assessment documented below.

No	Item	Notes
1	**Project Directory**	Please state details of Project Client, Project Manager/Principal Agent, Safety Agent, Consulting Engineer, etc. (Name, address, contact details).
2	**Contractors Directory**	Please indicate if you will be using Contractors on this project, if yes, include their details, trade, and FEM details.
3	**Other Parties Directory**	Please indicate contact details for any services applicable (electricity, water, etc.) as well as Department of Labour and Emergency Services.
4	**Project Safety Statement**	The Project Safety Statement must be included in the Safety Plan.
5	**Health and Safety standards for the project (OHS Act, construction regulations, basic conditions of employment, etc.)**	Health and Safety standards must be included in the Safety Plan.
6	**Project Particulars**	Scope of works must be included in the Safety Plan. This is critical.
7	**Existing environment – Structures and Surroundings, Services (Electrical, Water, Sewerage, etc.), Traffic Arrangements, Parking, Access to Site, Storage of Plant and Materials**	Please include these items in the plan. The items must be Site Specific, the location of services and services that will be affected must be mentioned.
8	**Management Structure for safety on the Project**	A structured organogram with names of the responsible people must be included.
9	**Appointed Persons, Supervision**	The required appointments must be identified. A list of the appointed persons must be included in the Safety Plan.
10	**Security Procedures**	Please indicate if a security company will be appointed and include the contact information in the Safety Plan.
11	**Registers list and inspection frequency**	A list of the Inspection Registers that will be on file must be included in the Safety Plan.
12	**Design Co-ordination**	Please indicate your procedure for implementation of design changes by designer on the project, and the procedures for liaison and implementation of temporary works design on the project.
13	**Contractor Co-ordination**	Mention must be made of how Contractors will be co-ordinated on site to ensure that they work together and not adversely affected health and safety.

No	Item	Notes
14	**Housekeeping, stacking and storage**	Housekeeping policies and procedures must be included in the Safety Plan.
15	**Waste Disposal Arrangements**	Waste disposal arrangements procedures must be included in the Safety Plan.
16	**Noise and dust control**	Please indicate if any noisy operations (more than 85 decibels) will be carried out and what measures will be used to reduce noise exposure to workforce.
17	**Training Requirements**	Training requirements must be identified and recorded.
18	**Plant and Equipment**	A list of plant and equipment to be used on site must be included in the Safety Plan.
19	**Safety Monitoring Arrangements**	The name, contact details and SACPCMP registration status of the Safety Officer must be included in the Safety Plan. State how often the Safety officer will be on site (note safety specification requirement in section 1.7).
20	**Information for Contractors**	State how information will be given to Contractors on site.
21	**Consultation/communication arrangements with Employees**	State how information will be given to employees e.g. notice board.
22	**Selection of Contractors Procedures**	Principal Contractor must state what health and safety procedures they will use to assess the competence and resources of their Contractors on site.
23	**Activities with risk to Health and Safety (Risk Assessment)**	A Baseline Risk Assessment must be included in the Safety Plan, it must address the Risks identified in the Safety Specification as well as the risk of any other hazards that the Principal Contractor is aware of that are relevant to the site.
24	**Hazardous Substances**	Must be listed in the Safety Plan and addressed in the Risk Assessment.
25	**First Aid and Medical Procedures**	Please indicate name of first aider, position of first aid box, location of nearest medical facility and emergency numbers.
26	**Fire and Emergency Procedures**	List of emergency telephone numbers must be drawn up and included in the Safety Plan. The position of Fire Extinguishers, Assembly Point location, fire drill frequencies, numbers of fire marshals, etc.
27	**Accident and Incident Reporting and investigation**	State the Accident and Incident Reporting and investigation procedures of your company.
28	**Welfare and Site Facilities**	Elaborate on toilets and eating areas, water provision, COVID-19 ablution provision, how will workers be protected during wet weather conditions etc.
29	**Site Rules**	The Site Rules must be included in the Safety Plan.
30	**Personal Protective Equipment**	The necessity must be identified by Risk Assessments, the required PPE for site risks and COVID-19 control measures.
31	**Health & Safety File arrangements**	Please indicate arrangements for the return of the Health and Safety File to the safety agent at the end of the project.

No	Item	Notes
32	**Method Statements/Safe System of Works**	A list of Method Statements/Safe System of Works must be included in Safety Plan for all High-risk activities. **PLEASE NOTE THAT THIS IS PARTICULARLY RELEVANT FOR COVID-19. NO WORK MAY COMMENCE UNLESS COVID-19 RISKS AND CONTROL MEASURES HAVE BEEN APPROVED BY THE PROFESSIONAL TEAM. REFER TO SECTION 2.61 OF THIS SAFETY SPECIFICATION.**
33	**Permits and wayleaves**	List of activities that Principal Contractor anticipates will require permits and wayleaves (including those stated in the safety specification) to be included.
34	**Fall Prevention and Protection Plan and Fall Rescue Plan**	A copy of the Fall Prevention and Protection Plan, fall rescue plan and fall risk assessment must be included in the Safety Plan.
35	**Demolition method statement**	A copy of the Demolition Method Statement must be included in the Safety Plan.
36	**Confined spaces**	The Principal Contractors' procedures for managing access, egress and work in confined spaces must be specified in the Safety Plan. Includes permit procedures, air monitoring, PPE, etc.
37	**Safety Representatives and Safety Committees**	When a project has more than 20 employees a designated employee must be chosen by the labourers to represent them. A safety committee must be established if 2 or more safety representatives are appointed. Please note Safety Specification requirements regarding this section (section 2.12).
38	**Have the significant hazards from the safety specification been addressed?**	See section 1.9 of the Specifications and ensure practical measures have been detailed in the safety plan.
39	**Safety File - Safety Policies in File and Signed by 16(1) CEO.**	Safety Policies must be signed and explained to employees.
40	**Safety File - A copy of the valid Letter of Good standing from FEM / Workman's Compensation must be on file.**	A copy of the valid Letter of Good standing from FEM / Workman's Compensation must be on file.
41	**Safety File - Signed copy of the 37.2 Mandatary Agreement**	A 37.2 Mandatary Agreement needs to be signed between the Client and the Principal Contractor.
42	**Safety File - Appointment letter from Client (as well as 5.1.K)**	The Client must appoint the Principal Contractor in writing.
43	**Safety File – Notification / Permit**	A copy of the Annexure 2 Notification (and proof of submission) to Department of Labour must be available. This can be in the form of a Department stamp, email, or copy of Construction Work Permit.

CONTROL MEASURES THAT MUST BE INCLUDED FOR SAFETY PLAN SUBMISSION PURPOSES:

Coordination on Site Relating to COVID-19 matters - refer to latest Regulations regarding Covid-19

Transportation to Site - Procedures for Transportation of Workers to Site – employees should be advised that if using transport, passengers must wear a cloth mask to be allowed entry into the vehicle.

Communication Procedures - Contractor to describe comprehensive induction and toolbox talk procedures to include COVID-19.

COVID-19 PPE on Site - Contractor must describe controls for wearing of PPE on site, including wearing of cloth masks on site - people working and visiting site must be instructed on the correct way of wearing cloth masks, procedure for maintenance and replacement of cloth masks. Note that some surgical masks should be kept on site to give to persons exhibiting COVID-19 symptoms prior to being tested.

NOTE:

Disaster Management Act: Regulations: Transitional measures

Mandatory protocols when in a public place (as updated on 4 April 2022)
67. (1) For the purposes of these Regulations, a 'face mask' means a cloth face mask or a homemade item that covers the nose and mouth, or another appropriate item to cover the nose and mouth.
(2) The wearing of a face mask is mandatory for every person when in an indoor public place, excluding a child under the age of six years.
(3) No person will be allowed to-
(a) use, operate, perform any service on any form of public transport; or
(b) enter or be in a building, place or premises, including government buildings, places or premises, used by the public to obtain goods or services, if he or she is not wearing a face mask.
(4) (a) All persons in an open public space need not wear a face mask but must maintain a distance of at least one metre from another person.
(b) The school environment is excluded from the requirement of maintaining a distance of at least one metre from another person.
(5) An employer may not allow any employee to perform any duties or enter the employment premises if the employee is not wearing a face mask while performing his or her duties.

ANNEXURE B – LEGAL APPOINTMENTS The Contractor shall make the following appointments, as required:
Chief Executive Officer (OSH Act 16(1)
Contract Director/Manager (OSH Act 16(2)
Construction Manager (CR 8(1)
Construction Supervisor (CR 8(7)
Assistant Construction Supervisor (CR 8(8)
Construction Safety Officer (CR 8(5)
Traffic Safety Officer
Safety Representative (where > 20 employees on site)
Temporary work Designer (CR 12(1)
Temporary work Supervisor (CR12(2)
Construction risk assessor (CR 9(1))
Excavation Supervisor (CR13(1)(a)
Demolition Supervisor (CR14(1)
Scaffold Supervisor (CR16(1)
Suspended Platform Supervisor (CR17(1)
Material Hoist Inspector (CR19(8)(a)
Material Hoist Operator (CR19(6)
Bulk Mixing Plant Supervisor (CR20(1)
Bulk Mixing Plant Operator (CR20(2)
Controller of Explosive Actuated Fastening Devices Nails, Cartridges or Studs Issue and Collection (CR21(2)(g)(1)
Construction Vehicle and Mobile Plant Operator (CR23(1)(d)(i)
Controller of Temporary Electrical Installations (CR24(c)
Stacking Supervisor (CR28(a)
Fire Extinguishing Equipment Inspector (CR29(h)
Fall Protection Plan Developer (CR 10(1)(a)
Incident Investigator (OSH Act 9(2)
Competent Person – Confined Spaces (GAR 5(1)
COVID 19 – Compliance Officer and COVID 19 – Manager (to address employees concerns and keep them informed re COVID-19)

ANNEXURE C - BASELINE RISK ASSESSMENT FOR PROJECT

Irrespective of the risk presented on site, it will be ensured that sufficient supervision is in place on site, that personnel are trained in accordance with legislation, including the requirement for site specific inductions on site to inform personnel on site of the risks and hazards applicable to the site. Site supervision is responsible for ensuring that the control measures required below are implemented on site.

	HAZARD	RISK	MINIMUM CONTROL MEASURES
1.	Bricklaying	Caustic contamination with mortar Contact with sharp bladed tools	• Use only trained personnel • Safe means of access to be provided • Safe/Suitable working platform required where working at height • PPE for mortar to include gloves where practicable and goggles/ masks where there is a risk of contamination
2.	Compacting and Filling	Contact with tipping materials Contact with moving plant Vehicles/personnel falling into excavations Contact with underground services	• Trained banksman to control vehicles movement • Only trained personnel use plant • Personal Protective Equipment to be worn • Personnel to stand clear as materials are being tipped • Use stop blocks and signs to warn vehicles of excavations, where applicable • Stand clear of plant whilst materials are being compacted • Establish position of underground services and protect services from damage
3.	Compactor Operations	Crushing of feet	• Only trained and competent personnel to use the machine • Ensure operative wears steel toe cap shoes or boots at all times
4.	Confined Spaces	Suffocation Fumes	• Ensure that confined space is sufficiently ventilated • Wear personal protective equipment such as proper masks if air supply insufficient or not of sufficient quality • Test oxygen levels in confined space to ensure that is safe for entry • Ensure that emergency procedures in place
5.	Cutting Off Disc	Noise Cuts from machine Fire (particularly at refuelling) Flying debris Blade shattering Contamination by fume created or exhaust fume	• Use competent personnel. • Hot works control- fire extinguisher, fire watchman. (Permit may be required) • PPE to include gloves, eye protection, hearing protection • Solid working position. • Clear working area • Correct grade of blade must be used. • Good ventilation to be provided (forced if necessary). • Changing of wheels to be by competent persons only • Cut off discs must not be used for grinding (grinding disc thicker) • Bystanders to wear hearing protection, as applicable
6.	Demolition	Falling materials Premature collapse of structure	• Ensure there is a current method statement in place • Ensure all emergency procedures are in place and all details are displayed • Ensure that structural demolition has been approved by the designer and site management • Personnel must be competent • Ensure at all times there is a safe means of access and egress • All personnel must wear suitable and sufficient Personal Protective Equipment, including head, eye and skin protection
7.	Electrical Commissioning	Electric shock	• Personnel to comply with permits to work issued by Client • Personal protective equipment to be worn by employees to prevent electric shock • First aid treatment to be readily available • Only competent and trained persons may decommission or commission electrical equipment

	HAZARD	RISK	MINIMUM CONTROL MEASURES
8.	Electric Tools and Electrical Installations	Electric shock Fire	• Electric tools and installations to be in good condition • Inspect electric tools before use • Do not use electric tools in wet/damp conditions • Use personal protective equipment such as insulated gloves • Electrical installations register to be maintained, inspected by competent person
9.	Excavations (Working in and around)	Toxic fumes Collapse of trench walls/trapping Falling into excavation Collapse of adjacent structures	• Deep excavations / monitor air for toxic fumes • Prevent collapse by battering back sides to a safe angle or install temporary support • Protect vehicles from falling into excavations – provide barriers, signage, etc as necessary • Beware of undermining of other structures (eg: buildings, scaffolds) • Record excavation inspections by competent person on daily basis • Provide suitable means of access/egress in case of emergency. • Excavations formed by explosives must be accompanied by method statement approved by Client
10.	Fire	Injuries to workers, pedestrians, residents, road users, damage to property through fire	• No littering on site which could become fire hazard, maintain site in clean condition. • No fires to be lit on site. Have a working fire extinguisher at hand at all times. • No smoking or naked flame near flammable substances or in unauthorised areas • Ensure proper storage/use of Petrol/diesel/flammable substances – post warning notices
11.	Flammable Liquids and Gases (Use of)	Fire Explosion	• No littering on site which could become fire hazard, maintain site in clean condition. • Have a working fire extinguisher at hand at all times. • No smoking or naked flame near flammable substances or in unauthorised areas • Ensure proper storage/use of Petrol/diesel/flammable substances – post warning notices • Equipment must be in good condition, maintained • Personnel using substances must be trained in safe use and risks
12.	Hand tools	Injuries caused by use of hand tool Impact with the tool Falls due to access problems Contamination with substance being worked	• Ensure: • Tool is correct for job • Tool is in good order and suitably sharp • Personnel must be competent/instructed in tool usage and tool safely • Lighting is sufficient • Access is safe, working platform is secure, leading edge is guarded • Operative is wearing all necessary PPE
13.	Hazardous Substances	Injuries to workers through use of hazardous substances, eg: injuries to eyes, skin, etc	• Use substances in accordance with data sheet, particularly reference protective clothing required (example: gloves, goggles, etc) • Know what First Aid measures are • Have welfare facilities available for washing of hands, etc
14.	Hot Works	Burns to eyes or other parts of the body	• Personal Protective Equipment to include eye, skin and hearing protection • Respirator may be required where cutting galvanized steel or anywhere else toxic fumes and gases arise. Dust can also be a problem and forced ventilation may be required.

	HAZARD	RISK	MINIMUM CONTROL MEASURES
15.	Lifting Operations	Falling material Crushing by materials Hand injuries to the slinger Toppling crane	• Check test certificate • Check examination certificate • Check inspection have been carried out • Check certificates for lifting equipment (chains, slings, shackles, etc) • Ensure lifting gear is rated to carry load (SWL) • Ensure materials being lifted are properly packaged and slung. • Be aware that there should be a minimum clearance of 600mm between any slewing parts of a crane and any fixed installation to prevent being trapped. • Access to the work area during lifting operations is to be restricted to those involved with and trained in the work in hand. Do not allow members of the public to gain access to the area. • Only trained banksmen to be used. • The crane driver and the banksman are to ensure that the signals given are clearly understood.
16.	Manual Handling of General Items	Muscular skeletal injuries if the load is too heavy or awkward Operative falling/ tripping Contamination from the substance being carried Fall of material being carried	• Personnel should be aware of safe manual handling techniques • Personnel to wear Personal Protective Equipment when carrying items, eg: safety footwear and gloves. • Ensure good housekeeping against tripping/fall hazards. • Operative to get assistance if load too heavy- team lift if necessary. • Utilise mechanical lifting and carrying aids where possible. • Personnel to ensure access equipment, ladders will take weight of operative and load being carried. • Personnel to ensure item being carried is properly bonded or is not liable to break apart whilst being manually handled.
17.	Members of Public – Protection of (municipal staff included)	Injury to member of public and road users from site works	• Barriers and signage to be in place • Workers must warn away any members of public from the works • Footpaths and bridges which are open to public must be closed off if in area of works or otherwise made safe so that no injury occurs to members of public • Traffic turning into site – traffic management and signage as required. • Signage to be on road at site entrance warning motorists that construction traffic turning into/out of site access. Keep roads free of mud where possible • Refer to plant risk assessment for details on plant safety precautions • NOTE: SIGNAGE TO BE POSTED ON SITE TO WARN OF CONSTRUCTION TRAFFIC MOVEMENTS. SAFE MEANS OF ACCESS FOR BOTH CONSTRUCTION TRAFFIC TO SITE AND PRIVATE HOMEOWNERS MUST BE AGREED.
18.	Mobile Crane Erection and Dismantling and Use	Collapse of structure Overturning of structure Falling materials	• Ensure emergency procedures are in place and all operative are aware of the details • Only use trained and competent operators for the erection and dismantling and use of cranes • Ensure crane driver is trained and holds certification as proof. Must have valid medical certificate of fitness. • Ensure there is safe means of access available at all times • Ensure the mobile crane driver has 360° vision if not ensure a fully trained banksman is used • Banksman to wear reflector vest to identify himself to the crane driver • Ensure all personnel wear suitable and sufficient personal protective equipment • Consider creating exclusion areas

	HAZARD	RISK	MINIMUM CONTROL MEASURES
19.	Noise and Dust	Breathing in dust can cause long term health problems, noise can damage hearing	• Wear respiratory and hearing protection • Dampen down and minimise dust where possible.
20.	Overhead Services (Working near)	Contact with live services causing injury to personnel Damage caused to services	• Maintain safe clearance levels • Establish presence of any services via proper walk-through survey of site and/or means of service drawings • Wear personal protective clothing • Ensure height of plant/vehicles does not compromise or exceed clearance levels for overhead services • Obtain information on clearance levels from service provider •
21.	Plant or Vehicles and Equipment Operation	Workers injured by passing traffic Road users and pedestrians at risk from plant operation Noise	• Implement traffic protection measures • Trained and competent operators must be used • Check plant and vehicles on daily basis before use and record inspections. Maintain vehicles in safe condition. • Medical certificates of fitness required for construction plant. • Crossing of road by construction vehicles or machines must be limited to the practical minimum • Plant and vehicles must be fitted with amber rotating beacons and reverse alarms. • Wear appropriate protective clothing/equipment, eg: goggles, gloves, ear defenders, etc as appropriate.
22.	Scaffold Erection/ Dismantling	Personnel falling from a height Items of scaffold falling onto personnel Scaffold collapsing onto those below	• Ensure • scaffold is designed to take the imposed loads • scaffolding is constructed properly • scaffold is not overloaded • scaffolders are fully trained • scaffolding is regularly checked by competent person and record of inspection retained. Written inspections to be recorded on weekly basis • scaffolders must adhere to the safe systems of work. • all fall arrest equipment to be checked and certified in good working order • that ALL understand the safe system of work
23.	Steel Fixing	Back injuries caused by manual handling Eye injuries from tie wire Trips / falls Falling form height	• PPE must include safety boots and goggles • Manual handling training may be required • Care to be taken when working near over head lines • Use only trained personnel • Provide safe means of access • Maintain and regularly inspect all lifting appliances and equipment • Cap starter bars to prevent injuries where feasible • Construct scaffold walk ways to cross reinforcing mesh, as required
24.	Temporary Works – shoring, scaffold, formwork	Collapse of temporary work	• Wear personal protective equipment such as gloves and goggles • Formwork must be built by trained person and also be inspected by competent person and results entered into register on site
25.	Troxler – use of	Radiation exposure Transportation and storage of nuclear equipment Working in road	Ensure • Training of Troxler gauge operators in basic radiation safety and correct operating procedure to satisfactory level of competence • An enclosed vehicle must be used for transport of the gauge • After use and before storing the gauge, a visual check to be carried out to confirm shutter is properly closed • Warning signage to be displayed at entrance to store indicating presence of radioactive material • Wear reflective vests when working in or near the road or road shoulder as well as any other required personal protective clothing. •

	HAZARD	RISK	MINIMUM CONTROL MEASURES
26.	Underground Services	Striking of buried services	• Make all necessary enquiries to establish what services are in the area. Consult drawings and advice from service provider (eg: Municipality or ESKOM) when planning work. • Assume all service to be live (Unless confirmation is received to confirm that services are isolated or otherwise made safe). Do not work near live services without authorisation from site management. • Comply with the requirements of the safe system of work for underground services. • Where available, locate services with a locator • Hand dig around services
27.	Working at Height	Personnel falling form height Falling debris Those beneath being injured	• All access equipment is properly constructed (inspections record must be maintained) • Only trained personnel construct, dismantle or control the access equipment • All access equipment must have full toe boards and guardrails - comply with SANS 10085 on erection, use and dismantling of scaffolding • No access equipment may be loaded above the level of the guardrail • No access equipment to be loaded above its safe working load • Where work involves leaning out on an open leading edge, then all personnel are to be fitted with full body harness. The harness must be connected at all times • All fall arrest equipment to be correctly maintained • Ensure if ladders are being used for access, they are either footed or tied. Also the ladder must be set at the correct level of 1 in 4 or approximately 75°
28.	Work over or next to Water (sewage containing structures)	Drowning	• Evaluate depth of water, height above water that work takes place, whether workers can swim or not and then determine safety precautions required: these may include such measures such as barriers, signage, life belts, safety harnesses, etc. • When working on water edge - erect life saving devices and barriers to protect workers and vehicles (stop blocks may also be required). Only trained and competent persons to be used. •
29.	Working with Effluent	Contact with effluent causing sickness or disease	• ensure good hygiene facilities • personnel to be competent in work activity • personnel to wear appropriate personal protective equipment such as goggles, overall, gloves and goggles

ANNEXURE D - BASELINE RISK ASSESSMENT FOR PROJECT – COVID-19

It must be ensured that sufficient supervision is in place on site, that personnel are trained in accordance with legislation, including the requirement for site specific inductions on site to inform personnel on site of the COVID 19 risks and hazards applicable to the site. Site supervision is responsible for ensuring that the control measures required below are implemented on site.

No.	HAZARD	MINIMUM CONTROL MEASURES
1.	COVID-19 - Contracting COVID-19, person to person transmission	• Do not share tools / equipment, crockery/cutlery/towels/bedding or anything that can facilitate the spread of the virus. • Masks have not been proven to definitively protect against every contagion. However, masks prevent a person from unconsciously touching their eyes, nose, and mouth, so they may offer a measure of protection. Masks are for single use only, not to be worn two days in a row. • Avoid touching your eyes, nose, and mouth and shaking hands with others. • Cough or sneeze into a tissue and dispose thereof safely into a bin provided. • Wash your hands frequently with soap and running water for no less than 20 seconds. If you have none available use a hand sanitizer with at least 70% alcohol. • Apply social distancing principles, stay at least 1m away from people/employees were possible. • Avoid crowds and gatherings. • Clean frequently touched objects/surfaces. • The following cleaning products can be used: Hypochlorite (e.g., Household Bleach) Alcohol (70%) Hydrogen Peroxide Phenolic Compounds Quaternary Ammonium Compounds

No.	ACTIVITY	HAZARD	MINIMUM CONTROL MEASURES
2.	Occupational Health	Older workers of 60+, workers with underlying auto-immune or chronic diseases are at increased risk of infection (note that workers may be symptom free but infected with COVID-19)	• Induction, toolbox talks to be done on topics relating to COVID-19, personal hygiene, and PPE.
3.	Labour	Underlying auto-immune or chronic diseases, socio-economic status, having to use public transport to get to work	• Induction, toolbox talks to be done on topics relating to COVID-19, personal hygiene, and PPE. • Public transport must comply with government guidelines ref wearing of masks.

No.	ACTIVITY	HAZARD	MINIMUM CONTROL MEASURES
4.	Transportation (Public and on Site)	Maximum allowed capacity exceeded; No facilities for sanitising vehicles and passengers; No additional protective measures available, e.g., face masks; Unlicensed drivers and operators	• Selection and provision of transport services compliant with gazetted requirements; Policy and procedures and rules for travel, where possible to limit the use of public transport, or to arrange selective methods of transport, ongoing toolbox talks and supply of cloth masks to be worn when travelling or moving on and off site.
5.	Waste Management	Spreading of virus and contact with virus causing infection from handwashing, drying hands, cleaning equipment, disposal of contaminated waste and other related aspects	• Establish and follow protocols for disposal of potentially infected waste (receptacles). Awareness through notices (posters) regarding correct procedures of waste disposal. Competent supervision and adequate awareness training required. Provide adequate supplies of material and consumables, provision of sealable disposal containers/bags through appropriate waste removal company. Provide adequate supply of paper towels. If contractors used ensure appropriate management.
6.	Signage	Unauthorised entry to site and work areas compromising workers health (contamination). Acts and behaviour that compromises worker	• Installation of posters and signage with the site rules and protocols that need to be maintained at strategic points.
7.	Welfare Facilities	Spreading of virus and contact with virus causing infection	• Limiting of personnel on site to minimum number required to maintain control and management. Implement and maintain cleaning and disinfecting programme.
8.	Use of Personal Protective Equipment	Risk of spread of droplet infection through coughing, sneezing when in close contact with other people	• No employee/ visitor will be allowed on site without a cloth mask. Adequate training must be provided in the correct use and disposal of these masks. Cloth masks must be washed and ironed. Where possible face shields should be used to protect mouth, nose, and eyes. Regular cleaning of face shields required. • No sharing of PPE will be permitted. Adequate supervision required. COVID PPE does not replace conventional PPE.

ANNEXURE E – SAFETY SPECIFICATION AND BASELINE RISK ASSESSMENT ISSUE REGISTER

Date of Original Safety Specification Compilation	Compiled By	Issue Date
June 2022	Mark Winter	14th June 2022

Revision Summary	Revised By	Revision Date

Acknowledgement:

I, _____representing

_____(Contractor), have satisfied myself with the content of this Health and Safety Specification and shall ensure that our employees and Contractors on site comply with the requirements of this document, our safety documentation and health and safety legislation.

_____ _____

Signature of Contractor Date

Comments:

_____

_____

_____

_____

_____

_____

ANNEX 2: CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN

ANNEXURE 2

ENVIRONMENTAL MANAGEMENT PLAN

SPECIFICATION: ENVIRONMENTAL MANAGEMENT

EM 1 **SCOPE**

This specification covers the requirements for controlling the impact on the environment of construction activities.

EM 2 **DEFINITIONS**

EM 2.1 **Environment** means the surroundings within which humans exist and that are made up of –

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

EM 2.2 **Potentially hazardous substance** is a substance, which, in the reasonable opinion of the Engineer, can have a deleterious effect on the environment.

EM 2.3 **Method Statement** : a written submission by the Contractor to the Engineer following a request by the Engineer, setting out the plant, materials, labour and method the Contractor proposes using to carry out an activity, identified by the Engineer when requesting the Method Statement, in such detail that the Engineer is enabled to assess whether the Contractor's proposal is in accordance with the Specifications and/or will produce results in accordance with the Specifications.

The Method Statement shall cover applicable details with regard to :

- construction procedures,
- materials and equipment to be used,
- getting the equipment to and from site,
- how the equipment/material will be moved while on site,
- how and where material will be stored,
- the containment (or action to be taken if containment is not possible) of leaks or spills of any liquid or material that may occur,
- timing and location of activities,
- compliance/non-compliance with the Specifications and
- any other information deemed necessary by the Engineer.

EM 2.4 **Reasonable** means, unless the context indicates otherwise, reasonable in the opinion of the Engineer after he has consulted with a person, not an employee of the Employer, suitably experienced in "environmental implementation plans" and "environmental management plans" (both as defined in Act No. 107, 1998).

EM 2.5 **Solid waste** means all solid waste, including construction debris, chemical waste, excess cement/concrete, wrapping materials, timber, tins and cans, drums, wire, nails, food and domestic waste (e.g. plastic packets and wrappers).

EM 2.6 **Contract** means the General Conditions of Contract and Special Conditions, Specifications, Drawings, Tender, written records of matters agreed after the submission of the Contractor's tender, Letter of Acceptance and Agreement, together with order documents which the parties have agreed in writing shall form part of the Contract and such amendments or additions to the Contract as may be agreed in writing between the parties.

EM 2.7 **Contaminated** water means water contaminated by the Contractor's activities.

EM 3 ENVIRONMENTAL MANAGEMENT PLAN

EM 3.1 Demarcation of the site

For the purpose of the EMP, the site shall be divided into two areas identified by the Engineer and the Contractor:

(i) The construction camp comprising all offices, lay down yards, vehicle wash areas, fuel and material storage areas, batching areas and other infrastructure that is required for the running of the job.

(ii) The working area in which construction activity is permitted to take place. No infrastructure, permanent lay down or storage areas shall be established in this working area unless specified in the project specification or prior approval is obtained from the Engineer.

EM 3.1 Construction camp

The Contractor shall provide the Engineer with a plan showing the positions of all buildings, yards, vehicle wash areas, batching areas and other infrastructure for approval by the Engineer at least ten (10) days prior to the commencement date. The construction site shall be planned in such away so as to affect as small an area as practically possible. The Engineer shall approve the location and layout of the construction camp prior to establishment.

EM 3.2 Fencing of the site

IF a temporary fence is required, the Contractor shall erect and maintain such a fence (demarcating) the boundary of the working area, construction camp and access roads) to the satisfaction of the Engineer. The erection of this fence shall be one of the first tasks undertaken by the Contractor after the commencement date. The boundaries between the construction camp area and the working area within the site shall also be fenced.

The contractor shall ensure that the erection of the fencing causes minimal disturbance to flore, fauna, natural, historical and culture features. A method statement shall be submitted to the Engineer prior to erection to ensure proper positioning of the fence.

All material left over from fencing operations shall be collected after the fence has been erected and removed from site. Fences shall not be moved or removed without the written consent of the Engineer. The Contractor throughout the construction period shall maintain all fences.

EM 3.3 Workshop

Any workshop shall be located inside the demarcated construction camp area. The exact location and design of the workshop shall be as approved by the Engineer prior to establishment. The workshop shall have a smooth impermeable (concrete) floor. The floor shall be bunded and sloped towards an oil trap or sump to contain any spillages of substances (e.g. oil). When servicing equipment, drip trays shall be used to collect the waste oil and other lubricants. All waste material shall be disposed of in accordance with national, regional and local laws, regulations and by-laws. The waste material shall be regularly removed off site and disposed of at an approved waste site.

EM 3.4 Eating areas

The Contractor's employees shall eat in the designated eating area indicated on the Contractor's drawing of the construction camp that has been approved by the Engineer. No changes to the eating area shall be made without the approval of the Engineer. The Contractor shall provide shade and adequate scaveger-proof and weatherproof refuse bins in this area.

Any cooking on site shall only be undertaken in the eating area and be done on well maintained gas cookers with fire extinguishers present. No cooking shall be done anywhere else on site and

no fires are permitted.

EM 3.5 **Ablution facilities**

The exact location of the toilets shall be as approved by the Engineer. The Contractor shall provide toilets and shall be responsible for the maintenance and servicing on a daily basis. The contractor shall ensure that no spillage occurs when the toilets are cleaned or emptied. Burial of waste from toilets on site is strictly prohibited. The toilets shall be maintained in a clean state. Performing ablutions anywhere other than in toilets is strictly prohibited. Leaking toilets shall be repaired immediately or removed from site.

EM 3.6 **Solid waste collection**

“Solid waste” refers to all solid waste, including construction debris, chemical waste, excess cement/concrete, wrapping materials, timber, tins and cans, drums, wire, nails, food and domestic waste (e.g. plastic packets and wrappers).

The Contractor shall set up a waste control and removal system. The Contractor shall submit a method statement for waste control and removal to the Engineer for approval prior to commencement. Bins shall be closed, weatherproof and scavenger-proof.

Waste shall be collected from these bins on a daily basis and shall be stored in a central collection area prior to removal off-site. This central collection area shall have appropriate storage containers (closed and weatherproof) bunded and lined with plastic or concrete. The waste from this central collection area shall be disposed off-site at an approved waste site. Waste shall be removed from site on a regular basis as approved by the Engineer. Waste shall not be burnt or buried on site or in the surrounding area. Where possible, appropriate material shall be reused or recycled.

EM 3.7 **Fuel storage area**

Fuels required for use during construction shall be stored in a depot at the construction camp at a location as agreed upon by the Engineer. The Contractor shall ensure that all liquid fuels (petrol and diesel) are stored in tanks with lids, which are kept firmly shut. The tanks shall be situated on a smooth impermeable (plastic or concrete) base with an earth bund. The impermeable lining shall extend to the crest of the bund and the volume inside the bund shall be 1,5 x the total capacity of the storage tank. The bunded area shall be emptied of water following rainfall events. The floor of the bund shall be sloped towards an oil trap or sump to enable any spilled fuel and / or fuel-soaked water to be removed.

EM 3.8 **Concrete batching area**

Cement and concrete are regarded as hazardous to the environment due to the high pH of the material and the chemicals it contains.

The Contractor shall submit a method statement for mixing of concrete for approval by the Engineer indicating where the mixing will take place and the method to ensure that wastewater and materials are contained in the batching area and disposed of correctly. Concrete shall not be mixed directly on the ground.

EM 3.9 **Equipment maintenance area**

All vehicles and equipment shall be kept in good working order and serviced regularly. Leaking Equipment shall be repaired immediately or removed from site. Where practical, all maintenance of equipment and vehicles on Site shall be performed in the workshop. If it is necessary to do maintenance outside of the workshop area, the Contractor shall obtain the approval of the Engineer prior to commencing activities.

The Contractor shall ensure that in his workshop and other plant maintenance facilities, including

those areas where, after obtaining the Engineer's approval, the Contractor carries out emergency plant maintenance, there is no contamination of the soil or vegetation.

When servicing equipment, drip trays shall be used to collect the waste oil and other lubricants. Drip trays shall also be provided in construction areas for stationary plant (such as compressors) and for "parked" plant (such as scrapers, loaders, vehicles).

The washing of equipment shall be restricted to urgent maintenance requirements only. All washing shall be undertaken in the workshop or maintenance areas, and these areas must be equipped with a suitable impermeable floor and sump/oil trap. The use of detergents for washing shall be restricted to low phosphate and nitrate containing, low sudsing type detergents.

EM 3.10 MATERIALS

EM 3.10.1 Material handling, use and storage

The Contractor shall ensure that any delivery drivers are informed of all procedures and restrictions (e.g. which access roads to use, including "no go" areas, speed limits, dust control, etc.) required to comply with the EMP before they arrive at site and off load any materials. The Contractor shall ensure that these delivery drivers are supervised during off loading, by someone with an adequate understanding of the requirements of the EMP, so as to ensure that all relevant requirements of the EMP are followed.

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 material shall be stored within the Contractor's camp, and if so required by the Project Specification, out of the rain. All lay down areas outside of the construction camp shall subject to the Engineer's approval shall not unreasonably be withheld.

EM 3.10.2 Hazardous Substances

The Contractor shall comply with all relevant national, regional and local legislation with regard to the transport, use and disposal of hazardous materials.

The contractor shall provide the Engineer with a list of all hazardous materials to be used on site, together with the storage, handling and disposal procedures of the materials. This information shall be available to all personnel on site.

Hazardous chemical substances (as defined in the Regulations for Hazardous Chemical Substances) used during construction shall be stored in secondary containers within the demarcated construction camp area. The relevant Material Safety Data Sheets (MSDS) shall be available on Site. Procedures detailed in the MSDS's shall be followed in the event of an emergency situation.

If potentially hazardous substances are to be stored on site, the Contractor shall provide a Method Statement detailing the substances/materials to be used, together with the storage handling and disposal procedures of the materials.

EM 3.10.3 Fuel (Petrol and Diesel) and Oil

Where reasonably practical, plant shall be refuelled at the depot or at the workshop as applicable. If it is not reasonably practical then the surface under the refueling area shall be protected against pollution to the reasonable satisfaction of the engineer prior to any refueling activities. Enretech or similar products approved by the Engineer shall be available during any refueling of maintenance

activities.

EM 3.11 **Fire control**

No fires may be lit on site. Any fires that occur shall be reported to the Engineer immediately. Smoking shall not be permitted in those areas where it is s fire hazard which areas shall include the workshop and fuel storage areas and any areas where the vegetation or other material is such as to make liable the rapid spread of an initial flame.

The Contractor shall appoint a Fire Officer 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 ensure that there is basic fire-fighting equipment available on Site at all times. This shall include at least rubber beaters when working in urban open spaces and fynbos areas, and at least one fire extinguisher of the appropriate type when welding activities are undertaken.

EM 3.12 **Emergency procedures**

The Contractor shall submit Method Statements covering the procedures for the following emergencies :

EM 3.12.1 **Fire**

The Contractor shall advise the relevant authority of a fire as soon as one starts and shall not wait until ha can no longer control it. The Contractor shall ensure that his employees are aware of the procedure to be followed in the event of a fire.

EM 3.12.2 **Accidental leaks and spillages**

The Contractor shall ensure that his employees are aware of the procedure to be followed for dealing with spills and leaks, which shall include notifying the Engineer, CMC Scientific Services and the relevant authorities. The Contractor shall ensure that the necessary materials and equipment for dealing with spills and leaks is available on Site at all times. Treatment and remediation of the spill areas shall be undertaken to the reasonable satisfaction of the Engineer.

In the event of a hydrocarbon spill, the source of the spillage shall be isolated, and the spillage contained. The area shall be cordoned off and secured. The Contractor shall ensure that there is always a supply of absorbent material readily available to absorb and where possible be designed to encapsulate minor hydrocarbon spillage. The quantity of such materials shall be able to absorb/deal with a minimum of 200 l of hydrocarbon liquid spill.

EM 3.13 **Care of surrounding areas**

The Contractor shall ensure that no contamination of or damage to the surrounding area or watercourses shall occur as a result of any of his activities during construction.

Care shall be taken to ensure no accidental spillage or leakage occurs. Should any spillage or leakage occur the Contractor shall immediately stop his operation and clean up the spillage. He shall then rectify the cause of the spillage or leakage before proceeding further to ensure that no further spillages occur.

The clean up of spillage and any damage caused by the spillage or leakage shall be for the Contractor's account. The Contractor shall submit a method statement for management of accidental leaks and spillages to the Engineer for approval.

EM 3.14 **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 Project Specification. Where erosion and/or sedimentation, whether on or off the Site, occurs despite the Contractor complying with the foregoing, rectification shall be carried out in accordance with details specified by the Engineer. Where erosion and/or sedimentation occurs due to the fault of the Contractor, rectification shall be carried out to the reasonable requirements of the Engineer.

EM 3.15 **TOLETRANCES**

Environmental management is concerned not only with the final results of the Contractor's operations to carry out the Works but also with the control of how those 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 environmental requirements on an ongoing basis and any failure on his part to do so will entitle the Engineer to certify the imposition of a fine subject to the conditions in the Pro Forms : Protection of the Environment and the details set out in the Project Specification.

ANNEX 3: MONTHLY PROJECT LABOUR REPORT

ANNEX 1 (continued)

MONTHLY PROJECT LABOUR REPORT

WORKER DETAILS AND WORK INFORMATION

CONTRACT OR WORKS PROJECT NUMBER:	

Year	Month		
		of	

	(8)	(8)	(8)	(9)	(10)			(11)	(12)	(13)
No.	First name	Surname	ID number	Jobseeker Database Reference Number	New Worker (Y/N)	Gender (M/F)	Disabled (Y/N)	No of days worked this month (excl. training)	No of training days this month (with stipend)	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 Project Manager/ Representative:	Name		Signature	
	Date			

ANNEX 4: B-BBEE SUB-CONTRACT EXPENDITURE REPORT

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
			Total:	R
			Expressed as a percentage of **P***	%

[1]Documentary evidence to be provided

Signatures

Declared by Contractor to be true and correct: ..... **Date:** .....

Verified by Employer's Agent/ Employer's Agent's Representative: ..... **Date:** .....

ANNEX 5: JOINT VENTURE EXPENDITURE REPORT

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	%

[1]Documentary evidence to be provided

Signatures

Declared by Contractor to be true and correct: ---------- **Date:** ----------

Verified by Employer's Agent/ Employer's Agent's Representative: ---------- **Date:** ----------

ANNEX 6: TARGETED LABOUR CONTRACT PARTICIPATION EXPENDITURE REPORT

CONTRACT NO. AND NAME: .....

CONTRACTOR: .....

TARGETED LABOUR CONTRACT PARTICIPATION EXPENDITURE REPORT BASED ON CERTIFICATE NO. .....

Value of the contract (as defined in the **Preference Schedule**) (**P***)	R

Specified Targeted Labour Contract Participation Goal	%

Name of Contractor/Sub-contractor (list all)	**Total previous expenditure on wages in respect of targeted labour**	**Net Amount for this month[1]**	**Total expenditure on wages in respect of targeted labour**
Contractor	R	R	R
Sub-contractor A	R	R	R
Sub-contractor B	R	R	R
		Total:	R
		Expressed as a percentage of **P***	%

[1]Documentary evidence to be provided

Signatures

Declared by Contractor to be true and correct: ..... **Date** .....

Verified by Employer's Agent/ Employer's Agent's Representative: ..... **Date** .....

ANNEX 7: 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 LANGEBERG MUNICIPALITY

Contractor ……..

Works **CONTRACT NO: T41/2022- REFURBISHMENT AND UPGRADE OF ROBERTSON WASTEWATER TREATMENT WORKS**

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:

Bill of Quantities 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 the ……..day of……..20……..

…….. ……

for the Contractor As witness

ANNEX 8: MECHANICAL AND ELECTRICAL DATA SHEETS

SECTION 1: MECHANICAL

The Tenderer shall include Manufacturer brochures, technical data sheets and drawing for all equipment offered.

PART 1 : MECHANICAL PERFORATED BAND SCREEN

MECHANICAL PERFORATED BAND SCREEN	
Name of manufacturer	
Place of manufacture	
Type of band	
Number band	
Model number and type	
Screw pitch (mm)	
Screw diameter (mm)	
Screw material	
Trough material	
Motor:	
Name of manufacturer	
Place of manufacture	
Type of motor	
Class of insulation	
Degree of motor protection (IP)	
Speed of rotation (r.p.m.)	
Rated output (kW)	
% Utilisation at rated output of motor	
Gearbox / Speed Reducer:	
Name of manufacturer	
Place of manufacture	
Type and number	
Mechanical power rating (kW)	
Thermal power rating (kW)	
Max torque capacity (Nm)	
Efficiency at motor rated output	
Service factor	

Signature Date

PART 2 : BIOLOGICAL REACTOR AND BLOWER BUILDING

MIXERS (4 off)	
Vertical line shaft Mixer:	
Name of manufacturer	
Place of manufacture	
Type of mixer	
Model number	
Total mass of unit (mixer, motor, speed reducer, base plate) (kg)	
Material of impeller	
Material of shaft	
Material of base plate	
Corrosion protection	
Detail of mixer impeller (radial / axial flow, no, of blades, etc)	
Shaft length (mm)	
Shaft diameter (mm)	
Means of supporting shaft	
Impeller diameter (mm)	
Impeller speed (rpm)	
Impeller tip speed (m/s)	
Pumping capacity (m^3/s)	
Maximum power absorbed at shaft (kW)	
Axial force on mixer (kN)	
Motor:	
Name of manufacturer	
Place of manufacture	
Type of motor	
Class of insulation	
Degree of motor protection (IP)	
Speed of rotation (r.p.m.)	
Rated output (kW)	
% Utilisation at rated output of motor	
Efficiency of motor (%)	
Gearbox / Speed Reducer:	
Name of manufacturer	
Place of manufacture	
Model number	
Type of gears	
Lubrication Method	
Weight of unit (kg)	
Transmission ratio	
Actual power transmitted under maximum load (kW)	
Efficiency (%)	
Service factor on installed power	

Service factor on absorbed power	
ASMA rating (kW)	
Thermal rating at 40°C (kW)	
Bearing life L10 for continuous 24 h operation (h)	
Gear life L10 for continuous 24 h operation (h)	

R-RECYCLE PUMP INSTALLATION (2 off)				
Pump:				
Name of manufacturer				
Place of manufacture				
Type of pump				
Number of pumps				
Model number and type				
Number of stages				
Impeller diameter (mm)				
Impeller material				
Characteristics:				
	Shut-off head	Best efficiency	Max. power condition	Duty point
Total manumatic head (m)				
Flow rate (l/s)				
NPSH required (m)				
Motor power (kW) / current (A) required at 400 V	/ …….	/ …….	/ …….	/ …….
Pump efficiency (%)				
Suction Diameter				
Discharge Diameter				
Weight of pump with motor				
Type of gland sealing				
Pump speed				
Solid size (mm)				
Motor:				
Name of manufacturer				
Place of manufacture				
Type of motor				
Class of insulation				
Degree of motor protection (IP)				
Speed of rotation (r.p.m.)				
Rated output (kW)				
Power factor at:				
Full load				
¾ load				
Motor efficiency at:				
Full load				
¾ load				
Protection class				
Full load speed				

% Utilisation at rated output of motor	
Pump Guaranteed Characteristics:	
We guarantee that each pump set shall perform, in compliance with the Specification, as per the figures completed below:	

Minimum flow rate at the operational point:	l/s
Minimum manometric head at the operational point:	m
Minimum pump efficiency at the operational point:	%
Maximum shaft power required at operational point:	kW
Maximum current drawn at the operational point at 400V:	A
Maximum operational speed to achieve the operational point:	RPM
Rated motor power exceeds required shaft power by:	%

Pipework and Valves:	
Pipework:	
Name of Manufacturer	
Material of piping	
Finish	
Maximum working pressure	
Test pressure	
Internal diameter	
Flange rating and drilling	
Couplings	
Non-return Valves	
Type of valve	
Name of Manufacturer	
Make and model number	
Material of body	
Material of door	
Material of shaft	
Maximum working pressure	
Test pressure	
Nominal diameter	
Shut-off Valves	
Type of valve	
Name of Manufacturer	
Make and model number	
Material of body	
Material of door	
Material of shaft	
Maximum working pressure	
Test pressure	
Nominal diameter	
Air-release Valves	
Type of valve	

Name of Manufacturer	
Make and model number	
Material of body	
Material of float	
Material of shaft	
Maximum working pressure	
Test pressure	
Nominal diameter	

A-RECYCLE PUMPS (2 off)				
Pump:				
Name of manufacturer				
Place of manufacture				
Type of pump				
Number of pumps				
Model number and type				
Number of stages				
Impeller diameter (mm)				
Impeller material				
Characteristics:				
	Shut-off head	Best efficiency	Max. power condition	Duty point
Total manumatic head (m)				
Flow rate (l/s)				
NPSH required (m)				
Motor power (kW) / current (A) required at 400 V	/ …….	/ …….	/ …….	/ …….
Pump efficiency (%)				
Suction Diameter				
Discharge Diameter				
Weight of pump with motor				
Type of gland sealing				
Pump speed				
Solid size (mm)				
Shaft diameter (mm)				
Shaft length (mm)				
Bearing life L10 for continuous 24 h operation (h)				
Gear life L10 for continuous 24 h operation (h)				
Motor:				
Name of manufacturer				
Place of manufacture				
Type of motor				
Class of insulation				
Degree of motor protection (IP)				
Speed of rotation (r.p.m.)				
Rated output (kW)				
Power factor at:				

Full load	
¾ load	
Motor efficiency at:	
Full load	
¾ load	
Protection class	
Full load speed	
% Utilisation at rated output of motor	
Pump Guaranteed Characteristics:	

We guarantee that each pump set shall perform, in compliance with the Specification, as per the figures completed below:

Minimum flow rate at the operational point:	l/s
Minimum manometric head at the operational point:	m
Minimum pump efficiency at the operational point:	%
Maximum shaft power required at operational point:	kW
Maximum current drawn at the operational point at 400V:	A
Maximum operational speed to achieve the operational point:	RPM
Rated motor power exceeds required shaft power by:	%

LIFTING EQUIPMENT	
I-Beam Gantry	
Name of manufacturer	
Place of manufacture	
Material of davit	
Lifting capacity (SWL)	
Height of gantry	
Length of gantry	
Chain hoist:	
Name of manufacturer	
Place of manufacture	
Motor rating (kW)	
Lifting capacity (SWL)	

SLUICE GATES (6 off)	
Sluice Gates - Wall Mounted (2 off):	
Name of manufacturer	
Place of manufacture	
Type of gate	
Height of gate (mm)	
Width of gate (mm)	
Material of gate	

Material of frame	
Material of spindle	
Material of headstock	
Adjustable Overflow Weir - Wall Mounted (3 off):	
Name of manufacturer	
Place of manufacture	
Type of gate	
Height of gate (mm)	
Width of gate (mm)	
Material of gate	
Material of frame	
Material of spindle	
Material of headstock	
Adjustable Overflow Weir - Channel Mounted (1 off):	
Name of manufacturer	
Place of manufacture	
Type of gate	
Height of gate (mm)	
Width of gate (mm)	
Material of gate	
Material of frame	
Material of spindle	
Material of headstock	

BLOWERS (3 off)				
Blower:				
Name of manufacturer				
Place of manufacture				
Type of pump				
Number of blowers				
Model number and type				
Number of stages				
Impeller diameter (mm)				
Impeller material				
Characteristics:				
	Shut-off head	Best efficiency	Max. power condition	Duty point
Total manumatic head (m)				
Flow rate (l/s)				
Motor power (kW) / current (A) required at 400 V	/ …….	/ …….	/ …….	/ …….
Blower efficiency (%)				
Suction Diameter				
Discharge Diameter				
Weight of unit				
Blower speed				
Motor:				

Name of manufacturer	
Place of manufacture	
Type of motor	
Class of insulation	
Degree of motor protection (IP)	
Speed of rotation (r.p.m.)	
Rated output (kW)	
Power factor at:	
Full load	
¾ load	
Motor efficiency at:	
Full load	
¾ load	
Protection class	
Full load speed	
% Utilisation at rated output of motor	
Blower Guaranteed Characteristics:	

We guarantee that each blower set shall perform, in compliance with the Specification, as per the figures completed below:

Minimum flow rate at the operational point:	l/s
Minimum manometric head at the operational point:	m
Minimum blower efficiency at the operational point:	%
Maximum shaft power required at operational point:	kW
Maximum current drawn at the operational point at 400V:	A
Maximum operational speed to achieve the operational point:	RPM
Rated motor power exceeds required shaft power by:	%
Intensity of noise of Unit at 1m	dB

Pipework and Valves in Blower room:	
Pipework:	
Name of Manufacturer	
Material of piping	
Finish	
Maximum working pressure	
Test pressure	
Internal diameter	
Flange rating and drilling	
Couplings	
Non-return Valves	
Type of valve	
Name of Manufacturer	
Make and model number	
Material of body	

Material of door	
Material of shaft	
Maximum working pressure	
Test pressure	
Nominal diameter	
Shut-off Valves	
Type of valve	
Name of Manufacturer	
Make and model number	
Material of body	
Material of door	
Material of shaft	
Maximum working pressure	
Test pressure	
Nominal diameter	

AERATION EQUIPMENT IN BIOLOGICAL REACTOR	
Diffusers:	
Name of manufacturer	
Place of manufacture	
Type of diffuser	
Model number and type	
Number of per Basin (high aeration area)	
Number of per Basin (low aeration area)	
Diffuser diameter (mm)	
Diffuser material	
Minimum flow (l/s)	
Maximum flow (l/s)	
Pipework and Valves in Biological Reactor:	
Pipework:	
Name of Manufacturer	
Material of piping	
Finish	
Maximum working pressure	
Test pressure	
Internal diameter	
Flange rating and drilling	
Couplings	
Size of main manifold (mm)	
Size of drop legs (mm)	
Size of network (mm)	
Size of Blowline (mm)	
Non-return Valves	
Type of valve	
Name of Manufacturer	
Make and model number	
Material of body	
Material of door	
Material of shaft	

Maximum working pressure	
Test pressure	
Nominal diameter	
Shut-off Valves - manual	
Type of valve	
Name of Manufacturer	
Make and model number	
Material of body	
Material of door	
Material of shaft	
Maximum working pressure	
Test pressure	
Nominal diameter	
Shut-off Valves - actuated	
Type of valve	
Name of Manufacturer	
Make and model number	
Material of body	
Material of door	
Material of shaft	
Maximum working pressure	
Test pressure	
Nominal diameter	
Actuators	
Type of actuator	
Name of Manufacturer	
Make and model number	
Material of body	
Maximum working torque	
Motor size	

FRESH AIR SUPPLY TO BLOWER ROOM / HVAC				
Blower:				
Name of manufacturer				
Place of manufacture				
Type of pump				
Number of blowers				
Model number and type				
Number of stages				
Impeller diameter (mm)				
Impeller material				
Characteristics:				
	Shut-off head	Best efficiency	Max. power condition	Duty point
Total manumatic head (m)				
Flow rate (l/s)				
Motor power (kW) / current (A) required at 400 V	/ …….	/ …….	/ …….	/ …….
Blower efficiency (%)				
Suction Diameter				

Discharge Diameter	
Weight of unit	
Blower speed	
Motor:	
Name of manufacturer	
Place of manufacture	
Type of motor	
Class of insulation	
Degree of motor protection (IP)	
Speed of rotation (r.p.m.)	
Rated output (kW)	
Power factor at:	
Full load	
¾ load	
Motor efficiency at:	
Full load	
¾ load	
Protection class	
Full load speed	
% Utilisation at rated output of motor	
Blower Guaranteed Characteristics:	

We guarantee that each blower set shall perform, in compliance with the Specification, as per the figures completed below:

Minimum flow rate at the operational point:	l/s
Minimum manometric head at the operational point:	m
Minimum blower efficiency at the operational point:	%
Maximum shaft power required at operational point:	kW
Maximum current drawn at the operational point at 400V:	A
Maximum operational speed to achieve the operational point:	RPM
Rated motor power exceeds required shaft power by:	%
Intensity of noise of Unit at 1m	dB

BLOWER ROOM SOUND ATTENUATION	
Blower:	
Name of manufacturer	
Place of manufacture	
Type of attenuation	
Model number	
Number of layers	
Material thickness (mm)	
Material type	

We guarantee that each blower set shall perform, in compliance with the Specification, as per the figures completed below:	
Intensity of noise for the blower room at 5m	dB

Signature Date

PART 3 : SECONDARY SETTLING TANKS AND DIVISION BOX

ROTATING BRIDGE (2 off)	
Bridge:	
Name of manufacturer	
Place of manufacture	
Length of bridge (mm)	
Width of bridge (mm)	
Material of bridge	
Material of scraper blades	
Material of scraper blade wearing edge	
Mass of bridge (kg)	
Mass of bridge scraper (kg)	
Size of electrical motor (kW)	
Peripheral speed of scraper	
Central Bearing Support	
Name of manufacturer	
Place of manufacture	
Model number	
Type of bearing	
Bearing capacity	
Material of base plate	
Motor:	
Name of manufacturer	
Place of manufacture	
Type of motor	
Class of insulation	
Degree of motor protection (IP)	
Speed of rotation (r.p.m.)	
Rated output (kW)	
% Utilisation at rated output of motor	
Gearbox / Speed Reducer:	
Name of manufacturer	
Place of manufacture	
Type and number	
Mechanical power rating (kW)	
Thermal power rating (kW)	
Max torque capacity (Nm)	
Efficiency at motor rated output	
Service factor	

WALL MOUNTED SLUICE GATES (2 off)	
Overflow weir:	
Name of manufacturer	
Place of manufacture	
Type of gate	
Height of gate (mm)	
Width of gate (mm)	
Material of gate	

Material of frame	
Material of spindle	
Material of headstock	

Signature Date

PART 4 : PUMP STATIONS

RAW SEWAGE FEED PUMP STATION				
Pump:				
Name of manufacturer				
Place of manufacture				
Type of pump				
Number of pumps				
Model number and type				
Number of stages				
Impeller diameter (mm)				
Impeller material				
Characteristics:				
	Shut-off head	Best efficiency	Max. power condition	Duty point
Total manumatic head (m)				
Flow rate (l/s)				
NPSH required (m)				
Motor power (kW) / current (A) required at 400 V	/ …….	/ …….	/ …….	/ …….
Pump efficiency (%)				
Suction Diameter				
Discharge Diameter				
Weight of pump with motor				
Type of gland sealing				
Pump speed				
Solid size (mm)				
Motor:				
Name of manufacturer				
Place of manufacture				
Type of motor				
Class of insulation				
Degree of motor protection (IP)				
Speed of rotation (r.p.m.)				
Rated output (kW)				
Power factor at:				
Full load				
¾ load				
Motor efficiency at:				
Full load				
¾ load				
Protection class				
Full load speed				
% Utilisation at rated output of motor				
Pump Guaranteed Characteristics:				
We guarantee that each pump set shall perform, in compliance with the Specification, as per the figures completed below:				

Minimum flow rate at the operational point:	l/s
Minimum manometric head at the operational point:	m
Minimum pump efficiency at the operational point:	%
Maximum shaft power required at operational point:	kW
Maximum current drawn at the operational point at 400V:	A
Maximum operational speed to achieve the operational point:	RPM
Rated motor power exceeds required shaft power by:	%

Pipework and Valves:	
Pipework:	
Name of Manufacturer	
Material of piping	
Finish	
Maximum working pressure	
Test pressure	
Internal diameter	
Flange rating and drilling	
Couplings	
Non-return Valves	
Type of valve	
Name of Manufacturer	
Make and model number	
Material of body	
Material of door	
Material of shaft	
Maximum working pressure	
Test pressure	
Nominal diameter	
Shut-off Valves	
Type of valve	
Name of Manufacturer	
Make and model number	
Material of body	
Material of door	
Material of shaft	
Maximum working pressure	
Test pressure	
Nominal diameter	
Air-release Valves	
Type of valve	
Name of Manufacturer	
Make and model number	
Material of body	
Material of float	
Material of shaft	
Maximum working pressure	

Test pressure	
Nominal diameter	

RETURN ACTIVATED SLUDGE PUMP STATION				
Pump:				
Name of manufacturer				
Place of manufacture				
Type of pump				
Number of pumps				
Model number and type				
Number of stages				
Impeller diameter (mm)				
Impeller material				
Characteristics:				
	Shut-off head	Best efficiency	Max. power condition	Duty point
Total manumatic head (m)				
Flow rate (l/s)				
NPSH required (m)				
Motor power (kW) / current (A) required at 400 V	/ …….	/ …….	/ …….	/ …….
Pump efficiency (%)				
Suction Diameter				
Discharge Diameter				
Weight of pump with motor				
Type of gland sealing				
Pump speed				
Solid size (mm)				
Motor:				
Name of manufacturer				
Place of manufacture				
Type of motor				
Class of insulation				
Degree of motor protection (IP)				
Speed of rotation (r.p.m.)				
Rated output (kW)				
Power factor at:				
Full load				
¾ load				
Motor efficiency at:				
Full load				
¾ load				
Protection class				
Full load speed				
% Utilisation at rated output of motor				
Pump Guaranteed Characteristics:				
We guarantee that each pump set shall perform, in compliance with the Specification, as				

per the figures completed below:	
Minimum flow rate at the operational point:	l/s
Minimum manometric head at the operational point:	m
Minimum pump efficiency at the operational point:	%
Maximum shaft power required at operational point:	kW
Maximum current drawn at the operational point at 400V:	A
Maximum operational speed to achieve the operational point:	RPM
Rated motor power exceeds required shaft power by:	%

Pipework and Valves:	
Pipework:	
Name of Manufacturer	
Material of piping	
Finish	
Maximum working pressure	
Test pressure	
Internal diameter	
Flange rating and drilling	
Couplings	
Non-return Valves	
Type of valve	
Name of Manufacturer	
Make and model number	
Material of body	
Material of door	
Material of shaft	
Maximum working pressure	
Test pressure	
Nominal diameter	
Shut-off Valves	
Type of valve	
Name of Manufacturer	
Make and model number	
Material of body	
Material of door	
Material of shaft	
Maximum working pressure	
Test pressure	
Nominal diameter	

WASTE ACTIVATED SLUDGE PUMP STATION – AEROBIC DIGESTER FEED	
Pump:	
Name of manufacturer	
Place of manufacture	

Type of pump				
Number of pumps				
Model number and type				
Number of stages				
Impeller diameter (mm)				
Impeller material				
Characteristics:				
	Shut-off head	Best efficiency	Max. power condition	Duty point
Total manumatic head (m)				
Flow rate (l/s)				
NPSH required (m)				
Motor power (kW) / current (A) required at 400 V	/ …….	/ …….	/ …….	/ …….
Pump efficiency (%)				
Suction Diameter				
Discharge Diameter				
Weight of pump with motor				
Type of gland sealing				
Pump speed				
Solid size (mm)				
Motor:				
Name of manufacturer				
Place of manufacture				
Type of motor				
Class of insulation				
Degree of motor protection (IP)				
Speed of rotation (r.p.m.)				
Rated output (kW)				
Power factor at:				
Full load				
¾ load				
Motor efficiency at:				
Full load				
¾ load				
Protection class				
Full load speed				
% Utilisation at rated output of motor				
Pump Guaranteed Characteristics:				

We guarantee that each pump set shall perform, in compliance with the Specification, as per the figures completed below:

Minimum flow rate at the operational point:	l/s
Minimum manometric head at the operational point:	m
Minimum pump efficiency at the operational point:	%

Maximum shaft power required at operational point:	kW
Maximum current drawn at the operational point at 400V:	A
Maximum operational speed to achieve the operational point:	RPM
Rated motor power exceeds required shaft power by:	%

Pipework and Valves:	
Pipework:	
Name of Manufacturer	
Material of piping	
Finish	
Maximum working pressure	
Test pressure	
Internal diameter	
Flange rating and drilling	
Couplings	
Non-return Valves	
Type of valve	
Name of Manufacturer	
Make and model number	
Material of body	
Material of door	
Material of shaft	
Maximum working pressure	
Test pressure	
Nominal diameter	
Shut-off Valves	
Type of valve	
Name of Manufacturer	
Make and model number	
Material of body	
Material of door	
Material of shaft	
Maximum working pressure	
Test pressure	
Nominal diameter	
Air-release Valves	
Type of valve	
Name of Manufacturer	
Make and model number	
Material of body	
Material of float	
Material of shaft	
Maximum working pressure	
Test pressure	
Nominal diameter	

WASTE ACTIVATED SLUDGE PUMP STATION – SLUDGE HOLDING TANK FEED

Pump:				
Name of manufacturer				
Place of manufacture				
Type of pump				
Number of pumps				
Model number and type				
Number of stages				
Impeller diameter (mm)				
Impeller material				
Characteristics:				
	Shut-off head	Best efficiency	Max. power condition	Duty point
Total manumatic head (m)				
Flow rate (l/s)				
NPSH required (m)				
Motor power (kW) / current (A) required at 400 V	/ …….	/ …….	/ …….	/ …….
Pump efficiency (%)				
Suction Diameter				
Discharge Diameter				
Weight of pump with motor				
Type of gland sealing				
Pump speed				
Solid size (mm)				
Motor:				
Name of manufacturer				
Place of manufacture				
Type of motor				
Class of insulation				
Degree of motor protection (IP)				
Speed of rotation (r.p.m.)				
Rated output (kW)				
Power factor at:				
Full load				
¾ load				
Motor efficiency at:				
Full load				
¾ load				
Protection class				
Full load speed				
% Utilisation at rated output of motor				
Pump Guaranteed Characteristics:				
We guarantee that each pump set shall perform, in compliance with the Specification, as per the figures completed below:				
Minimum flow rate at the operational point:				l/s
Minimum manometric head at the operational point:				m

Minimum pump efficiency at the operational point:	%
Maximum shaft power required at operational point:	kW
Maximum current drawn at the operational point at 400V:	A
Maximum operational speed to achieve the operational point:	RPM
Rated motor power exceeds required shaft power by:	%

Pipework and Valves:	
Pipework:	
Name of Manufacturer	
Material of piping	
Finish	
Maximum working pressure	
Test pressure	
Internal diameter	
Flange rating and drilling	
Couplings	
Non-return Valves	
Type of valve	
Name of Manufacturer	
Make and model number	
Material of body	
Material of door	
Material of shaft	
Maximum working pressure	
Test pressure	
Nominal diameter	
Shut-off Valves	
Type of valve	
Name of Manufacturer	
Make and model number	
Material of body	
Material of door	
Material of shaft	
Maximum working pressure	
Test pressure	
Nominal diameter	
Air-release Valves	
Type of valve	
Name of Manufacturer	
Make and model number	
Material of body	
Material of float	
Material of shaft	
Maximum working pressure	
Test pressure	
Nominal diameter	

Signature Date

ANNEX 9: MECHANICAL STANDARD SPECIFICATIONS

C4 Site Information

C4.1 SCOPE

The documentation included in this section describes the site as at the time of the tender, to enable the tenderer to price his tender and to decide upon his method of working and programming.

Only actual information about physical conditions on the site and its surroundings has been included in this section and interpretation is a matter for the tenderers.

LANGEBERG MUNICIPALITY

REFURBISHMENT AND UPGRADE OF ROBERTSON WASTEWATER TREATMENT WORKS

CONTRACT NO.: T41/2022

LOCALITY PLAN – SITE VISIT



ROBERTSON WWTW Co-ordinates: 33°49'2.45"S - 19°52'28.98"E

LOCALITY PLAN –CLARIFICATION MEETING VENUE



ROBERTSON WWTW Co-ordinates: 33°48'14.55"S - 19°52'55.86"E

C5 Drawings

The Works shall be carried out in accordance with the following drawings which are included in Volume 4: Drawings and form part of the contract documents:

CIVIL		
DRAWING NO.	**DRAWING NAME**	REV
GENERAL DRAWINGS		
21-LBM-039/G701	Contract Nameboard	00
21-LBM-039/G702	Typical Handrails	00
21-LBM-039/G703	Typical Detail of Flow Meter Box	00
21-LBM-039/G704	Parshall Flume Detail	00
21-LBM-039/G705-01	Typical Steel Door (Sheet 1 of 3)	00
21-LBM-039/G705-02	Typical Steel Door (Sheet 2 of 3)	00
21-LBM-039/G705-03	Typical Steel Door (Sheet 3 of 3)	00
21-LBM-039/G706	Typical Manhole Detail	00
21-LBM-039/G707	Fencing Detail	00
SURVEY/LAYOUT DRAWINGS		
21-LBM-039/SUR100	Existing Services Plan	00
21-LBM-039/SUR101	Proposed Site Layout	00
21-LBM-039/SUR102	Road and Kerb Layout	00
STRUCTURAL DRAWINGS		
21-LBM-039/ST601-1	Plan Section and Elevations of New Inlet Works (Sheet 1 of 2)	00
21-LBM-039/ST601-2	Plan Section and Elevations of New Inlet Works (Sheet 2 of 2)	00
21-LBM-039/ST602-1	Plan Section and Elevations of Biological Reactor (Sheet 1 of 2)	00
21-LBM-039/ST603-2	Plan Section and Elevations of Biological Reactor (Sheet 1 of 2)	00
21-LBM-039/ST604	Clarifier Layout	00
21-LBM-039/ST605	Division Box between SSTs	00
21-LBM-039/ST606	Return Activated Sludge Pump Station	00
21-LBM-039/ST605	Sludge Dewatering Building	00
21-LBM-039/ST610-1	MCC Room (Sheet 1 of 2)	00
21-LBM-039/ST610-2	MCC Room (Sheet 2 of 2)	00

ELECTRICAL		
DRAWING NO.	**DRAWING NAME**	REV
X_19-11/001	Site layout with LV Cable Routes	00
X_19-11/101	Main LV Switchboard (Main MCC) Single Line Diagram	00
X_19-11/102	Building Services Distribution board Single Line Diagrams	00
X_19-11/501	Proposed Main LV Switchboard General Arrangement Layout	00