

TENDER NO. 191Q/2023/24



CITY OF CAPE TOWN
ISIXEKO SASEKAPA
STAD KAAPSTAD

SCM – 510

Approved by Branch Manager: 23/01/2024

Version: 6.2

Pages 1 of 43

CONTRACT DOCUMENT

FOR THE

DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS

VOLUME 1: TENDERING PROCEDURES

(SEE VOLUMES 3A & 3B FOR SPECIFICATIONS)

NOTE:

- The Form of Offer and Acceptance (C1.1) is on **page 43** of this document
- Table 1: Tender preference indication is on **page 284** of this document

ISSUED BY:	COMPILED BY:	For official use.
DIRECTOR: WATER AND SANITATION Water and Sanitation Head Office 8 Voortrekker Road (corner of Mike Pienaar Boulevard) Cape Town Bellville 7535	Zutari (Pty) Ltd 1 Century City Waterford Precinct Century City CAPE TOWN 7441	TENDER SERIAL No.:
		SIGNATURES OF CITY OFFICIALS AT TENDER OPENING
		1.
		2.
		3.

MARCH 2024

NAME OF TENDERING ENTITY	
EMAIL ADDRESS OF TENDERING ENTITY	
FAX NUMBER OF TENDERING ENTITY	
NATURE OF TENDER OFFER (please indicate below)	
Main Offer (see clause C.2.12)	
Alternative Offer (see clause C.2.12)	

CITY OF CAPE TOWN

DIRECTORATE: WATER AND SANITATION

CONTRACT NO. 191Q/2023/24

DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS

General Tender Information

TENDER ADVERTISED	:	15 March 2024
ESTIMATED CIDB CONTRACTOR GRADING		
DESIGNATION	:	9ME or higher
SITE VISIT/CLARIFICATION MEETING	:	10h00 on 03 April 2024 (Compulsory Meeting)
VENUE FOR SITE VISIT/CLARIFICATION MEETING	:	Macassar Wastewater Treatment Works GPS Coordinates: -34.07610, 18.77135
CLOSING DATE	:	18 June 2024
CLOSING TIME	:	10h00
TENDER BOX & ADDRESS	:	Tender Box 121 at the Tender & Quotation Box Office , 2 nd Floor (Concourse Level), Civic Centre, 12 Hertzog Boulevard, Cape Town.

The Tender Document (which includes the Form of Offer and Acceptance) completed in all respects, plus any additional supporting documentation required, must be submitted in a sealed envelope with the name and address of the Tenderer, the Tender No. and title, the Tender Box No. and the closing date indicated on the envelope. The sealed envelope must be inserted into the appropriate official tender box before closing time.

If the tender offer is too large to fit into the abovementioned box or the box is full, please enquire at the public counter (Tender Distribution Office) for alternative instructions. The onus remains with the tenderer to ensure that the tender is placed in either the original box or as alternatively instructed.

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'

CITY OF CAPE TOWN

DIRECTORATE: WATER AND SANITATION

CONTRACT NO. 191Q/2023/24

DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF
THE MACASSAR WASTEWATER TREATMENT WORKS

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CITY OF CAPE TOWN

DIRECTORATE: WATER AND SANITATION

CONTRACT NO. 191Q/2023/24

DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS

T1.1 Tender Notice and Invitation to Tender

The **CITY OF CAPE TOWN**, **DIRECTORATE: WATER AND SANITATION**, invites tenders for Tender No. **191Q/2023/24: DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS**

Tenderers must be registered on Supplier Databases as described in the tender conditions.

Tenderers who are not registered on these Supplier Databases are not precluded from submitting tenders, but must however be registered upon being requested to do so in writing and within the period contained in such a request.

It is estimated that tenderers must have a CIDB contractor grading designation of 9ME or higher.

Preferences are offered to tenderers who tender in accordance with the Preferential Procurement Regulations and the City of Cape Town's Supply Chain Management Policy (SCM Policy). Furthermore, in terms of these Regulations and the SCM Policy, tenderers are required to meet the HDI and/or RDP specific goals

The physical address for collection of tender documents is:

Tender Distribution Office, 2nd Floor (Concourse Level), Civic Centre, 12 Hertzog Boulevard, Cape Town.

Documents may be collected during working hours between **08:30 – 15:00** from **15 March 2024**.

A non-refundable tender fee of R300.00 payable via electronic funds transfer (EFT) to the City of Cape Town, is required on collection of the tender documents. Tender documents are not available for download.

Queries relating to any issues in these documents may be addressed to e-mail address: MacassarMechanical.Queries@capetown.gov.za.

A compulsory site visit/clarification meeting with representatives of the Employer will take place at the Macassar Wastewater Treatment Works at Tie Road, Cape Town, GPS Coordinates: -34.07610, 18.77135 (Refer to Locality Plan – Site Visit/Clarification Meeting Venue overleaf) on **03 April 2024** starting at **10:00**.

The closing time for receipt of tenders is **10:00** on **18 June 2024**.

Telegraphic, telephonic, telex, facsimile, e-mail and late tenders will not be accepted.

Tenders may only be submitted on the tender documentation that has been issued. Printed Schedules of Quantities, in the same format (that is, layout, scheduled items and quantities) as those issued electronically by the Employer upon request, may be submitted as stated in the Tender Data.

Requirements for sealing, addressing, delivery, opening and assessment of tenders are stated in the Tender Data.



CITY OF CAPE TOWN
DIRECTORATE: WATER AND SANITATION
CONTRACT NO. 191Q/2023/24
DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND
EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS

LOCALITY PLAN – SITE VISIT/CLARIFICATION MEETING VENUE

CITY OF CAPE TOWN

DIRECTORATE: WATER AND SANITATION

CONTRACT NO. 191Q/2023/24

DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS

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
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C.1	General
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C.1.1	Actions
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C.1.1.1	<i>Add the following:</i>
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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 remedies available to it as described in the SCM Policy.

The Employer is the City of Cape Town, represented by the Director: Water and Sanitation.

In addition to the above, the following further documents are part of the tender:

VOLUME 3A:

Specifications

Section A	Detailed Mechanical Specification (including General Works)
Section D	Standard Specification for Mechanical Works (including General Works)
Section G	Health and Safety Specification
Section H	Environmental Management Specification

VOLUME 3B:

Specifications

Section B1	Detailed Electrical Specification (including General Works)
Section B2	Detailed Electronic Specification (including General Works)
Section B3	Standard Specification for LV and Electrical Works (including General Works)
Section B4	Standard Specification for MV Electrical Works
Section B5	General Specification SPE-II-0007 - Instrumentation
Section B6	Electrical and Electronic Design Schedules
Section B7	Asset Numbering System
Section B8	Standard for Standby Supply Soft Load Transfer Scheme
Section B9	Technical Standard for the Interconnection of Embedded Generation
Section B10	General Specification SPE-EP-0024 - NECRT
Section B11	General Specification SPE-EE-0015 - Street and Area Lighting

VOLUME 4: Drawings (listed in C3.2 Engineering)

VOLUME 5: The Conditions of Contract for Plant and Design-Build for Electrical and Mechanical Works and for Building and Engineering Works Designed by the Contractor, First Edition 1999 (Yellow Book), published by the International Federation of Consulting Engineers (FIDIC).

This publication is available and tenderers must obtain copies at their own cost from the South African Institution of Civil Engineering (SAICE) (tel 011 805 5947) or Consulting Engineers South Africa (CESA) (tel 011 463 2022).

VOLUME 6 : The SANS Standardised Specifications for Civil Engineering Construction prepared by Standards South Africa. These publications are available and tenderers must obtain copies at their own cost from Standards South Africa, Private Bag X191, PRETORIA, 0001.

Volumes 5 and 6 may also be inspected, by appointment, at the offices of the Employer's agent during normal office hours.

C.1.4 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 Director: Supply Chain Management or his nominee.

The Employer's agent is:

Name: The Project Manager

Address: Water and Sanitation Head Office
8 Voortrekker Road (corner of Mike
Pienaar Boulevard)
Cape Town
Bellville
7535

E-mail: MacassarMechanical.Queries@capetown.gov.za]

C.1.5 Cancellation and Re-Invitation of Tenders

Delete the fulstop at the end of C.1.5.1 d) and replace with , or

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 to C.1.6.2.1:

A competitive negotiation procedure will not be followed.

C.1.6.3 Proposal procedure using the two-stage system

Add the following to 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 Nomination of Standby Supplier

Standby Supplier means a bidder, identified at the time of awarding a bid, that will be considered for award should the contract be terminated for any reason whatsoever. In the event that a contract is terminated during the execution thereof, the CCT may consider the award of the contract, or non-award, to the standby supplier in terms of the procedures included in its SCM Policy.

C.1.6.5 Objections, complaints, queries and disputes/ Appeals in terms of Section 62 of the Systems Act/ Access to court

C.1.6.5.1 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 City of Cape Town 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.1.6.5.2 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 City, may appeal against that decision by giving written notice of the appeal and reasons to the City 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 City 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.1.6.5.3 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.1.6.5.4 All requests referring to sub clauses C.1.6.5.1 and C.1.6.5.2 must be submitted in writing to:

The City Manager - C/o the Manager: Legal Compliance Unit, Legal Services Department,
Corporate Services Directorate

Via hand delivery at: 20th Floor, Tower Block, 12 Hertzog Boulevard, Cape Town 8001

Via post at: Private Bag X918, Cape Town, 8000

Via fax at: 021 400 5963 or 021 400 5830

Via email at: MSA.Appeals@capetown.gov.za

C.1.6.5.5 All requests referring to clause C.1.6.5.3 must be submitted in writing to:

The City Manager - C/o the Manager: Access to Information Unit, Corporate Services Directorate

Via hand delivery at: 20th Floor, Tower Block, 12 Hertzog Boulevard, Cape Town 8001

Via post at: Private Bag X918, Cape Town, 8000

Via fax at: 086 202 9982

Via email at: Access2info.Act@capetown.gov.za

C.1.6.5.6 The minimum standards regarding accessing and 'processing' of any personal information belonging to another in terms of Protection of Personal Information Act, 2013 (POPIA).

The Employer, its employees, representatives and sub-contractors may, from time to time, Process the Contractor's and/or its employees', representatives' and/or sub-contractors' Personal Information, for purposes of, and/or relating to, the tender, this agreement, for research purposes, and/or as otherwise may be envisaged in the Employer's Privacy Notice and/or in relation to the Employer's Supply Chain Management Policy or as may be otherwise permitted by law. This includes the employers due diligence assurance provider and the Appeal Authority.

C.1.6.5.7 Compliance to the City's Appeals Policy.

"In terms of the City's Appeals Policy, a fixed upfront administration fee will be charged. In addition, a surcharge may be imposed for vexatious tender related appeals.

The current approved administration fee is R300.00 and may be paid at any of the Municipal Offices or at the Civic Centre in Cape Town using the GL Data Capture Receipt attached as annexure 'B'. Alternatively, via EFT into the City's **NEDBANK** Account: **CITY OF CAPE TOWN** and using Reference number: **198158966**. You are required to send proof of payment when lodging your appeal.

Should the payment of the administration fee of R300.00 not be received, such fee will be added as a Sundry Tariff to your municipal account.

In the event where you do not have a Municipal account with the City, the fee may be recovered in terms of the City's Credit Control and Debt Collection By-law, 2006 (as amended) and its Credit Control and Debt Collection Policy."

C.1.7 City of Cape Town Supplier Database Registration

Tenderers are required to be registered on the CCT Supplier Database 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 City of Cape Town's Supplier Database may collect registration forms from the Supplier Management Unit located within the Tender Distribution Office, 2nd Floor (Concourse Level), Civic Centre, 12 Hertzog Boulevard, Cape Town (Tel 021 400 9242/3/4/5). Registration forms and related information are also available on the City of Cape Town's website www.capetown.gov.za (follow the Supply Chain Management link to Supplier registration).

C.1.8 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 **Tenderers are obligated to submit a tender offer that complies in all aspects to the conditions as detailed in this tender document. An 'acceptable tender must "COMPLY IN ALL aspect with the tender conditions, specifications, pricing instructions and contract conditions.**

Add the following 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 **Construction Industry Development Board (CIDB) Registration**

Only those tenderers who are registered with the cidb, or capable of being so prior to the 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, for a 9ME class of construction work, are eligible to have their tenders evaluated. Tenderers must obtain such active status 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.

Joint Ventures are eligible to submit tenders provided that:

- a) every member of the joint venture is registered with an active status with the CIDB;
- b) the lead partner has a contractor grading designation of not lower than one level below the required grading designation in the 9ME class of construction work; and
- c) the combined contractor grading designation calculated in accordance with the Construction Industry Development Regulations is equal to or higher than a contractor grading designation determined in accordance with the sum tendered for a 9ME 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 attached.

C.2.1.4.2 **Compliance with requirements of CCT SCM Policy and procedures**

Only those tenders that are compliant with the requirements below will be declared responsive:

- a) A completed **Compulsory Enterprise Questionnaire** to be provided (applicable schedule to be completed);
- b) A completed **Certificate of Authority for Partnerships/ Joint Ventures/ Consortiums** to be provided authorising the tender to be made and the signatory to sign the tender on the partnership /joint venture/consortium's behalf (applicable schedule to be completed);
- c) A copy of the partnership / joint venture / consortium agreement to be provided;
- d) A completed **Declaration of Interest – State Employees** to be provided and which does not indicate any non-compliance with the legal requirements relating to state employees (applicable schedule to be completed);
- e) A completed **Declaration – Conflict of Interest** and **Declaration of Bidder's past Supply Chain Management Practices** to be provided and which does not indicate any conflict or past practises that renders the tender non-responsive based on the conditions contained thereon (applicable schedules to be completed);
- f) A completed **Certificate of Independent Bid Determination** to be provided and which does not indicate any non-compliance with the requirements of the schedule (applicable schedule to be completed);
- g) The tenderer (including any of its directors or members), has not been restricted in terms of abuse of the Supply Chain Management Policy;
- h) The tenderer's tax matters with SARS are in order, or the tenderer is a foreign supplier that is not required to be registered for tax compliance with SARS;
- i) The tenderer is not an advisor or consultant contracted with the Employer whose prior or current obligations creates any conflict of interest or unfair advantage;
- j) The tenderer is not a person, advisor, corporate entity or a director of such corporate entity, involved with the bid specification committee;
- k) A completed Authorisation for the Deduction of Outstanding Amounts Owed to the City of Cape Town to be provided and which does not indicate any details that renders the tender non-responsive based on the conditions contained thereon (applicable schedules to be completed);
- l) The tenderer (including any of its directors or members), has not been found guilty of contravening the Competition Act 89 of 1998, as amended from time to time;
- m) The tenderer (including any of its directors or members), has not been found guilty on any other basis listed in the Supply Chain Management Policy.

C.2.1.4.3 Minimum score for functionality

In order to be considered for a contract in terms of this tender, tenderers must achieve the minimum score for functionality as stated below.

The description of the functionality criteria and the maximum possible score for each is shown in the table below. The score achieved for functionality will be the sum of the scores achieved, in the evaluation process, for the individual criteria.

Description of functionality criteria	Maximum possible score
Demonstrated experience of the tendering entity with respect to municipal wastewater and water treatment projects	50
Qualifications and demonstrated experience of the key staff in relation to the scope of work	40
Submission and quality of evidence of planning for the project	10
Maximum possible score for Functionality Criteria	100

The minimum score for functionality is **70**. Tenderers that fail to achieve the minimum score for functionality will be declared as non-responsive.

Where the entity tendering is a Joint Venture the tender must be accompanied by a statement describing exactly what aspects of the work will be undertaken by each party to the joint venture (appended to Schedule 3, Part T2.2: Returnable Schedules).

Tenderers shall ensure that all relevant information has been submitted with the tender offer in the prescribed format to ensure optimal scoring of functionality points for each Evaluation Criteria. Failure to provide all information **IN THIS TENDER SUBMISSION** could result in the tenderer not being able to achieve the specified minimum scoring.

A more detailed explanation of the functionality criteria is given below :

Item	Description of Functionality Criteria	Points Allocation	Maximum Points Available
1	Demonstrated experience of the tendering entity with respect to comparable projects	To be substantiated by submission of a detailed list and description of relevant projects/work, contact details for client references and submission of a Taking Over Certificate or Performance Certificate. Failure to submit requested project details may adversely impact scoring. This information will be assessed based on the information completed for Returnable Schedule 9. Points will only be awarded for completed projects. In the case of Joint Ventures, qualifying projects of all members of the Joint Venture will count, however, the nature of work and financial contribution must be provided for each member of the Joint Venture for each project submitted.	50
1.1	Wastewater treatment and water treatment related projects (local or international) with a project construction value greater than R 200 million (per individual project) excluding VAT (escalated to date of tender closure by the Employer/Employer's Representative using an escalation factor of 7.5% per annum) successfully completed within the past fifteen (15) years: Mechanical Contractor (Principle Contractor)	<u>Points for 1.1 will be allocated as follows:</u> - Four projects listed with all details as requested = 30 points - Three projects listed with all details as requested = 25 points - Two projects listed with all details as requested = 20 points - One project listed with all details as requested = 10 points - No projects listed = 0 points	30
1.2	Wastewater treatment and water treatment related projects (local or international) with a project construction value greater than R 120 million (per individual project) excluding VAT (escalated to date of tender closure by the Employer/Employer's Representative using an escalation factor of 7.5% per annum) successfully completed within the past fifteen (15) years: Electrical Contractor/Subcontractor	<u>Points for 1.2 will be allocated as follows:</u> - Four projects listed with all details as requested = 20 points - Three projects listed with all details as requested = 15 points - Two projects listed with all details as requested = 10 points - One project listed with all details as requested = 5 points - No projects listed = 0 points	20

Item	Description of Functionality criteria	Points Allocation						Maximum Points Available																						
		Qualification		Professional Accreditation		Relevant Experience																								
		Type	Points	Type	Points	Type	Points																							
2	Qualifications and demonstrated experience of the key staff in relation to the scope of work.	Refer to Returnable Schedule 12 for details of qualifications and experience of staff. Points will be measured and awarded to qualification, professional accreditation and relevant experience columns independently and then combined to get the total points scored. All key staff will be separate individuals and will not be considered for more than one discipline. * For ECSA registrations, note that a registration with a body who is a member of the International Engineering Alliance with its Standards and processes recognized by the Washington Accord will also be recognised.						40																						
2.1	Contract Manager/Director Contract Manager/Director appointed by the Contractor (relevant experience refers to experience in the Mechanical and Electrical construction industry). Contract Manager to have a minimum of 15 years' experience ((i.e., post-graduate experience) and a minimum 3-year Diploma in the Built Environment. (It is expected that the Contractor Manager/Direction will fulfil the following duties as part of their role: - Managing the project on behalf of the contractor, which includes project management, financial management and contractual related matters. - Preparation and management of construction programmes, cash flows and budgets. The Contracts Manager/Director shall be responsible for the overall management of the contractor's staff completing the project and shall be the primary contact for the Engineer and Employer. - The Contracts Director/Manager is expected to attend all contract site meetings and is responsible for Health and Safety and overall quality control for the project.)	Points for 2.1 will be allocated as follows: <table><tr><td>Four (4) Year Degree in the Built Environment</td><td>2</td><td>ECSA Pr. Eng</td><td>1</td><td>≥ 30 Year's Relevant Experience</td><td>5</td></tr><tr><td>Three (3) Year Diploma in the Built Environment</td><td>1</td><td>ECSA Pr. Tech or Pr. Techni</td><td>1</td><td>≥ 25 to < 30 Year's Relevant Experience</td><td>4</td></tr><tr><td colspan="4" rowspan="3"></td><td>≥ 20 to < 25 Year's Relevant Experience</td><td>3</td></tr><tr><td>≥ 15 to < 20 Year's Relevant Experience</td><td>2</td></tr><tr><td>< 15 Year's Relevant Experience</td><td>0</td></tr></table>						Four (4) Year Degree in the Built Environment	2	ECSA Pr. Eng	1	≥ 30 Year's Relevant Experience	5	Three (3) Year Diploma in the Built Environment	1	ECSA Pr. Tech or Pr. Techni	1	≥ 25 to < 30 Year's Relevant Experience	4					≥ 20 to < 25 Year's Relevant Experience	3	≥ 15 to < 20 Year's Relevant Experience	2	< 15 Year's Relevant Experience	0	8
Four (4) Year Degree in the Built Environment	2	ECSA Pr. Eng	1	≥ 30 Year's Relevant Experience	5																									
Three (3) Year Diploma in the Built Environment	1	ECSA Pr. Tech or Pr. Techni	1	≥ 25 to < 30 Year's Relevant Experience	4																									
				≥ 20 to < 25 Year's Relevant Experience	3																									
				≥ 15 to < 20 Year's Relevant Experience	2																									
				< 15 Year's Relevant Experience	0																									
2.2	Contractor's Representative/Project Manager Contractor's Representative appointed by Contractor (relevant experience should include as a minimum, wastewater treatment projects with an average capacity of 20 Ml/d and/or R 100 million or more (per individual project), escalated to date of tender closure by Employer/ Employer's Agent using an escalation factor of 7.5% per annum). Contractor's Representative should include a minimum of two such projects.	Points for 2.2 will be allocated as follows: <table><tr><td>Four (4) Year Degree in the Built Environment</td><td>2</td><td>ECSA Pr. Eng</td><td>1</td><td>>4 Relevant Projects</td><td>5</td></tr><tr><td>Three (3) Year Diploma in the Built Environment</td><td>1</td><td>ECSA Pr. Tech or Pr. Techni</td><td>1</td><td>4 Relevant Projects</td><td>4</td></tr><tr><td colspan="4" rowspan="2"></td><td>3 Relevant Projects</td><td>3</td></tr></table>						Four (4) Year Degree in the Built Environment	2	ECSA Pr. Eng	1	>4 Relevant Projects	5	Three (3) Year Diploma in the Built Environment	1	ECSA Pr. Tech or Pr. Techni	1	4 Relevant Projects	4					3 Relevant Projects	3	8				
Four (4) Year Degree in the Built Environment	2	ECSA Pr. Eng	1	>4 Relevant Projects	5																									
Three (3) Year Diploma in the Built Environment	1	ECSA Pr. Tech or Pr. Techni	1	4 Relevant Projects	4																									
				3 Relevant Projects	3																									

Item	Description of Functionality criteria	Points Allocation						Maximum Points Available
		Qualification		Professional Accreditation		Relevant Experience		
		Type	Points	Type	Points	Type	Points	
	(It is expected that the Contractor's Representative/Project Manager will fulfil the following duties as part of their role: • Shall be delegated the necessary authority to act on the Contractor's behalf under the Contract. • Shall direct the Contractor's performance of the Contract. • Shall be full time on site for the duration of the construction contract and programme, particularly when work is being performed or when the Engineer, with reason requires his presence. • Shall have authority to receive, on behalf of the Contractor, all oral or written communications from the Engineer/ Engineer's Representative or other duly appointed persons.)					2 Relevant Projects	2	
				<2 Relevant Projects	0			
2.3	Mechanical Design Engineer Mechanical Design Engineer (relevant experience should include as a minimum, wastewater treatment projects with an average capacity of 20 Ml/d and/or R 100 million or more (per individual project), escalated to date of tender closure by Employer/ Employer's Agent using an escalation factor of 7.5% per annum). Mechanical Design Engineer should include a minimum of two such projects.	Points for 2.3 will be allocated as follows:						6
		Four (4) Year Eng. Degree	2	ECSA Pr. Eng	1	≥4 Relevant Projects	3	
		Three (3) Year Diploma / BTech	1	ECSA Pr. Tech or Pr. Techni	0.5	3 Relevant Projects	2	
						2 Relevant Projects	1	
						<2 Relevant Projects	0	
2.4	Electrical Design Engineer Electrical Design Engineer (relevant experience should include as a minimum, wastewater and water treatment projects with an average capacity of 20 Ml/d and/or R 80 million or more (per individual project), escalated to date of tender closure by Employer/ Employer's Agent using an escalation factor of 7.5% per annum). Electrical Design Engineer should include a minimum of two such projects.	Points for 2.4 will be allocated as follows:						6
		Four (4) Year Eng. Degree	2	ECSA Pr. Eng	1	≥4 Relevant Projects	3	
		Three (3) Year Diploma / BTech	1	ECSA Pr. Tech or Pr. Techni	0.5	3 Relevant Projects	2	
						2 Relevant Projects	1	
						<2 Relevant Projects	0	

Item	Description of Functionality criteria	Points Allocation						Maximum Points Available
		Qualification		Professional Accreditation		Relevant Experience		
		Type	Points	Type	Points	Type	Points	
2.5	Control and Instrumentation (C&I) Design Engineer C&I Design Engineer (relevant experience should include as a minimum, wastewater and water treatment projects with an average capacity of 20 Ml/d and/or R 40 million or more (per individual project), escalated to date of tender closure by Employer/ Employer’s Agent using an escalation factor of 7.5% per annum). C&I Design Engineer should include a minimum of two such projects.	<u>Points for 2.5 will be allocated as follows:</u>						6
		Four (4) Year Eng. Degree	2	ECSA Pr. Eng	1	≥4 Relevant Projects	3	
		Three (3) Year Diploma / BTech	1	ECSA Pr. Tech or Pr. Techni	0.5	3 Relevant Projects	2	
						2 Relevant Projects	1	
						<2 Relevant Projects	0	
2.6	Health and Safety Officer Health and Safety Officer to have a minimum of 10 years' experience, (relevant experience should include as a minimum, wastewater treatment projects with an average capacity of 20 Ml/d and/or R 200 million or more (per individual project), escalated to date of tender closure by Employer/ Employer’s Agent using an escalation factor of 7.5% per annum).	<u>Points for 2.6 will be allocated as follows:</u>						6
		Four (4) Year OHS Related Degree	2	ACHASM OHS Officer	1	≥4 Relevant Projects	3	
		Three (3) Year OHS Related Diploma / BTech	1	ACHASM OHS Officer	1	3 Relevant Projects	2	
						2 Relevant Projects	1	
						<2 Relevant Projects	0	

Item	Description of Functionality Criteria	Points Allocation	Maximum Points Available
3	Submission and quality of evidence of planning for the project		10

Item	Description of Functionality Criteria	Points Allocation	Maximum Points Available
3.1	Organogram of all staff to be employed on the Contract, including sub-contractors.	Refer to Returnable Schedule: Schedule 12 (Please ensure the organogram is attached to Schedule 12) <u>Points for 3.1 will be allocated as follows:</u> - Comprehensive organogram provided indicating key personnel and subcontractors including the contract manager, project manager, mechanical engineer, electrical engineer, control and instrumentation engineer, H&S representative, etc. = 2.5 points - Up to three key elements are not shown on the organogram = 1.5 points - More than three key elements are excluded from the organogram = 0 points	2.5
3.2	Provision of a preliminary programme of the Works in compliance with Schedule 15: Preliminary Programme	Refer to Returnable Schedule 15 (Please ensure the preliminary program is attached to Schedule 15). <u>Points for 3.2 will be allocated as follows:</u> - Programme submitted is comprehensive indicating the order of work, taking cognisance of the restrictions placed on the order of work and the various areas where work must be undertaken as set out in the document and drawings and indicating compliance with the contract period = 5 points - Main activities are listed, but two or less main activities are excluded from the programme = 2.5 points - Programme does not indicate the different areas and sufficient main activities or does not comply with the Tender requirements = 0 points	5
3.3	Provision of a realistic estimated monthly cash flow forecast in compliance with Schedule 15: Preliminary Programme	Refer to Returnable Schedule 17 (Please ensure the cash flow forecast is attached to Schedule 17 and is completed in compliance with Schedule 15) <u>Points for 3.3 will be allocated as follows:</u> - Cashflow submitted aligns with the programme (Schedule 15), taking cognisance of the restrictions placed on the order of work and the various areas where work must be undertaken as set out in the document and drawings and indicating compliance with the contract period = 2.5 points - Cashflow partially aligns with the programme (Schedule 15), and partially incorporates the restrictions placed on the order of work and the various areas where work must be undertaken as set out in the document and drawings and indicating compliance with the contract period = 1.5 points - Cashflow does not align with the programme or does not comply with the Tender requirements = 0 points	2.5

C.2.1.4.4 **Compulsory clarification meeting**

Tenderers are required to attend a compulsory clarification meeting at which they may familiarise themselves with aspects of the proposed work, services or supply and pose questions.

Details of the meeting(s) are stated in the General Tender Information.

Only those tenders submitted by tenderers whose attendance at this meeting have been recorded will be declared responsive.

C.2.1.4.5 **Good standing with Bargaining Council**

Only those tenders submitted by tenderers who are in good standing with the **Metal & Engineering Industries Bargaining Council (MEIBC)** 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.2.3 **Check documents**

C.2.3 *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).

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.

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 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 **Alternative tender offers**

C.2.12.1 *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*, taken into account in considering the alternative offer.

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

In the event that 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.

C.2.13.3 *Delete the clause and replace with the following:*

1 (One) copy(ies) of the following elements of the bid submission (please refer to **Contents (Volume 3)**) must be submitted separately bound in the same envelope where possible (see C.2.13.5):

Number	Heading
T2.2	Returnable Schedules
C2.2	Bills of Quantities
C2.3	Schedule of Rates for Electrical Variations
	All other attachments submitted by bidder

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. If it is not possible to submit the original tender and the required copies (see C.2.13.3) in a single envelope, then seal the original and each copy of the tender offer as separate packages marking the packages as "ORIGINAL" and "COPY" in addition to the aforementioned tender submission details.

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 after C.2.13.9:

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, provided that printed Bills of Quantities, in the same format (that is, layout, billed items and quantities) as those issued electronically by the Employer, shall be submitted with the tender as stated in C.2.13.2.
- 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.
- h) Volume 3A, Volume 3B and Volume 4 will be provided electronically on a USB and appended to the hardcopy tender document.

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 **12 weeks (84 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 City 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 City Manager, unless the required extension is as a result of an appeal process or court ruling.

In circumstances where the validity period of a tender has expired, and the tender has not been awarded, the tender process is considered "completed", despite there being no decision (award or cancellation) made. This anomaly does not fall under any of the listed grounds of cancellation and should be treated as a "non award". A "non award" is supported as a recommendation to the BAC for noting.

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:
notarized

C.2.18.1 *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 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 or upon request, appended to Schedule 19: 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 C3.5 Management in the Scope of Work.

- 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.2.1.4.2.h. The tenderer must also provide its Tax Compliance Status PIN number on the **Compulsory Enterprise Questionnaire**

Before making an award the City 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 City, within 7 working day, 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 City via CSD or e-Filing. The City 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**

In order to qualify for preference points for HDI and/or Specific Goals, it is the responsibility of the tenderer to submit documentary proof, as either certificates, sworn affidavits or any other requirement prescribed in terms of the B-BBEE Act or any other legislation relevant for the points claimed for that specific goal.

Tenderers are further referred to the content of the **Preference Schedule** for the full terms and conditions applicable to the awarding of preference points.

Add the following 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.

C.3.4 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.3.9.3 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 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 after clause C.3.11.1

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 and SCM Policy v as follows:

C.3.11.3.1 The preference point system applicable to this tender is the 90/10 preference point system. Preference points shall be based on the Specific Goal as per below:

Table B2: Awards ABOVE R50 mil (VAT Inclusive)

#	Specific goals allocated points	Preference Points (90/10) Above R50 mil	Evidence	Additional Guidance
	<i>Persons, or categories of persons, historically disadvantaged- (HDI) by unfair discrimination on the basis of</i>			
1	Gender are women (ownership)* >75% - 100% women ownership: 3 points >50% - 75% women ownership: 2 points >25% - 50% women ownership: 1 point >0% - 25% women ownership: 0.5 point 0% women ownership = 0 points	3	Company Registration Certification	Issued by the Companies and Intellectual Property Commission
			Central Supplier Database report	Report name: CSD Registration report
2	Race are black persons (ownership)* >75% - 100% black ownership: 3 points >50% - 75% black ownership: 2 points >25% - 50% black ownership: 1 point >0% - 25% black ownership: 0.5 point 0% black ownership = 0 points	3	B-BBEE certificate;	South African National Accreditation System approved certificate or commissioned sworn affidavit
			Company Registration Certification	Issued by the Companies and Intellectual Property Commission
			Central Supplier Database report	Report name: CSD Registration report

3	Disability are disabled persons (ownership)* WHO disability guideline >2% ownership: 1 points >0% - 2% ownership: 0.5 point 0% ownership = 0 point	1	• Proof of disability	• Medical certificate/ South African Revenue Services disability registration
			• Company Registration Certification	• Issued by the Companies and Intellectual Property Commission
Reconstruction and Development Programme (RDP) as published in Government Gazette				
4	Promotion of Micro and Small Enterprises Micro with a turnover up to R20million and Small with a turnover up to R80 million as per National Small Enterprise Act, 1996 (Act No.102 of 1996) SME partnership, sub-contracting, joint venture or consortiums	3	• B-BBEE status level of contributor;	• Specifically in line with the respective sector codes which the company operates, • South African National Accreditation System approved certificate or commissioned sworn affidavit
			• South African owned enterprises;	• Certificate of incorporation or commissioned sworn affidavit
			• Financial Statement to determine annual turnover	• Latest financial statements (1 Year)
	Total points	10		

*Ownership: main tendering entity

C.3.11.3.2 Price, preference and functionality 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 specific goals set out in the **Preference Schedule** which is included in T2.2 Returnable Schedules.

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:

- reasonableness of the financial offer
- reasonableness of unit rates and prices
- the tenderer's ability to fulfil its obligations in terms of the tender document, that is, that the tenderer can demonstrate that he/she possesses the necessary professional and technical qualifications, professional and technical competence, financial resources, 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, etc.

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 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).

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 City as a result of (inter alia):

- a) reports of poor governance and/or unethical behaviour;
- b) association with known notorious individuals and family of notorious individuals
- c) poor performance issues, known to the City;
- d) negative social media reports; and
- e) adverse assurance (e.g. due diligence) report outcomes.
- f) circumstances where the relevant vendor has employed, or is directed by, anyone who was previously employed in the service of the state, where the person is or was negatively implicated in any SCM irregularity.

C.3.13.2 The Employer reserves the right to nominate a standby supplier at the time when an award is made and in the event that a contract is terminated during the execution thereof, the CCT may consider the award of the contract, or non-award, to the standby supplier in terms of the procedures included in 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.

C.3.18 Add the following 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 City 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 CCT.

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 SCM Policy, tenders must be cancelled in the event that negotiations fail to achieve a reasonable price with any of the three highest scoring tenderers.

Annex C
(normative)
Standard Conditions of Tender

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 otherwise 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 not 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 item total as quoted shall govern, and the unit rate shall be corrected.
- b) Where there is an error in the total of the prices either as a result of other corrections required by this checking process or in the tenderer's addition of prices, the total of the prices shall govern and the tenderer will be asked to revise selected item prices (and their rates if 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.

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

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, grand stand, 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, storm-water 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;	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: a) are primarily concerned with the development, extension, installation, renewal, renovation, alteration, or dismantling of a permanent shelter for its occupants or contents; or b) cannot be categorised in terms of the definitions provided for civil engineering works, electrical engineering works, mechanical engineering works, or	Buildings and ancillary works other than those categorised as being: a) civil engineering works; b) electrical engineering works; c) mechanical engineering works; or	Buildings for domestic, industrial, institutional or commercial occupancies Car ports Fences other than classified as SS Stores Walls
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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. a) gas transmission and distribution systems b) pipelines c) solid waste disposal d) materials handling, lifting machinery, heating, ventilation and cooling, pumps, e) continuous process systems f) 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	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		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	A subset of construction works identified and defined by the Board that involves specialist capabilities for its execution	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, travellers 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	
	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	

TENDER NO. 191Q/2023/24



CITY OF CAPE TOWN
ISIXEKO SASEKAPA
STAD KAAPSTAD

SCM – 510

Approved by Branch Manager: 23/01/2024

Version: 5

Pages 1 of 561

CONTRACT DOCUMENT

FOR THE

DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS

VOLUME 2: RETURNABLE DOCUMENTS

ISSUED BY:	COMPILED BY:	For official use.
DIRECTOR: WATER AND SANITATION Water and Sanitation Head Office 8 Voortrekker Road (corner of Mike Pienaar Boulevard) Cape Town Bellville 7535	Zutari (Pty) Ltd 1 Century City Waterford Precinct Century City CAPE TOWN 7441	TENDER SERIAL No.:
		SIGNATURES OF CITY OFFICIALS AT TENDER OPENING
		1.
		2.
		3.

MARCH 2024

NAME OF TENDERING ENTITY	
EMAIL ADDRESS OF TENDERING ENTITY	
FAX NUMBER OF TENDERING ENTITY	
NATURE OF TENDER OFFER (please indicate below)	
Main Offer (see clause C.2.12)	
Alternative Offer (see clause C.2.12)	

Part T2: Returnable Documents

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C2.2 Schedules of Quantities	47 – 235
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CITY OF CAPE TOWN

DIRECTORATE: WATER AND SANITATION

CONTRACT NO. 191Q/2023/24

DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS

T2.1 List of Returnable Documents

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

1. C1.1 The offer portion of the C1.1 Form of Offer and Acceptance

2. C1.2 Contract Data (provided by contractor)

3. C2.2 Schedules of Quantities

C2.3 Schedule of Rates for Electrical Variations

4. Returnable Schedules that will be incorporated into the Contract

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1: COMPULSORY ENTERPRISE QUESTIONNAIRE.....	238 - 239
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5: DECLARATION OF INTEREST – STATE EMPLOYEES (<u>MBD 4</u>).....	245 - 247
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7: DECLARATION IN RESPECT OF <u>COMPLIANCE WITH LABOUR LEGISLATION</u>	249
8: CONFIRMATION OF CCT SUPPLIER DATABASE REGISTRATION	250
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11: CONFIRMATION OF CONTRACTOR REGISTRATION / <u>ACCREDITATION</u>	262
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13: SCHEDULE OF CONSTRUCTION EQUIPMENT	267- 268
14: DETAILS OF TENDERER'S WORKSHOP FACILITIES	269
15: PRELIMINARY PROGRAMME	270
16: PROPOSED WORK PLAN	271
17: SCHEDULE OF ESTIMATED MONTHLY EXPENDITURE.....	272 - 274
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19: HEALTH AND SAFETY PLAN	276
20: PROPOSED DEVIATIONS AND QUALIFICATIONS BY TENDERER.....	277
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22: DECLARATION CERTIFICATE FOR LOCAL PRODUCTION AND CONTENT FOR DESIGNATED SECTORS	279
23: PRICE BASIS FOR RESOURCES	280
24: RECORD OF ADDENDA TO TENDER DOCUMENTS	281
25: PREFERENCE SCHEDULE (where preferences are granted in respect of specific goal(s)).....	282- 285
26: SCHEDULE OF PRE-QUALIFICATION CRITERIA FOR SUB-CONTRACTORS	286 .
27: INFORMATION TO BE PROVIDED WITH THE TENDER	287
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5. Other documents required for tender evaluation purposes

- a) Joint Venture Agreement (if applicable) - append to Schedule 3.
- b) Health and Safety Plan - append to Schedule 19.
- c) Functionality Criteria - append to Schedule 21.

DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS

C1.1 Form of Offer and Acceptance

Offer

The employer, identified in the acceptance signature block, has solicited offers to enter into a contract for the procurement of:

CONTRACT NO. 191Q/2023/24 : DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS

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

By the representative of the tenderer, deemed to be duly authorized, signing this part of this form of offer and acceptance, the tenderer offers to perform all of the obligations and liabilities of the contractor under the contract including compliance with all its terms and conditions according to their true intent and meaning for an amount to be determined in accordance with the conditions of contract identified in the contract data.

THE OFFERED TOTAL OF THE PRICES INCLUSIVE OF VALUE ADDED TAX IS:

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

This offer may be accepted by the employer by signing the acceptance part of this form of offer and acceptance and returning one copy of this document to the tenderer before the end of the period of validity stated in the tender data, whereupon the tenderer becomes the party named as the contractor in the conditions of contract identified in the contract data.

Signature(s)
Name(s)
Capacity
for the tenderer

(Name of organization/tenderer)
(Address of organization/tenderer)
.....

Name and signature of witness Date

For official use.		
INITIALS OF CITY OFFICIALS AT TENDER OPENING		
1.	2.	3.

Acceptance

By signing this part of this form of offer and acceptance, the employer identified below accepts the tenderer's offer. In consideration thereof, the employer shall pay the contractor the amount due in accordance with the conditions of contract identified in the contract data. Acceptance of the tenderer's offer shall form an agreement between the employer and the tenderer upon the terms and conditions contained in this agreement and in the contract that is the subject of this agreement.

The terms of the contract are contained in:

- Part C1: Agreements and contract data (which includes this agreement)
- Part C2: Pricing data
- Part C3: Scope of work
- Part C4: Site information

and drawings and documents or parts thereof, which may be incorporated by reference into the above listed Parts.

Deviations from and amendments to the documents listed in the tender data and any addenda thereto as 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.

The tenderer shall within two weeks after receiving a completed copy of this agreement, including the schedule of deviations (if any), contact the employer's agent (whose details are given in the contract data) to arrange the delivery of any securities, bonds, guarantees, proof of insurance and any other documentation to be provided in terms of the conditions of contract identified in the contract data. Failure to fulfil any of these obligations in accordance with those terms shall constitute a repudiation of this agreement.

Notwithstanding anything contained herein, this agreement comes into effect on the date when the parties have signed the table below and confirms receipt from the employer of one fully completed original copy of this agreement, including the schedule of deviations (if any). The tenderer (now contractor) shall within five working days of the agreement coming into effect notify the employer in writing of any reason why he cannot accept the contents of this agreement as a complete and accurate memorandum thereof, failing which the agreement presented to the contractor shall constitute the binding contract between the parties.

The Parties	Employer	Contractor
Business Name		
Business Registration		
Tax number (VAT)		
Physical Address		
Accepted contract sum including tax		
Accepted contract duration		
Signed – who by signature hereto warrants authority		
Name of signatory		
Signed: Date		
Signed: Location		
Signed: Witness		
Name of Witness		

Schedule of Deviations

Notes:

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

1 Subject
Details

2 Subject
Details

3 Subject
Details

4 Subject
Details

By the duly authorised representatives signing this agreement, the employer and the tenderer agree to and accept the foregoing schedule of deviations as the only deviations from and amendments to the documents listed in the tender data and addenda thereto as listed in the returnable schedules, as well as any confirmation, clarification or changes to the terms of the offer agreed by the tenderer and the employer during this process of offer and acceptance.

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

CITY OF CAPE TOWN

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C1.2 Contract Data

Data provided by the Contractor

The name of the Contractor is

The address of the Contractor is

Physical : Postal :
Address Address

.....

.....

.....

.....

.....

.....

.....

Telephone : Fax:

email :

CONTRACTOR'S ANNUAL HOLIDAY PERIODS DURING CONSTRUCTION PERIOD

Year 1 contractor's annual holiday period	Start date	End date
Year 2 contractor's annual holiday period	Start date	End date
Year 3 contractor's annual holiday period	Start date	End date
Year 4 contractor's annual holiday period	Start date	End date
Year 5 contractor's annual holiday period	Start date	End date

CITY OF CAPE TOWN

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

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

C2.2 Schedules of Quantities

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PAGES

C.2.2.1 Schedule of Quantities for Mechanical Portion of Works

SCHEDULE P&Gs GENERAL REQUIREMENTS AND CONDITIONS

SCHEDULE M1 ARCHIMEDEAN SCREW PUMPS

SCHEDULE M2 SCREENS, WATER LAUNDERS, WASHING SCREW PRESSES & SKIP DOLLY

SCHEDULE M3 GRIT REMOVAL EQUIPMENT

SCHEDULE M4 SLUICE GATES, HAND STOPS AND WEIRS

SCHEDULE M5 ODOUR CONTROL & COVERS

SCHEDULE M6 PRIMARY SETTLING TANKS

SCHEDULE M7 VERTICAL SHAFT MIXERS

SCHEDULE M8 FINE BUBBLE DIFFUSED AERATION

SCHEDULE M9 INTERNAL RECYCLE PUMPS

SCHEDULE M10 RETURN ACTIVATED SLUDGE PUMPS

SCHEDULE M11 SECONDARY SETTLING TANKS

SCHEDULE M12 ULTRAVIOLET DISINFECTION EQUIPMENT

SCHEDULE M13 CHLORINE BUILDING

SCHEDULE M14 CHEMICAL DOSING EQUIPMENT

SCHEDULE M15 COMPRESSED AIR SYSTEMS (INSTRUMENT AIR)

SCHEDULE M16 SCUM PUMP STATION

SCHEDULE M17 TSE PUMP STATION

SCHEDULE M18 SERVICE WATER SUPPLY SYSTEM

SCHEDULE M19 PRIMARY SLUDGE SCREENING EQUIPMENT

SCHEDULE M20 MAIN (MULTIPURPOSE) SLUDGE PUMPSTATION

SCHEDULE M21 GRAVITY THICKENERS

SCHEDULE M22 HYDROCYCLONES

SCHEDULE M23 BIOGAS HANDLING EQUIPMENT

SCHEDULE M24 SLUDGE HEATING EQUIPMENT

SCHEDULE M25 ANAEROBIC DIGESTER SLUDGE EQUIPMENT

SCHEDULE M26 SLUDGE HOLDING TANKS EQUIPMENT

SCHEDULE M27 SLUDGE DEWATERING EQUIPMENT

SCHEDULE M28 CAKE SILO LIVE BOTTOMS

SCHEDULE M29 POLYELECTROLYTE PREPARATION EQUIPMENT

SCHEDULE M30 COMBINED HEAT AND POWER (CHP) PLANT

SCHEDULE M31 LIFTING EQUIPMENT

SCHEDULE M32 VENTILATION SYSTEMS

SCHEDULE M33 SPARES

SCHEDULE M34 SUNDRIES

SCHEDULE M35 PROCESS CONTROL ASSISTANCE, MAINTENANCE AND TRAINING (FULL TIME)

SCHEDULE M36 MAINTENANCE INSPECTIONS (PART TIME)

SUMMARY

DECLARATION

C.2.2.2 Schedule of Quantities for Electrical Portion of Works

SCHEDULE E1 SUPPLY AND LOCAL AUTHORITY LIAISON

SCHEDULE E2 PRIMARY MV SWITCHGEAR

SCHEDULE E3 SECONDARY MV SWITCHGEAR

SCHEDULE E4 DISTRIBUTION TRANSFORMERS

SCHEDULE E5 ISOLATION TRANSFORMERS

SCHEDULE E6 MV CABLING

SCHEDULE E7 LV SWITCHGEAR, CONTROL ASSEMBLIES AND VFCs

SCHEDULE E8 LV CABLES

SCHEDULE E9 CABLE SUPPORT

SCHEDULE E10 AREA LIGHTING

SCHEDULE E11 EARTHING

SCHEDULE E12 DIESEL GENERATORS

SCHEDULE E13 INSTRUMENTATION AND FIELDBUS CABLES

SCHEDULE E14 MEASURING INSTRUMENTS

SCHEDULE E15 CONTROL & INSTRUMENTATION CABINETS AND JUNCTION BOXES

SCHEDULE E16 FIBRE OPTIC COMMUNICATION SYSTEMS

SCHEDULE E17 TELEMETRY EQUIPMENT

SCHEDULE E18 DATA ARCHITECTURE, SCADA, HISTORIAN AND REPORTING

SCHEDULE E19 PROGRAMMABLE LOGIC CONTROLLER (PLC)

SCHEDULE E20 MISCELLANEOUS AND SUNDRIES

SUMMARY

DECLARATION

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		BILL P&Gs				
		GENERAL REQUIREMENTS AND CONDITIONS				
		Allow for all costs and expenses in connection with the following items:				
P&Gs-1		Providing Performance Security	Sum	1		
P&Gs-2		Providing Insurances	Sum	1		
P&Gs-3		Detailed design of the Works and Submission of Contractor's Documents	Sum	1		
P&Gs-4		Establishment of Contractor's camp, including security and ablution facilities	Sum	1		
P&Gs-5		Destablishment of Contractor's camp, including security and ablution facilities	Sum	1		
P&Gs-6		Provision of water, electricity and other services	Sum	1		
P&Gs-7		Provision of facilities for the Engineer, as described in the Scope of Work	Sum	1		
P&Gs-8		General expenses incurred in complying with the requirements of T1.2 Tender Data, not included above	Sum	1		
P&Gs-9		General expenses incurred in complying with the requirements of C1.2 Contract Data, not included above	Sum	1		
		Health and Safety, Environmental and Quality Management				
P&Gs-10		Compliance with the requirements of the Occupational Health and Safety Act 1993 and Construction Regulations 2014, including appointment of Construction Supervisor and Competent Person (for Health and Safety Plan see separate Item).	Sum	1		
P&Gs-11		Provision of and adherence to a Health and Safety Plan	Sum	1		
P&Gs-12		Compliance with the Health and Safety Specification in the Scope of Work	Sum	1		
P&Gs-13		Liaison, co-ordination and chairing of meetings in respect of Health and Safety requirements.	Sum	1		
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		Brought forward / ...				
P&Gs-14		Quality management plan and quality assurance system	Sum	1		
P&Gs-15		Compliance with the Environmental Management Specification in the Scope of Work	Sum	1		
		Dealing with water:				
P&Gs-16		(a) Dealing with subsurface water	Sum	1		
P&Gs-17		(b) Dealing with surface water	Sum	1		
P&Gs-18		Other general expenses incurred in complying with the requirements of the Scope of Work not included above (Specify):	Item	-		
						
						
						
						
						
TOTAL OF BILL P&Gs CARRIED TO SUMMARY					R	

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
	Vol 3A, Section A 17	BILL M1				
		ARCHIMEDEAN SCREW PUMPS				
		Allow for all the costs and expenses in connection with the manufacture, painting, testing, supplying, delivery, offloading and storage of the following materials and equipment:				
M1-1		Screw pumps (all components included)	No	8		
M1-2		Bottom Bearing Lubrication System	No	8		
M1-3		GRP splash guards (Dome) including 316 stainless steel support brackets and anchors	Sum	1		
		Allow for all costs and expenses in connection with the Site installation of the following:-				
M1-4		All materials and equipment for item 1 to 3 above. Includes grouting at lower bearing	Sum	1		
		Other:-				
M1-5		Supervision of screeding trough area of each screw pump to ensure mechanical contractor's requirements are met without damage to equipment	No	8		
M1-6		All grease required for the lubrication of the lower bearings until the issue of the taking over certificate	Sum	1		
M1-7		Grease gun (and grease for the upper bearing until issuing of the taking over certificate)	Sum	1		
M1-8		All other 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)	Item	-		
TOTAL OF BILL M1 CARRIED TO SUMMARY					R	

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
	Vol 3A, Section A 18,19,20, 21, & 24	BILL M2				
		SCREENS & WASHING SCREW PRESSES				
		Allow for all the costs and expenses in connection with the manufacture, painting, testing, supplying, delivery, offloading and storage of the following materials and equipment:				
M2-1		Mechanical front raked screens	No	4		
M2-2		Perforated Plate Belt Screens	No	4		
M2-3		40mm Hand raked screen at inlet works by-pass channel, including screenings collection trough and manual rake	No	2		
M2-4		25mm Hand raked screen at inlet works by-pass channel, including screenings collection trough and manual rake	No	2		
M2-5		Water launder	Sum	1		
M2-6		Wash presses including motorised diverter	No	4		
M2-7		Wash press drainage valve	No	4		
M2-8		Actuator for item 7 above	No	4		
M2-9		All pipework and valves at inlet works (including actuators)	Sum	1		
M2-10		Skip Dolly suitable for two skips complete with gear motor and cable drum system (Inlet Works & Screen press)	No	3		
M2-11		Rail sets for skip dolly system (Inlet Works & Inline sludge Screen)	Sum	1		
		Allow for all costs and expenses in connection with the Site installation of the following:-				
M2-12		All materials and equipment summarized in Bill M2 complete	Sum	1		
TOTAL OF BILL M2 CARRIED TO SUMMARY					R	

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
	Vol 3A, Section A 22, 23 & 24	BILL M3 GRIT REMOVAL EQUIPMENT Allow for all the costs and expenses in connection with the manufacture, painting, testing, supplying, delivery, offloading and storage of the following materials and equipment:				
M3-1		Paddle system / vortex inducer complete with gearbox, motor and shaft	No	6		
M3-2		Grit fluidising pipework and valves (including any actuators)	Sum	1		
M3-3		Grit extraction pipework and valves (including actuators)	Sum	1		
M3-4		Grit classifier complete (Inlet works).	No	3		
M3-5		Grit classifier complete (WAS hydrocyclones).	No	1		
M3-6		Drainage pipework from grit classifier including valves and supports (for item 4 and 5 above)	Sum	1		
M3-7		Skip Dolly suitable for two skips complete with gear motor and cable drum system at inlet works	No	1		
M3-8		Rail sets for skip dolly system	Sum	1		
		Allow for all costs and expenses in connection with the Site installation of the following:-				
M3-9		All materials and equipment summarized in Bill M3 complete.	Sum	1		
		Other:-				
M3-10		All other 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)	Item	-		
TOTAL OF BILL M3 CARRIED TO SUMMARY					R	

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
	Vol 3A, Section A 25 & 26	BILL M4 SLUICE GATES, HAND STOPS AND WEIRS Allow for all the costs and expenses in connection with the manufacture, painting, testing, supplying, delivery, offloading and storage of the following materials and equipment: Channel Mounted Sluice Gates				
M4-1		Sluice gates upstream of 1st stage of screw pumps (11CH01 to 04)	No	4		
M4-2		Sluice gates upstream of 2nd stage of screw pumps (11CH05 to 08)	No	4		
M4-3		Sluice gates upstream of mechanical screens (12CH01 to 05)	No	5		
M4-4		Sluice gates downstream of perforated plated belt screens (13CH01 to 13CH05)	No	5		
M4-5		Sluice gates upstream of degritters (14CH01 to 14CH06, VLV01)	No	6		
M4-6		Upstream of UV screens (72CH02 to 72CH04, VLV01)	No	3		
M4-7		Downstream of the UV Banks (72UV01 to 72UV03 - VLV01)	No	3		
M4-8		Actuators for items 1 to 7 above	Sum	1		
M4-9		Sluice gate for downstream of degritters (14CH01 to 14CH06, VLV02)	No	6		
M4-10		Sluice gate for upstream of PST splitter box (20CH01)	No	1		
M4-11		PST bypass channel Upstream of Bioreactor (20CH02)	No	1		
M4-12		Upstream of UV Channel (50CH07)	No	1		
M4-13		Maturation Pond 1 Isolation Gate (83DM03)	No	1		
M4-14		Maturation Pond 2 Isolation Gate (83DM04)	No	1		
M4-15		Maturation Pond 4 Isolation Gate (83DM05)	No	1		
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		Brought forward / ...				
M4-16		Maturation Pond 5 Isolation Gate (83DM02)	No	1		
M4-17		Downstream of UV screens (72CH02 to 72CH04 - VLV02)	No	3		
M4-18		Upstream of the UV Banks (72CH06 to 72CH08 - VLV01)	No	3		
M4-19		UV Bypass Channel Isolation Gates (72CH01 - VLV01 and VLV02)	No	2		
M4-20		Upstream of Chlorine Contact Tank (CH09 - VLV01 and VLV02)	No	2		
		Wall Mounted Sluice Gates				
M4-21		Bypass Flow splitter Isolation Gates (16EB01-VLV01/02/03, 83DM06,83DM07,83DM08-VLV01)	No	6		
M4-22		PST Splitter Isolation Gates (21ST01,22ST01,23ST01,24ST01,25ST01,26ST01)	No	6		
M4-23		Reactor Splitter Isolation Gates (40RX01, 40RX02, 40RX03,40RX04,40RX05,40RX06)	No	6		
M4-24		Reactor Outlet Gates (41RX06,42RX06,43RX06,44RX06)	No	4		
M4-25		Actuators for item above	No	4		
M4-26		Gates Upstream Reactor on RAS return channel (41to44RX04 -VLV01 and 41to44RX05-VLV01)	No	8		
M4-27		Gates Upstream Anaerobic Zone (41to44RX07 -VLV01)	No	4		
M4-28		Gates Upstream Anoxic Zone (41to44RX08 - VLV01)	No	4		
M4-29		Reactor flow mixer (50CH07-VLV01 to VLV09)	No	9		
M4-30		SST Cluster 1 Splitter Isolation Gates 50CH02 - VLV01 to VLV06)	No	6		
		Carried forward / ...				

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
M4-31		Brought forward / ... SST Cluster 2 Splitter Isolation Gates (50CH04 - VLV01 to VLV06)	No	6		
		Weir Plates				
M4-32		PST Splitter (21 to 26ST01-WEI01)	No	6		
M4-33		Upstream A recycle pump of reactor 1	No	3		
M4-34		Upstream A recycle pump of reactor 2	No	3		
M4-35		Upstream A recycle pump of reactor 3	No	3		
M4-36		Upstream A recycle pump of reactor 4	No	3		
M4-37		Upstream R recycle pump of reactor 1	No	2		
M4-38		Upstream R recycle pump of reactor 2	No	2		
M4-39		Upstream R recycle pump of reactor 3	No	2		
M4-40		Upstream R recycle pump of reactor 4	No	2		
M4-41		Upstream S recycle pump of reactor 1	No	2		
M4-42		Upstream S recycle pump of reactor 2	No	2		
M4-43		Upstream S recycle pump of reactor 3	No	2		
M4-44		Upstream S recycle pump of reactor 4	No	2		
M4-45		SST Splitter 1	No	6		
M4-46		SST Splitter 2	No	6		
M4-47		Reactor Flow Mixer	No	3		
		Hand stops				
M4-48		Provisional allowance for hand stops	Prov	1	2 000 000	2 000 000.00
M4-49		Charge required by Contractor on above item	%	2 000 000		
		Allow for all costs and expenses in connection with the Site installation of the following:-				
M4-50		All materials and equipment summarized in Bill M4 complete including grouting.	Sum	1		
TOTAL OF BILL M4 CARRIED TO SUMMARY						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
	Vol 3A, Section A 27 & 63	BILL M5				
		ODOUR CONTROL & COVERS				
		Odour Control (Located at Inlet Works):				
M5-1		Odour control study	Sum	1		
M5-2		Inspection reports (as specified)	Sum	1		
		Odour Control (Located at Main sludge pump station/Gravity thickener):				
M5-3		Odour control study	Sum	1		
M5-4		Inspection reports (as specified)	Sum	1		
		Odour Control (Located at Dewatering Building):				
M5-5		Odour control study	Sum	1		
M5-6		Inspection reports (as specified)	Sum	1		
		Allow for all the costs and expenses in connection with the manufacture, painting, testing, supplying, delivery, offloading and storage of the following materials and equipment:				
		Odour Control (Located at Inlet Works):				
M5-7		Channel and equipment covers (Including PST Launderers)	m ²	1 500		
M5-8		All odour extraction piping, supports and valves	Sum	1		
M5-9		Concrete slab with reinforcement for odour control equipment	m3	30		
M5-10		Brickwork and concrete slab for extraction pipe manifold and drain points chamber	Sum	1		
M5-11		Biological trickling filter odour control system including media (complete)	Sum	1		
M5-12		Media / chemicals as required	Sum	1		
M5-13		Extraction fans (incl. motor and supports)	Sum	1		
M5-14		Nutrient supply for one year continuous operation (if required)	Sum	1		
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		Brought forward / ...				
		Odour Control (Located at Main sludge pump station/Gravity thickener):				
M5-15		Channel and equipment covers	m ²	300		
M5-16		All odour extraction piping, supports and valves	Sum	1		
M5-17		Concrete slab with reinforcement for odour control equipment	m ³	30		
M5-18		Brickwork and concrete slab for extraction pipe manifold and drain points chamber	Sum	1		
M5-19		Biological trickling filter odour control system including media (complete)	Sum	1		
M5-20		Media / chemicals as required	Sum	1		
M5-21		Extraction fans (incl. motor and supports)	Sum	1		
M5-22		Nutrient supply for one year continuous operation (if required)	Sum	1		
		Odour Control (Located at Dewatering Building):				
M5-23		Channel and equipment covers	m ²	100		
M5-24		All odour extraction piping, supports and valves	Sum	1		
M5-25		Concrete slab with reinforcement for odour control equipment	m ³	60		
M5-26		Brickwork and concrete slab for extraction pipe manifold and drain points chamber	Sum	1		
M5-27		Modular biological filter, biotrickling filter or hybrid biotrickling filter/biological filter including media (if applicable)	Sum	1		
M5-28		Media / chemicals as required	Sum	1		
M5-29		Extraction fans (incl. motor and supports)	Sum	1		
M5-30		Nutrient supply for one year continuous operation (if required)	Sum	1		
		Allow for all costs and expenses in connection with the Site installation of the following:-				
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		Brought forward / ...				
M5-31		All items listed in Bill M5, Items 7 to 14. Includes excavating, laying, bedding and backfilling of all odour control pipes.	Sum	1		
M5-32		All items listed in Bill M5, Items 15 to 22. Includes excavating, laying, bedding and backfilling of all odour control pipes.	Sum	1		
M5-33		All items listed in Bill M5, Items 23 to 30. Includes excavating, laying, bedding and backfilling of all odour control pipes.	Sum	1		
		Other:				
M5-34		All other 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)	Item	-		
TOTAL OF BILL M5 CARRIED TO SUMMARY						R

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
	Vol 3A, Section A 28	BILL M6				
		PRIMARY SETTLING TANKS				
		Allow for all the costs and expenses in connection with the manufacture, painting, testing, supplying, delivery, offloading and storage of the following materials and equipment:				
M6-1		Clarifier bridge and supports complete with centre bearing, guard rails, access ladder, bottom scrapers and drive etc.	No	4		
M6-2		Spray bar system (including pumps, pipework, valves and supports)	Sum	1		
M6-3		V-notch weirs	No	4		
M6-4		Central inlet pipe and stilling well	No	4		
M6-5		Desludge valves complete with actuator	No	4		
M6-6		Total solids analyser (on sludge cake discharge pipes)	No.	2		
		Allow for all costs and expenses in connection with the Site installation of the following:-				
M6-7		Materials and equipment summarized in Bill M6 for items 1 to 5	Sum	1		
		Other:-				
M6-8		Supervision of screeding each clarifier to ensure mechanical contractor's requirements are met without damage to equipment	Sum	1		
M6-9		All other 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)	Item	-		
						
						
						
						
						
TOTAL OF BILL M6 CARRIED TO SUMMARY					R	

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
	Vol 3A, Section A 29	BILL M7				
		VERTICAL SHAFT MIXERS				
M7-1		CFD analysis of mixers in anaerobic basin	Sum	1		
M7-2		CFD analysis of mixers in anoxic basin	Sum	1		
M7-3		CFD analysis of mixers in balancing/emergency tank	Sum	1		
M7-4		CFD analysis of mixers in Main Sludge Pump Station	Sum	1		
		Allow for all the costs and expenses in connection with the manufacture, painting, testing, supplying, delivery, offloading and storage of the following materials and equipment:				
M7-5		Mixers for Anaerobic Zone 01 Reactor 01,02, 03, 04 (incl. motor and gearbox)	No	12		
M7-6		Mixers for Anoxic Zone 01 & 02 Reactor 01,02,03,04 (incl. motor and gearbox)	No	24		
M7-7		Mixers for balancing/emergency tank (incl. motor and gearbox)	No	23		
M7-8		Mixers for main sludge pump station sump (incl. motor and gearbox)	No	3		
		Allow for all costs and expenses in connection with the Site installation of the following:-				
M7-9		All materials and equipment summarized in Bill M7 for items 5 to item 8 above	Sum	1		
		Other:				
M7-10		All other 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)	Item	-		
TOTAL OF BILL M7 CARRIED TO SUMMARY					R	

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
	Vol 3A, Section A 31	BILL M8 FINE BUBBLE DIFFUSED AERATION Allow for all the costs and expenses in connection with the manufacture, painting, testing, supplying, delivery, offloading and storage of the following materials and equipment:				
M8-1		Blowers complete with motors, integrated control cabinet and user interface, filters, all silencers, sound attenuating hoods etc.	No	8		
M8-2		Stainless steel manifolds and connecting pipework to each blower inside blower room complete with isolation valves, non-return valves and supports for centrifugal type blower package	Sum	1		
M8-3		Stainless steel blowline from blower room to reactor walkway including connections to manifold at blower room. Couplings and supports to be included	Sum	1		
M8-4		Stainless steel elevated blowline at reactor walkway including couplings, elbows and supports	Sum	1		
M8-5		Drop legs from blowline to reactor floor including supports and lateral s/s piping	Sum	1		
M8-6		V-Port knife gate valves	No	24		
M8-7		Actuators for above V-Port knife gate valves for automatic aeration	No	24		
M8-8		Lateral and distribution pipework including anchors, supports and condensate removal system for both basins	Sum	1		
M8-9		Diffusers and membranes	Sum	1		
		Allow for all costs and expenses in connection with the Site installation of the following:-				
M8-10		Blowers complete with motors, integrated control cabinet and user interface, filters, all silencers, sound attenuating hoods etc.	No	8		
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
M8-11		Brought forward / ... Stainless steel manifolds and connecting pipework to each blower inside blower room complete with isolation valves, non-return valves and supports for centrifugal type blower package	Sum	1		
M8-12		Stainless steel blowline from blower room to reactor walkway including connections to manifold at blower room. Couplings and supports to be included	Sum	1		
M8-13		Stainless steel elevated blowline at reactor walkway including couplings, elbows and supports	Sum	1		
M8-14		Drop legs from blowline to reactor floor including supports and lateral s/s piping	Sum	1		
M8-15		All materials and equipment summarized in Bill M8 for items 6 & 7	Sum	1		
M8-16		Lateral and distribution pipework including anchors, supports and condensate removal system for all basins	Sum	1		
M8-17		Diffusers and membranes	Sum	1		
		Other:				
M8-18		Testing of FBDA system	Sum	1		
M8-19		Performance testing of entire FBDA system using the steady state method.	Sum	1		
M8-20		All other 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)	Item	-		
TOTAL OF BILL M8 CARRIED TO SUMMARY					R	

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
	Vol 3A, Section A 30	BILL M9				
		INTERNAL RECYCLE PUMPS				
		Allow for all the costs and expenses in connection with the manufacture, painting, testing, supplying, delivery, offloading and storage of the following materials and equipment:				
M9-1		A-Recycle: Axial Flow Recycle Pump (incl. motor) complete	No	12		
M9-2		R-Recycle: Axial Flow Recycle Pump (incl. motor) complete	No	8		
		Allow for all costs and expenses in connection with the Site installation of the following:-				
M9-3		All materials and equipment summarized for item 1 above	Sum	1		
M9-4		All materials and equipment summarized for item 2 above	Sum	1		
		Other:-				
M9-5		All other 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)	Item	-		
						
						
						
						
						
TOTAL OF BILL M9 CARRIED TO SUMMARY					R	

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
	Vol 3A, Section A 35	BILL M10				
		RETURN ACTIVATED SLUDGE PUMPS				
		Allow for all the costs and expenses in connection with the manufacture, painting, testing, supplying, delivery, offloading and storage of the following materials and equipment:				
M10-1		Vertical axial pump (submersible)	No	8		
M10-2		Coupling ring with flange for concrete well	No	8		
		Allow for all costs and expenses in connection with the Site installation of the following:-				
M10-3		All materials and equipmment list in Bill M10 complete	Sum	1		
		Other:-				
M10-4		Witness test including test certificates	No	8		
M10-5		All other 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)	Item	-		
						
						
						
						
						
TOTAL OF BILL M10 CARRIED TO SUMMARY					R	

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
	Vol 3A, Section A 33	BILL M11				
		SECONDARY SETTLING TANKS				
		Allow for all the costs and expenses in connection with the manufacture, painting, testing, supplying, delivery, offloading and storage of the following materials and equipment:				
M11-1		Clarifier bridge and supports complete with centre bearing, guard rails, access ladder, bottom scrapers and drive etc.	No	12		
M11-2		V-notch weirs	No	12		
M11-3		Scum removal system (includes scum box, scum scraper, baffle plate, etc)	Sum	1		
M11-4		Central inlet pipe and stilling well	No	12		
M11-5		Telescopic valves complete with actuator	No	12		
		Allow for all costs and expenses in connection with the Site installation of the following:-				
M11-6		Materials and equipment summarized in Bill M11 for items 1 to 5	Sum	1		
		Other:-				
M11-7		Supervision of screeding each clarifier to ensure mechanical contractor's requirements are met without damage to equipment	Sum	1		
M11-8		All other 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)	Item	-		
TOTAL OF BILL M11 CARRIED TO SUMMARY					R	

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
	Vol 3A, Section A 37	BILL M12 ULTRAVIOLET DISINFECTION EQUIPMENT Allow for all the costs and expenses in connection with the manufacture, painting, testing, supplying, delivery, offloading and storage of the following materials and equipment:				
M12-1		Mechanical Screens	No	3		
M12-2		Screw Conveyor	No	1		
M12-3		Wheelie Bin 240L	No	1		
M12-4		UV dosing equipment complete	Sum	1		
M12-5		Channel covers.	Sum	1		
		Allow for all costs and expenses in connection with the Site installation of the following:-				
M12-6		All materials and equipment summarized in Bill M12 complete (items 1 to 5).	Sum	1		
M12-7		Other:- All other 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) 	Item	-		
TOTAL OF BILL M12 CARRIED TO SUMMARY					R	

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
	Vol 3A, Section A 38 & 39	BILL M13 CHLORINE BUILDING Allow for all the costs and expenses in connection with the manufacture, painting, testing, supplying, delivery, offloading and storage of the following materials and equipment: High Pressure Room Chlorine Dosing Equipment:				
M13-1		Auto Changeover Devices	No	2		
M13-2		Drum Cradles with Scales (mass meters)	No	6		
M13-3		Drum Cradles without Scales	No	6		
M13-4		All chlorine gas pipework complete as specified, including valves, pressure reducing devices, catchpots, heaters, vaporisers, pigtails supports etc., as required	Sum	1		
M13-5		Vacuum Regulator	No	2		
		Low Pressure Room Chlorine Dosing Equipment:				
M13-6		Chlorinators	No	2		
M13-7		Injectors	No	2		
M13-8		Motive Water Pumps (complete with motor, couplings, etc.)	No	2		
M13-9		Motive water pipework, pipe supports, filters, valves, etc.)	Sum	1		
M13-10		Chlorine sparge bars (located at the chlorine contact tank disinfection chamber)	Sum	1		
M13-11		Residual chlorine meters	Sum	1		
		Chlorine Dosing Safety Equipment:				
M13-12		Gas Leak Detector, including beacon and siren	No	1		
M13-13		Breathing Apparatus set including enclosure	No	2		
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		Brought forward / ...				
M13-14		Windsock	No	1		
M13-15		Emergency Closure Kit (safety equipment including weather proof cabinet, gas masks, eye wash bottle, etc.)	No	1		
M13-16		Ventilation System	Sum	1		
M13-17		Safety Signage (wall charts)	Sum	1		
M13-18		Two complete Stainless Steel full body shower and eye bath (including Accumulator and Pumps)	Sum	1		
		Chlorine Scrubber:				
M13-19		Dry Chlorine Scrubber (complete with extraction fan(s)) as specified	Sum	1		
		Allow for all costs and expenses in connection with the Site installation of the following:-				
		High Pressure Room Chlorine Dosing Equipment				
M13-20		Auto Changeover Device	No	2		
M13-21		Drum Cradles with Scales (mass meters)	No	6		
M13-22		Drum Cradles without Scales	No	6		
M13-23		All chlorine gas pipework complete as specified, including valves, pressure reducing devices, catchpots, heaters, vaporisers, pigtails supports etc., as required	Sum	1		
M13-24		Vacuum Regulator	No	2		
		Low Pressure Room Chlorine Dosing Equipment:				
M13-25		Chlorinator Skids Complete	No	2		
M13-26		Injectors	No	2		
M13-27		Motive Water Pumps	No	3		
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
M13-28		Brought forward / ... Motive water pipework, with pipe supports, valves, etc.	Sum	1		
M13-29		Chlorine sparge bars (located at the chlorine contact tank disinfection chamber)	Sum	1		
		Chlorine Dosing Safety Equipment:				
M13-30		Gas Leak Detector, including beacon and siren	No	1		
M13-31		Breathing Apparatus set including enclosure	No	2		
M13-32		Windsock	No	1		
M13-33		Emergency Closure Kit (safety equipment including weather proof cabinet, gas masks, eye wash bottle, etc.)	No	1		
M13-34		Ventilation System	Sum	1		
M13-35		Safety Signage (wall charts)	Sum	1		
M13-36		Two complete Stainless Steel full body shower and eye bath (including Accumulator and Pumps)	Sum	1		
M13-37		Residual chlorine meters	Sum	1		
		Chlorine Scrubber				
M13-38		Dry Chlorine Scrubber as specified	Sum	1		
		Other:				
M13-39		Provisional allowance for MHI study for chlorine installation	Prov	1	1 000 000	1 000 000.00
M13-40		Charge required by Contractor for above item	%	1 000 000		
		All other 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)				
TOTAL OF BILL M13 CARRIED TO SUMMARY						R

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
	Vol 3A, Section A 32	BILL M14				
		CHEMICAL DOSING EQUIPMENT				
		Allow for all the costs and expenses in connection with the manufacture, painting, testing, supplying, delivery, offloading and storage of the following materials and equipment:				
		Coagulant for P-removal Equipment				
M14-1		Chemical room ventilation system	Sum	1		
M14-2		Dosing system (bundled skids and cabinet etc) as specified	Sum	1		
M14-3		Pressurised storage tanks	No	2		
M14-4		Pipework	Sum	1		
M14-5		Filling station booster pump (inclusive of bundled skids and cabinet etc)	Sum	1		
M14-6		Supports	Sum	1		
M14-7		FRP banded grating and frame support	m ²	60		
M14-8		Grating support beams (50 x 150 x 5mm)	Sum	1		
M14-9		Chemical required during the entire performance period (commissioning) of the plant	Sum	1		
M14-10		Chemical - one tank fill	No	2		
		Formic Acid Dosing Skid				
M14-11	Formic Acid mobile dosing skid system	Sum	1			
M14-12	Formic Acid for commissioning (at least 50L)	Sum	1			
M14-13	Formic Acid Skid - one tank fill	Sum	1			
	Allow for all costs and expenses in connection with the Site installation of the following:-					
	Coagulant for P-removal Equipment					
M14-14	Chemical room ventilation system	Sum	1			
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		Brought forward / ...				
		Set of bottom bearings and stub shaft/Return mechanism suitable for the screen supplied. All wearing parts to be supplied				
M14-15		Dosing system (bundled skids and cabinet etc) as specified	Sum	1		
M14-16		Pressurised storage tanks	No	2		
M14-17		Pipework	Sum	1		
M14-18		Filling station booster pump (inclusive of bundled skids and cabinet etc)	Sum	1		
M14-19		Supports	Sum	1		
M14-20		FRP banded grating and frame support	m ²	60		
M14-21		Grating support beams (50 x 150 x 5mm) as shown on drawings	Sum	1		
M14-22		Chemical required during the entire performance period (commissioning) of the plant	Sum	1		
		Formic Acid Dosing Skid				
M14-23		Formic Acid for commissioning (at least 50L)	Sum	1		
M14-24		Formic Acid Skid - one tank fill	Sum	1		
		Allow for all costs and expenses in connection with Chemical Dosing Safety Equipment for the following:				
		Coagulant for P-removal Equipment				
M14-25		Supply of full set of Chemical Handling PPE (including Goggles, Aprons, Respirators, Masks, Aprons/Body Suits etc.) as required by chemical.	No	12		
M14-26		Windsock	No	1		
M14-27		Safety equipment including weather proof cabinet, gas masks, eye wash bottle, etc.)	No	2		
M14-28		Safety Signage (wall charts)	Sum	1		
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
M14-29		Brought forward / ... Complete Shower Stainless Steel full body shower and eye bath (including Accumulator and Pumps)	No	1		
TOTAL OF BILL M14 CARRIED TO SUMMARY						R

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
	Vol 3A, Section A 43	BILL M15 COMPRESSED AIR SYSTEMS (INSTRUMENT AIR) Allow for all the costs and expenses in connection with the manufacture, painting, testing, supplying, delivery, offloading and storage of the following materials and equipment: Chlorine Dosing Building:				
M15-1		Compressors (complete with accoustic enclosure, inlet filter, after cooler, oil seperator, etc.)	No	2		
M15-2		Condensate / moisture trap	No	2		
M15-3		Air receiver	No	2		
M15-4		Condensate management system	Sum	1		
M15-5		Air pipework (including drain pipes, pipe supports, valves, etc.).	Sum	1		
M15-6		Seperator units and filter sets	No	2		
M15-7		Pnuematic actuated valves (inside chlorine building)	Sum	1		
		Dewatering Building:				
M15-8		Compressors (complete with accoustic enclosure, inlet filter, after cooler, oil seperator, etc.)	No	2		
M15-9		Condensate / moisture trap	No	2		
M15-10		Air receiver	No	2		
M15-11		Condensate management system	Sum	1		
M15-12		Air pipework (including drain pipes, pipe supports, valves, etc.).	Sum	1		
M15-13		Seperator units and filter sets	No	2		
M15-14		Silo pnuematic actuated equipment	Sum	1		
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		Brought forward / ...				
		Allow for all costs and expenses in connection with the Site installation of the following:-				
M15-15		Chlorine Building Compressed Air System - complete	Sum	1		
M15-16		Dewatering Building Compressed Air System - complete	Sum	1		
		Other:				
		All other 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)				
TOTAL OF BILL M15 CARRIED TO SUMMARY						R

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
	Vol 3A, Section A 34	BILL M16				
		SCUM PUMP STATION				
		Allow for all the costs and expenses in connection with the manufacture, painting, testing, supplying, delivery, offloading and storage of the following materials and equipment:				
M16-1		Progressive cavity pumps	No	2		
M16-2		Pipework (including puddle pipes, couplings, supports, etc.)	Sum	1		
M16-3		All isolation valves, non-return valves, instrumentation and pressure gauges, etc.	Sum	1		
		Allow for all costs and expenses in connection with the Site installation of the following:-				
M16-4		All materials and equipment summarized in Bill M16 complete (items 1 to 3).	Sum	1		
		Other:-				
M16-5		All other 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)	Item	-		
						
						
						
						
						
TOTAL OF BILL M16 CARRIED TO SUMMARY					R	

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
	Vol 3A, Section A 40	BILL M17 TSE PUMP STATION Allow for all the costs and expenses in connection with the manufacture, painting, testing, supplying, delivery, offloading and storage of the following materials and equipment:				
M17-1		Centrifugal pumps (complete with baseplates, couplings, coupling guards, etc.) for Macassar network	No	5		
M17-2		Centrifugal pumps (complete with baseplates, couplings, coupling guards, etc.) for Zandvliet network	No	2		
M17-3		Pipework (including puddle pipes, flange adapters, pipe supports, etc).	Sum	1		
M17-4		All isolation valves, control valves, instrumentation, pressure gauges, etc.	Sum	1		
M17-5		Automatic self-cleaning primary filters (macassar network)	No	4		
M17-6		Automatic self-cleaning secondary filters (macassar network)	No	3		
M17-7		Automatic self-cleaning primary filters (zandvliet network)	No	2		
M17-8		Automatic self-cleaning secondary filters (zandvliet network)	No	3		
M17-9		Filter pipework, couplings, supports and valves.	Sum	1		
		Allow for all costs and expenses in connection with the Site installation of the following:-				
M17-10		All materials and equipment summarized in Bill M17 complete (items 1 to 9).	Sum	1		
TOTAL OF BILL M17 CARRIED TO SUMMARY						R

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
	Vol 3A, Section A 41	BILL M18 SERVICE WATER SUPPLY SYSTEM Allow for all the costs and expenses in connection with the manufacture, painting, testing, supplying, delivery, offloading and storage of the following materials and equipment:				
M18-1		End suction centrifugal pumps (complete with baseplates, couplings, coupling guards, etc.)	No	5		
M18-2		Pipework (including puddle pipes, flange adapters, pipe supports, etc).	Sum	1		
M18-3		All isolation valves, control valves, instrumentation, pressure gauges, etc.	Sum	1		
M18-4		Automatic self-cleaning filters	No	2		
M18-5		Basket Strainer (Manual strainer)	No	2		
M18-6		Service water supply pipework connection lines to end users (includes all Service water piping terminating at the respective equipments).	Sum	1		
		Allow for all costs and expenses in connection with the Site installation of the following:-				
M18-7		Materials and equipment summarized in Bill M18; Items 1 to 5	Sum	1		
M18-8		Service water supply pipework connection lines to end users (includes all Service water piping terminating at the respective equipments).	Sum	1		
		Other:-				
M18-9		All other 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)	Item	-		
TOTAL OF BILL M18 CARRIED TO SUMMARY					R	

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
	Vol 3A, Section A 44 & 45	BILL M19				
		PRIMARY SLUDGE SCREENING EQUIPMENT				
		Allow for all the costs and expenses in connection with the manufacture, painting, testing, supplying, delivery, offloading and storage of the following materials and equipment:				
M19-1		End suction, non-clog type, centrifugal pumps (complete with motor, baseplate, couplings, etc.)	No	2		
M19-2		Pipework (including puddle pipes, flange adapter, couplings, pipe supports, valves, etc.) for Item 1 above	Sum	1		
M19-3		Check valve, isolation valves, control valves, pressure gauges, instrumentation, etc. for Item 1 above	Sum	1		
M19-4		Primary Sludge Inline Screens (complete with motor, gearbox, instrumentation, local control panel).	No	3		
M19-5		Pipework, isolation valves, control valves, etc. for Item 4 above	Sum	1		
M19-6		Custom screenings discharge chutes for Item 4	Sum	1		
M19-7		Elevated steel platform with access walkway for item 4 above	Sum	1		
		Allow for all costs and expenses in connection with the Site installation of the following:-				
M19-8		All materials and equipment summarized in Bill M19 complete (Items 1 to 7).	Sum	1		
		Other:-				
M19-9		All other 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)	Item	-		
						
						
						
TOTAL OF BILL M19 CARRIED TO SUMMARY					R	

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
	Vol 3A, Section A 46	BILL M20				
		MAIN (MULTIPURPOSE) SLUDGE PUMPSTATION				
		Allow for all the costs and expenses in connection with the manufacture, painting, testing, supplying, delivery, offloading and storage of the following materials and equipment:				
M20-1		WAS transfer pumps (complete with motors, gearboxes, couplings, etc.)	No	3		
M20-2		Digester feed pumps (complete with motors, gearboxes, couplings, etc.)	No	2		
M20-3		Thickener feed pumps (complete with motors, gearboxes, couplings, etc.)	No	2		
M20-4		Pipework for item 1 including puddle pipes, couplings, supports, gauges and pipework to drain.	Sum	1		
M20-5		Pipework for item 2 including puddle pipes, couplings, supports, gauges and pipework to drain.	Sum	1		
M20-6		Pipework for item 3 including puddle pipes, couplings, supports, gauges and pipework to drain.	Sum	1		
M20-7		All drain, pressure relief, isolation and control valves etc. for item 1 above.	Sum	1		
M20-8		All drain, pressure relief, isolation and control valves etc. for item 2 above.	Sum	1		
M20-9		All drain, pressure relief, isolation and control valves etc. for item 3 above.	Sum	1		
M20-10		316 stainless steel pipework, couplings and pipe supports at WAS flowmeter chambers upstream of main sludge pump station	Sum	1		
		Allow for all costs and expenses in connection with the Site installation of the following:-				
M20-11		All materials and equipment summarized in Bill M14 complete (items 1 to 9).	Sum	1		
M20-12		316 stainless steel pipework, couplings and pipe supports at WAS flowmeter chambers upstream of main sludge pump station	Sum	1		
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
M20-13		Brought forward / ... Other:- All other 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) 	Item	-		
TOTAL OF BILL M20 CARRIED TO SUMMARY						R

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
	Vol 3A, Section A 48	BILL M21				
		GRAVITY THICKENERS				
		Allow for all the costs and expenses in connection with the manufacture, painting, testing, supplying, delivery, offloading and storage of the following materials and equipment:				
M21-1		Gravity Sludge Thickener Picket fence complete with drive unit and gearbox	No	2		
M21-2		V-notch weirs	No	2		
M21-3		Inlet pipework, manual and actuated valves, and stilling well	Sum	1		
M21-4		Supernatant withdrawal lines, including valves	Sum	1		
		Allow for all costs and expenses in connection with the Site installation of the following:-				
M21-5		Materials and equipment summarized in Bill M15 for items 1 to 4	Sum	1		
		Other:-				
M21-6		All other 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)	Item	-		
						
						
						
						
						
TOTAL OF BILL M21 CARRIED TO SUMMARY					R	

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
	Vol 3A, Section A 47	BILL M22				
		HYDROCYCLONES				
		Allow for all the costs and expenses in connection with the manufacture, painting, testing, supplying, delivery, offloading and storage of the following materials and equipment:				
		Primary Sludge				
M22-1		Primary sludge cyclone	No	2		
M22-2		Cyclone Support structure	No	1		
M22-3		All the pipework and valves associated with the primary sludge cyclones (including underflow piping, actuators, isolation valves, control valves and pressure gauges, etc. terminating at the discharge hoppers).	Sum	1		
M22-4		Custom designed overflow collection hopper and underflow launders to grit classifier.	Sum	1		
M22-5		Access platforms to access the cyclones and valves (as neccesary)	Sum	1		
		WAS (Waste Activate Sludge)				
M22-6		WAS cyclone	No	2		
M22-7		Cyclone Support structure	No	1		
M22-8		All the pipework and valves associated with the WAS cyclones (including underflow piping, underflow piping, actuators, isolation valves, control valves and pressure gauges, etc. terminating at the discharge hoppers).	Sum	1		
M22-9		Custom designed overflow collection hopper and underflow collection hopper (with pipework terminating at the WAS holding tanks).	Sum	1		
M22-10		Access platforms to access the cyclones and valves (as neccesary)	Sum	1		
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		Brought forward / ...				
		Allow for all costs and expenses in connection with the Site installation of the following:-				
M22-11		All materials and equipment summarized in Bill M22 complete (items 1 to 10).	Sum	1		
M22-12		All other 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)	Item	-		
						
						
						
						
TOTAL OF BILL M22 CARRIED TO SUMMARY					R	

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
	Vol 3A, Section A 51, 52 & 53	BILL M23 BIOGAS HANDLING EQUIPMENT Allow for all the costs and expenses in connection with the manufacture, painting, testing, supplying, delivery, offloading and storage of the following materials and equipment: Biogas pipework (and pipe supports) from digesters, including all condensate traps, drain pipes, valves, pressure valves, etc. terminating at:				
M23-1		(a). Boiler house	Sum	1		
M23-2		(b). Excess gas flare	Sum	1		
M23-3		(c). Gas storage tanks	Sum	1		
M23-4		Flame arrestors (all flame arrestors installed within the digester complex).	Sum	1		
M23-5		Gas flow meters	No.	5		
		Gas Flare Equipment				
M23-6		Excess gas flare (complete with pilot operated valve, control panel, etc.)	No.	1		
M23-7		Steel Pallisade fence (for excess gas flare).	Sum	1		
		Allow for all costs and expenses in connection with the Site installation of the following:-				
M23-8		All materials and equipment summarized in Bill M23, Items 1 to 5.	Sum	1		
M23-9		All materials and equipment summarized in Bill M23, Items 6 & 7.	Sum	1		
		Anaerobic Digesters				
M23-10		Provisional sum for digester roof equipment (including but not limited to flame arrestors, pressure relief valves and pressure vacuum valves and any pipework, pipe supports, etc.). To include installation and commissioning	Prov sum	1	8 000 000	8 000 000.00
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
M23-11		Brought forward / ... Charge required by Contractor for above item	%	8 000 000		
M23-12		Provisional sum for double membrane gas storage tanks (2 off) with combined storage capacity of 9020 m ³ (complete with flame arresters, pressure safety equipment, valves and any pipework, pipe supports, etc. as shown on relevant drawings). To include installation and commissioning	Prov sum	1	8 000 000	8 000 000.00
M23-13		Charge required by Contractor for above item	%	8 000 000		
M23-14		Other: All other 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)	Item	1		
TOTAL OF BILL M23 CARRIED TO SUMMARY						R

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
	Vol 3A, Section A 50	BILL M24				
		SLUDGE HEATING EQUIPMENT				
		Allow for all the costs and expenses in connection with the manufacture, painting, testing, supplying, delivery, offloading and storage of the following materials and equipment:				
		Water softening				
M24-1		Package plant (complete with interconnecting pipes, intermediate pumps (as required), process units, etc).	Sum	1		
M24-2		Buffer storage tank (make-up water tank).	No.	1		
		Boiler Package				
M24-3		Boiler (complete with safety valves, isolation valves, pressure regulating equipment, gauges, control panel, etc.).	No	2		
M24-4		Dual Fuel Burner (complete with integrated gas train, forced draft fan, fuel circulation pump, etc.).	No	2		
M24-5		Shimney stack	No	2		
		Hot water recirculation				
M24-6		Boiler Feed Pumps (complete with gearboxes, couplings, motors, shafts, safety covers and guards, baseplates, etc.).	No	2		
M24-7		Hot water recirculation pipework (including pipe support, couplings, check valves, all isolation and control valves, gauges, instrumentation, etc.) between the boilers	Sum	1		
M24-8		Insulation and cladding of Bill M24 Item 7 above	Sum	1		
		Sludge Heating and recirculation				
M24-9		Heat exchanger	No	2		
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
M24-10		Brought forward / ... Hot Sludge recirculation pump (complete with gearboxes, couplings, motors, shafts, safety covers and guards, baseplates, etc.).	No	2		
M24-11		Hot sludge recirculation pipework (including couplings, flange adapter, supports, instrumentation, etc) between the digesters and the heat exchagers.	Sum	1		
M24-12		Insulation and cladding of Bill M24 Item 11 above	Sum	1		
		Allow for all costs and expenses in connection with the Site installation of the following:-				
M24-13		All materials and equipment for Bill M24 Items 1 and 2 above	Sum	1		
M24-14		All materials and equipment for Bill M24 Items 3 to 5 above	Sum	1		
M24-15		All materials and equipment for Bill M24 Items 6 to 8 above	Sum	1		
M24-16		All materials and equipment for Bill M24 Items 9 to 12 above	Sum	1		
M24-17		Other: All other 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)	Item	-		
TOTAL OF BILL M24 CARRIED TO SUMMARY					R	

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
	Vol 3A, Section A 49	BILL M25 ANAEROBIC DIGESTER SLUDGE EQUIPMENT Allow for all the costs and expenses in connection with the manufacture, painting, testing, supplying, delivery, offloading and storage of the following materials and equipment:				
M25-1		Hydraulic Mixing Pumps (End suction, non-clog type, centrifugal pumps complete with drive units, couplings, shafts, safety guards, baseplates, etc.).	No	3		
M25-2		Suction and discharge pipework (including pipe supports, air release valves, isolation and control valves, guages, etc.) for Item 1 above.	Sum	1		
M25-3		Discharge mixing nozzles, scum and foam suppression equipment inside the digesters.	Sum	1		
M25-4		Insulation and cladding of Bill M25 Item 2 above	Sum	1		
		Allow for all costs and expenses in connection with the Site installation of the following:-				
M25-5		Materials and equipment summarized in Bill M25 above.	Sum	1		
		Other:				
M25-6		All other 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)	Item	-		
TOTAL OF BILL M25 CARRIED TO SUMMARY					R	

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
	Vol 3A, Section A 49	BILL M26 SLUDGE HOLDING TANKS EQUIPMENT Allow for all the costs and expenses in connection with the manufacture, painting, testing, supplying, delivery, offloading and storage of the following materials and equipment: WAS holding tanks				
M26-1		Hydraulic Mixing Pumps (End suction, non-clog type, centrifugal pumps complete with drive units, couplings, shafts, safety guards, baseplates, etc.).	No	6		
M26-2		Pipework (including pipe supports, air release valves, isolation valve, control valves, guages, etc.) for Item 1 above.	Sum	1		
M26-3		Internal tank assemblies (icludes all internal pipework, floor mounted nozzles, foam dissipating equipment, etc.) for 4 WAS holding tanks	Sum	1		
		Primary sludge holding tanks				
M26-4		Hydraulic Mixing Pumps (End suction, non-clog type, centrifugal pumps complete with drive units, couplings, shafts, safety guards, baseplates, etc.).	No.	3		
M26-5		Pipework (including pipe supports, air release valves, isolation valve, control valves, guages, etc.) for Item 4 above.	Sum	1		
M26-6		Internal tank assemblies (icludes all internal pipework, floor mounted nozzles, foam dissipating equipment, etc.) for 2 primary sludge holding tanks	Sum	1		
		Computation Fluid Dynamics Analysis				
M26-7		Computation Fluid Dynamics Analysis for WAS Hydraulic Mixing Systems	Sum	1		
M26-8		Computation Fluid Dynamics Analysis for Primary Sludge Hydraulic Mixing Systems	Sum	1		
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		Brought forward / ...				
		Allow for all costs and expenses in connection with the Site installation of the following:-				
M26-9		All materials and equipment summarized in Bill M26 Items 1 and 2.	Sum	1		
M26-10		All materials and equipment summarized in Bill M26, Items 3).	Sum	1		
M26-11		All materials and equipment summarized in Bill M26 for Items 4 and 5).	Sum	1		
M26-12		All materials and equipment summarized in Bill M26, Items 6).	Sum	1		
		Other:				
M26-13		Provisional allowance for Fine bubble aeration system for the WAS holding tanks including blowers, pipework, supports, valves, diffuser discs, etc	Prov	1	10 000 000	10 000 000.00
M26-14		Charge required by Contractor on above item	%	10 000 000		
M26-15		All other 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)	Item	-		
TOTAL OF BILL M26 CARRIED TO SUMMARY					R	

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
	Vol 3A, Section A 58	BILL M27				
		SLUDGE DEWATERING EQUIPMENT				
		Allow for all the costs and expenses in connection with the manufacture, painting, testing, supplying, delivery, offloading and storage of the following materials and equipment:				
		Primary Sludge Equipment				
M27-1		Belt press feed pumps (Progressive cavity pumps complete with drive units, couplings, shafts, safety guards, baseplates, etc.).	No	4		
M27-2		Pipework (including pipe supports, pressure gauges, pressure and flow switches, pressure relief valves, isolation valves, control valves, etc.) for Item 1 above.	Sum	1		
M27-3		Belt presses (complete with drive motor, gearbox, hydraulic unit, mixing unit, spray pipes, etc.)	No	4		
M27-4		Belt press odour hoods	No.	4		
M27-5		Centralised lubrication system (per belt press).	No.	4		
		WAS Equipment				
M27-6		Linear screen feed pumps (Progressive cavity pumps complete with drive units, couplings, shafts, safety guards, baseplates, etc.).	No	10		
M27-7		Pipework (including pipe supports, pressure gauges, pressure and flow switches, pressure relief valves, isolation valves, control valves, etc.) for Item 6 above.	Sum	1		
M27-8		Linear Screens (complete with drive motor, gearbox, mixing unit, etc.)	No	10		
M27-9		Belt presses (complete with drive motor, gearbox, hydraulic unit, mixing unit, spray pipes, etc.)	No	10		
M27-10		Transfer chute	No	10		
M27-11		Spreader box	No.	10		
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
M27-12		Brought forward / ... Centralised lubrication system	No	10		
M27-13		Sludge Cake Equipment WAS and Primary Sludge Horizontal Screw Conveyor (complete including trough, covers, replaceable liners, shaftless screw, geared motor, discharge chutes and supports.)	No	6		
M27-14		WAS and Primary Sludge Horizontal screw conveyor discharge chute isolation valves (complete with actuators)	No.	10		
M27-15		WAS cake pumps (Progressive cavity pumps complete with drive units, couplings, shafts, safety guards, baseplates, etc.).	No	6		
M27-16		WAS cake hopper(s) with motorised bridge breaker device	No.	6		
M27-17		WAS cake discharge pipework, terminating at the silo (including pipe supports, pressure gauges, pressure and flow switches, pressure relief valves, isolation valves, control valves, etc.) for Item 15 above.	Sum	1		
M27-18		Primary sludge cake pumps (Progressive cavity pumps complete with drive units, couplings, shafts, safety guards, baseplates, etc.).	No	4		
M27-19		Primary sludge cake hopper(s) with motorised bridge breaker device	No.	4		
M27-20		Primary sludge cake discharge pipework, terminating at the silos (including pipe supports, pressure gauges, pressure and flow switches, pressure relief valves, isolation valves, control valves, etc.) for Item 18 above.	Sum	1		
M27-21		Total solids analyser (on sludge cake discharge pipes) Access platforms, walkways and staircases	No.	10		
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
M27-22		Brought forward / ... Allow for all the costs and expenses in connection with the design and certification of welded and bolted walkways (including support frames, kicker plates, non-slip open floor grating, handrailing, etc).	Sum	1		
M27-23		Allow for all the costs and expenses in connection with the manufacture, corrosion protection, testing, supplying, delivery, offloading and storage of welded and bolted walkways (including support frames, kicker plates, non-slip open floor grating, handrailing, etc).	Sum	1		
		Allow for all costs and expenses in connection with the Site installation of the following:-				
M27-24		All materials and equipment summarized in Bill M27, Item 1 to 2).	Sum	1		
M27-25		All materials and equipment summarized in Bill M27, Items 3 to 5).	Sum	1		
M27-26		All materials and equipment summarized in Bill M27, Items 6 to 7).	Sum	1		
M27-27		All materials and equipment summarized in Bill M27, Items 8 to 12).	Sum	1		
M27-28		All materials and equipment summarized in Bill M27, Items 13 and 14).	Sum	1		
M27-29		All materials and equipment summarized in Bill M27, Items 15 to 17).	Sum	1		
M27-30		All materials and equipment summarized in Bill M27, Items 18 to 21).	Sum	1		
M27-31		All materials and equipment summarized in Bill M27, Items 23).	Sum	1		
		Other:				
M27-32		All other 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)	Item	-		
TOTAL OF BILL M27 CARRIED TO SUMMARY						R

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		BILL M28				
		CAKE SILO LIVE BOTTOMS				
		Allow for all the costs and expenses in connection with the manufacture, painting, testing, supplying, delivery, offloading and storage of the following materials and equipment:				
M28-1	Vol 3A, Section A 61	Live bottom for primary sludge cake silo (including motor, gearboxes, support structure, troughs etc for 2 silos)	Sum	1		
M28-2		Live bottom for WAS cake silo (including motor, gearboxes, support structure, troughs etc. for 2 silos)	Sum	1		
M28-3		Pneumatically actuated valves for isolating flow from live bottom screw conveyors (for 4 silos)	Sum	1		
M28-4		Pneumatically actuated flap gate and chute for evenly distribution of sludge cake into truck (including actuator)	No	4		
		Allow for all costs and expenses in connection with the Site installation of the following:-				
M28-5		All materials and equipment summarized in Bill M28 complete	Sum	1		
		Other:-				
M28-6		All other 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)	Item	-		
						
						
						
						
						
TOTAL OF BILL M28 CARRIED TO SUMMARY					R	

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
	Vol 3A, Section A 54, 55 & 56	BILL M29 POLYELECTROLYTE PREPARATION EQUIPMENT Allow for all the costs and expenses in connection with the manufacture, painting, testing, supplying, delivery, offloading and storage of the following materials and equipment:				
M29-1		Poly bag Unloader (complete with electrical hoist for bulk bags of up to 1000kg, a powder hopper).	No	2		
		Dry poly conveyance system:				
M29-2		Option 1: Flexible screw conveyor(s), complete with motor, gearbox, control panel, etc.	Sum	1		
M29-3		Option 2: Pnuematic conveyance, complete with eductors, blowers, pipework, control panels, etc.	Sum	1		
M29-4		Dehumidifier	No	1		
M29-5		Automatic poly preparation unit	No	2		
M29-6		Poly solution distribution pipework (complete with pipe supports, valves, etc.), PVC pipes	Sum	1		
M29-7		Poly dosing pumps (Progressive cavity pumps complete with drive units, couplings, shafts, safety guards, baseplates, etc.).	No.	14		
M29-8		Pipework (including pipe supports, pressure gauges, pressure and flow switches, pressure relief valves, isolation valves, control valves, etc.) for Item 7 above.	Sum	1		
M29-9		Poly injector	No	14		
M29-10		In-line static mixer	No	14		
		Allow for all costs and expenses in connection with the Site installation of the following:-				
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
M29-11		Brought forward / ... All materials and equipment summarized in Bill M29 complete (items 1 to 10).	Sum	1		
M29-12		Other: All other 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) 	Item	-		
TOTAL OF BILL M29 CARRIED TO SUMMARY						R

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
	Vol 3A, Section A 62	BILL M30				
		COMBINED HEAT AND POWER (CHP) PLANT				
		Allow for all the costs and expenses in connection with the manufacture, painting, testing, supplying, delivery, offloading and storage of the following materials and equipment:				
M30-1		Gas Engines (complete with engine gas train, base frame, lubrication system, alternator, etc.)	No	3		
M30-2		Heat Recovery System (complete with hot water pumps, hot water circuits, heat exchangers, etc).	Sum	1		
M30-3		Gas Cleaning Plant (complete with H2S removal, moisture removal, particulate removal, siloxane removal, all interconnecting pipework, valves, instruments etc.).	Sum	1		
M30-4		Biogas pipework (between the gas storage tanks to the Gas Cleaning Plant, includes all valves, instruments, moisture traps, etc.).	Sum	1		
M30-5		Biogas pipework (between the Gas Cleaning Plant and the CHP units, including all internal pipework, valves, instrumentation, gas boosters, etc. inside the Engine Room).	Sum	1		
M30-6		Fire extinguishers	No	10		
M30-7		Gas engine controllers (engine and master sync) and integrated control system, control cabling, network system, engine auxiliary power cabling and integration of engine controller with PCS and collector substation	Sum	1		
		Allow for all costs and expenses in connection with the Site installation of the following:-				
M30-8		All materials and equipment summarized in Bill M30 Item 1, 2 and 3 above.	Sum	1		
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
M30-9		Brought forward / ... All materials and equipment summarized in Bill M30 Item 4 and 5 above.	Sum	1		
M30-10		All materials and equipment summarized in Bill M30 Item 6 above.	Sum	1		
M30-11		All materials and equipment summarized in Bill M30 Item 7 above.	Sum	1		
M30-12		Other: All other 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)	Item	-		
TOTAL OF BILL M30 CARRIED TO SUMMARY						R

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
	Vol 3A, Section A 64	BILL M31				
		LIFTING EQUIPMENT				
		Allow for all the costs and expenses in connection with the manufacture, painting, testing, supplying, delivery, offloading and storage of the following materials and equipment:				
M31-1		Lifting Equipment for Lower and Upper Screw Pump Stations	Sum	1		
M31-2		Lifting Equipment for Mechanical Front Raked Screens	Sum	1		
M31-3		Lifting Equipment for Perforated Plate Screens	Sum	1		
M31-4		Lifting Equipment for Main Sludge Pump Station	Sum	1		
M31-5		Gantry and lifting equipment for all R-recycle pump stations	Sum	1		
M31-6		Gantry and lifting equipment for all A-recycle pump stations	Sum	1		
M31-7		Gantry and lifting equipment for all RAS pump stations	Sum	1		
M31-8		Lifting Equipment for UV units: Crawl and hoist	Sum	1		
M31-9		Lifting equipment for Service water pump station	Sum	1		
M31-10		Lifting equipment for TSE pump station and filter building	Sum	1		
M31-11		Lifting equipment for Scum pump station	Sum	1		
M31-12		Lifting equipment for Return Flow pump station	Sum	1		
M31-13		Lifting equipment for Blower room: Overhead travelling crane	Sum	1		
M31-14		Lifting equipment for Chlorine building:Overhead Travelling Crane	Sum	1		
M31-15		Lifting equipmt for Dewatering Building: Overhead Travelling Cane	Sum	1		
M31-16		Lifting Equipment for Polyelectrolyte Storage and Loading Area: Overhead Travelling Crane	Sum	1		
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		Brought forward / ...				
M31-17		Lifting equipment for CHP Engine room: Overhead Travelling crane	Sum	1		
M31-18		Mobile gantry for mixers	Sum	1		
M31-19		Mobile gantry for mixers	Sum	1		
M31-20		Trolley for transporting mixers	Sum	1		
		Allow for all costs and expenses in connection with the Site installation of the following:-				
M31-21		Lifting Equipment for Lower and Upper Screw Pump Stations	Sum	1		
M31-22		Lifting Equipment for Mechanical Front Raked Screens	Sum	1		
M31-23		Lifting Equipment for Perforated Plate Screens	Sum	1		
M31-24		Lifting Equipment for Main Sludge Pump Station	Sum	1		
M31-25		Gantry and lifting equipment for all R-recycle pump stations	Sum	1		
M31-26		Gantry and lifting equipment for all A-recycle pump stations	Sum	1		
M31-27		Gantry and lifting equipment for all RAS pump stations	Sum	1		
M31-28		Lifting Equipment for UV units: Crawl and hoist	Sum	1		
M31-29		Lifting equipment for Service water pump station	Sum	1		
M31-30		Lifting equipment for TSE pump station and filter building	Sum	1		
M31-31		Lifting equipment for scum pump station	Sum	1		
M31-32		Lifting equipment for Return flow pump station	Sum	1		
M31-33		Lifting equipment for Chlorine building:Overhead Travelling Crane	Sum	1		
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		Brought forward / ...				
M31-34		Lifting equipmt for Dewatering Building: Overhead Travelling Cane	Sum	1		
M31-35		Lifting Equipment for Polyelectrolyte Storage and Loading Area: Overhead Travelling Crane	Sum	1		
M31-36		Workshop building Overhead Travelling crane	Sum	1		
M31-37		Lifting equipment for CHP Engine room: Overhead Travelling crane	Sum	1		
		Other:				
M31-38		Load testing of all lifting equipment	Sum	1		
M31-39		All other 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)	Item	-		
TOTAL OF BILL M31 CARRIED TO SUMMARY					R	

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
	Vol 3A, Section A 65 & 66	BILL M32 VENTILATION SYSTEMS Allow for all the costs and expenses in connection with the manufacture, painting, testing, supplying, delivery, offloading and storage of the following materials and equipment:				
M32-1		Screw pump station buildings	Sum	1		
M32-2		Main sludge pump station dry well ventilation system	Sum	1		
M32-3		Blower House ventilation system	Sum	1		
M32-4		Boiler House ventilation system	Sum	1		
M32-5		Scum pump station	Sum	1		
M32-6		Service water pump station ventilation system	Sum	1		
M32-7		TSE pump station ventilation system	Sum	1		
M32-8		Dewatering building ventilation system	Sum	1		
M32-9		Poly storage room ventilation system	Sum	1		
M32-10		CHP Engine Building Room ventilation system	Sum	1		
M32-11		Inlet works MCC room split AC units	Sum	1		
M32-12		MV intake substation split AC units	Sum	1		
M32-13		PST MCC room (Main sludge pump station) split AC units	Sum	1		
M32-14		Blower MCC room split AC units	Sum	1		
M32-15		Bioreactor MCC room split AC units	Sum	1		
M32-16		Dewatering building MCC room split AC units	Sum	1		
M32-17		UV & SST MCC room split AC units	Sum	1		
M32-18		Service water pump station MCC room split AC units	Sum	1		
M32-19		TSE pump station MCC room split AC units	Sum	1		
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
M32-20		Brought forward / ... Guard hut split AC units	Sum	1		
		Allow for all costs and expenses in connection with the Site installation of the following:-				
M32-21		Screw pump station buildings ventilation system	Sum	1		
M32-22		Main sludge pump station dry well ventilation system	Sum	1		
M32-23		Blower House ventilation system	Sum	1		
M32-24		Boiler House ventilation system	Sum	1		
M32-25		Scum pump station ventilation system	Sum	1		
M32-26		Service water pump station ventilation system	Sum	1		
M32-27		TSE pump station ventilation system	Sum	1		
M32-28		Dewatering building ventilation system	Sum	1		
M32-29		Poly storage room ventilation system	Sum	1		
M32-30		CHP Engine Building Room ventilation system	Sum	1		
M32-31		MV intake substation split AC units	Sum	1		
M32-32		PST MCC room (Main sludge pump station) split AC units	Sum	1		
M32-33		Blower MCC room split AC units	Sum	1		
M32-34		Bioreactor MCC room split AC units	Sum	1		
M32-35		Dewatering building MCC room split AC units	Sum	1		
M32-36		UV & SST MCC room split AC units	Sum	1		
M32-37		Service water pump station MCC room split AC units	Sum	1		
M32-38		TSE pump station MCC room split AC units	Sum	1		
M32-39		Guard hut split AC units	Sum	1		
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		Brought forward / ... Other: All other 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) 				
TOTAL OF BILL M32 CARRIED TO SUMMARY						R

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		BILL M33				
		SPARES				
		Allow for all costs and expenses in connection with the following items:				
	Vol 3A, Section A					
	17.11	First Lift Archimedean Screw Pump				
M33-1		Complete spare bottom bearing and all seals provided for Lower Archimedean screw pumps	No	4		
M33-2		Complete spare top bearing and all seals provided for Lower Archimedean screw pumps	No	4		
M33-3		Bearing grease refills enough for 6 months for Lower Archimedean screw pumps	Sum	1		
M33-4		Spare Grease Pump for all lower Archimedean screw pumps	No	4		
	17.11	Second Lift Archimedean Screw Pump				
M33-5		Complete spare bottom bearing and all seals provided for Upperr Archimedean screw pumps	No	4		
M33-6		Complete spare top bearing and all seals provided for Upper Archimedean screw pumps	No	4		
M33-7		Bearing grease refills enough for 6 months for Upper Archimedean screw pumps	Sum	1		
M33-8		Spare Grease Pump for all upper Archimedean screw pumps	No	1		
	18.12	Mechanical Front Rake Screens				
M33-9		Screen field suitable for the Mechanical Front Rake screen supplied.	No	4		
M33-10		Set of Chains for rake mechanism suitable for the screen supplied.	No	8		
M33-11		Chain link sets complete with pins, rollers, inner and outer plates for replacing damaged chain sections for the screen supplied.	No	16		
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
M33-12		Brought forward / ... Set of bottom bearings and stub shaft/Return mechanism suitable for the screen supplied. All wearing parts to be supplied	No	8		
M33-13		Complete gear motor and torque limiter for rake drive suitable for the screen supplied	No	1		
M33-14		Set of rakes suitable for the screen supplied including chain attachments and fasteners	No	16		
M33-15		Replaceable wiper blade for clearing screenings off rakes	No	1		
	18.12	Perforated Belt Press				
M33-16		One Rotary Brush per screen	No	4		
M33-17		Complete gear motor and torque limiter for rake drive suitable for the screen supplied	No	1		
M33-18		Set of OEM recommended spares for each perforated plate belt screen	No	4		
	21.13	Wash Compactors				
M33-19		Set of two Wash press brushes for each screw press	No	8		
M33-20		Through liners, screw and complete set of screw bearings for each wash press supplied	Sum	1		
M33-21		Complete spare set of Motor and Gearbox for the mixer/agitator of the wash press supplied	No	4		
M33-22		Complete spare set of Motor and Gearbox for the screw conveyor of the wash press supplied	No	1		
M33-23		One drain ball valve, complete with actuator, per wash compactor	Sum	1		
M33-24		One Hydrostatic level control instrument	No	1		
	20.12	Wash Launderers				
M33-25		Actuated valve for wash water launder	No	2		
	22.12	Degritting System				
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		Brought forward / ...				
M33-26		Complete Motor and Gearbox set for Vortex degritters supplied	No	2		
M33-27		Spare Electrical Actuator for grit withdrawal valve of the vortex degritter.	No	2		
	23.13	Grit Classifiers				
M33-28		Complete motor and gearbox set for Mixer/paddle of the grit classifiers supplied	No	1		
M33-29		Complete motor and gearbox set for screw conveyors supplied	No	1		
M33-30		Through liners, screw and complete set of screw bearings for the conveyors of each grit classifiers supplied	Sum	1		
	31.9	FBDA (Including Blowers)				
M33-31		Spare actuator to regulate diffuser vanes for each Blower supplied.	No	16		
M33-32		Blower Oil Refill for the blowers supplied	Sum	1		
M33-33		All special tools for blower maintenance	No	2		
M33-34		Diffuser bodies complete with membranes	No	100		
M33-35		Blower inlet filters- two per unit supplied fully sealed in original packaging.	No	16		
M33-36		Acoustic enclosure cooling fan including motor	No	4		
	28.11	Primary Settling Tanks				
M33-37		One wheel set (one drive and one non drive wheel) for each PST	No	4		
M33-38		Spare electrical actuator for PST desludge valve	No	4		
M33-39		Spare Motor and Gearbox for PST bridge	No	1		
	29.12	Vertical Shaft Mixers				
M33-40		Spare sets of Motor and Gearbox for flow balancing tank mixers	No	4		
M33-41		Spare sets of Motor and Gearbox for Anoxic Zone mixers	No	5		
M33-42		Spare sets of Motor and Gearbox for Anaerobic Zone mixers	No	3		
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		Brought forward / ...				
	30.14	Recycle Pumps				
M33-43		A recycle Pump spares (including oil change and V belt set) for each pump	No	12		
M33-44		R recycle Pump spares (including oil change and V belt set) for each pump	No	8		
M33-45		Complete Spare A - recycle pump (inclduing motor, gearbox, shaft with impeller, etc)	No	1		
M33-46		Complete Spare R - recycle pump (inclduing motor, gearbox, shaft with impeller, etc)	No	1		
	35.12	RAS Pumps				
M33-47		Complete Spare RAS Pump	No	1		
	33.13	Secondary Settling Tank				
M33-48		One wheel set (one drive and one non drive wheel) for each SST	No	12		
M33-49		Spare sets of Motor and Gearbox for SST bridge	No	2		
M33-50		Spare electrical actuator for SST desludge valve	No	12		
	36.12 & 37.12	UV Disinfections				
M33-51		100% of total number of Lamps supplied	Sum	1		
M33-52		20% of total number of Ballast supplied	Sum	1		
M33-53		1 UVT sensor	No	1		
M33-54		Hydraulic system oil filters for each hydraulic unit	Sum	1		
M33-55		20% of total Quartz sleeves, include O-rings supplied.	Sum	1		
M33-56		6 A Fuses class CC	No	2		
M33-57		10 A Fuses class CC	No	2		
M33-58		Wiper kit	No	9		
M33-59		Set of supplier recommended spares for each mechanical screen upstream of UV	Sum	1		
	40.12	TSE Pumpstation				
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		Brought forward / ...				
M33-60		Oil change per pump	No	7		
	41.8	Service Water Pumpstation				
M33-61		Oil change per pump	No	5		
	34.13	Scum Pumpstation				
M33-62		Scum Pump spares (including rotor and Stator) for each pump	No	2		
	42.10	Return Flow Pumpstation				
M33-63		Spare set of mechanical seals	No	1		
	44.13	Screening Press Feed Pumpstation				
M33-64		Seal kit (Mechanical seals, volute sels, backplate gasket, seal cap gaskets, impeller cap screw, impeller washer, impeller key, impeller nut), as applicable.	Sum	1		
M33-65		Wear Ring Kit (Wear rings)	Sum	1		
M33-66		Sleeves (Bronze or stainless steel, whichever is applicable).	Sum	1		
M33-67		Bearing Frame Kit (Ball bearings, moisture seals, retaining rings).	Sum	1		
	46.13, 56.12 & 60.12	Progressive Cavity Pumps				
M33-68		Thickener feed Pump spares (including rotor and stator)	No	2		
M33-69		Complete Spare Thickener Pump	No	1		
M33-70		Digester feed Pump spares (including rotor and stator)	No	2		
M33-71		WAS Transfer Feed Pump spares (including rotor and stator) at Multipurpose sludge pump station	No	3		
M33-72		WAS Transfer Pump spares (including rotor and stator), Dewatering	No	10		
M33-73		Complete Spare pump for Dewatering WAS transfer pump	No	1		
M33-74		Primary Sludge Transfer Pump spares (including rotor and stator), Dewatering	No	4		
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		Brought forward / ...				
M33-75		Complete Spare pump for Dewatering Primary Sludge transfer pump	No	1		
M33-76		Polydosing Pump spares (including rotor and stator)	No	14		
M33-77		Complete spare pump for polydosing	No	2		
M33-78		Primary Sludge Cake pump spares (including rotor and stator)	No	4		
M33-79		Complete spare primary sludge cake pump	No	1		
M33-80		WAS Cake pump spares (including rotor and stator)	No	6		
M33-81		Complete spare WAS cake pump	No	1		
	58.17	Linear Screens				
M33-82		Belt	No	10		
M33-83		Belt scraper blade	No	10		
M33-84		Ramp scraper blade	No	10		
M33-85		Rubber profile	No	50		
M33-86		Spray Nozzle	No	40		
M33-87		Brush for spraypipe	No	10		
	58.17	Belt Pressess				
M33-88		Rubber Profile	No	60		
M33-89		Set Vertical Seal	No	7		
M33-90		Set Hydraulic Seal for Piston	No	28		
M33-91		Filter Hydraulic unit	No	7		
M33-92		Spare Hydraulic Unit	No	2		
M33-93		Set Hydraulic Seal for for Belt tracking unit	No	14		
M33-94		Set of seals for Hydraulic Switch	No	14		
M33-95		Spring for sensing paddle	No	14		
M33-96		Spray Nozzle	No	60		
M33-97		Brush Spray Pipe	No	14		
M33-98		Scraper Blades	No	14		
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		Brought forward / ...				
M33-99		Upper Belt	No	14		
M33-100		Lower Belts	No	14		
	54.12 59.12,	Screw Conveyors in Dewatering Building				
M33-101		Spares for Flexible Conveyors (Including Through Liner, screw and screw bearings) @ Poly make-up	Sum	1		
M33-102		Complete spare motor and gearbox for flexible conveyors @ poly make-up	No	1		
M33-103		Spares for Primary sludge cake conveyors (Including Through Liner, screw and screw bearings)	Sum	1		
M33-104		Complete spare motor and gearbox for Primary sludge cake conveyors	No	1		
M33-105		Spares for Primary sludge silo 1 live bottom conveyors (Including Through Liner, screw and screw bearings)	Sum	1		
M33-106		Complete spare motor and gearbox for Primary sludge silo 1 live bottom conveyors	No	1		
M33-107		Spares for Primary sludge silo 2 live bottom conveyors (Including Through Liner, screw and screw bearings)	Sum	1		
M33-108		Complete spare motor and gearbox for Primary sludge silo 2 live bottom conveyors	No	1		
M33-109		Spares for WAS cake conveyors (Including Through Liner, screw and screw bearings)	Sum	1		
M33-110		Complete spare motor and gearbox for WAS cake conveyors	No	1		
M33-111		Spares for WAS silo 1 live bottom conveyors (Including Through Liner, screw and screw bearings)	Sum	1		
M33-112		Complete spare motor and gearbox for WAS silo 1 live bottom conveyors	No	1		
M33-113		Spares for WAS silo 2 live bottom conveyors (Including Through Liner, screw and screw bearings)	Sum	1		
M33-114		Complete spare motor and gearbox for WAS silo 2 live bottom conveyors	No	1		
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		Brought forward / ...				
	50.12	Sludge Heating				
M33-115		Boiler Feed water Pump spares (including oil change)	Sum	1		
	49.12	Sludge Recirculation pumps @ Heat Exchangers				
M33-116		Seal kit (Mechanical seals, volute seals, backplate gasket, seal cap gaskets, impeller cap screw, impeller washer, impeller key, impeller nut), as applicable.	Sum	1		
M33-117		Wear Ring Kit (Wear rings)	Sum	1		
M33-118		Sleeves (Bronze or stainless steel, whichever is applicable).	Sum	1		
M33-119		Bearing Frame Kit (Ball bearings, moisture seals, retaining rings).	Sum	1		
	50.12	Hot Water Boilers				
M33-120		Burner controller ignition flame optic sensor	No	2		
M33-121		Boiler feed water stage pumps	No	2		
M33-122		Spare valves that are used on the boiler system	Sum	1		
	55.12	Automatic Poly preparation Unit				
M33-123		Spares for dry Feeder screw (Including Through Liner and screw bearings)	Sum	1		
M33-124		HDPE Y-Strainer: 1 x	No	1		
M33-125		HDPE Ball Valve: 1 x	No	1		
M33-126		Water Feed valve solenoid: x 1	No	1		
M33-127		Water Feed line pressure regulating valve: 1 x	No	1		
M33-128		Dry material feeder vibrator: x 1	No	1		
M33-129		Level instrument (ultrasonic): x 1	No	1		
M33-130		Dehumidifier	No	1		
	49.12	Sludge Recirculation Pumps for Primary sludge Holding Tanks				
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
M33-131		Brought forward / ...				
		Seal kit (Mechanical seals, volute sels, backplate gasket, seal cap gaskets, impeller cap screw, impeller washer, impeller key, impeller nut), as applicable.	Sum	1		
M33-132		Wear Ring Kit (Wear rings)	Sum	1		
M33-133		Sleeves (Bronze or stainless steel, whichever is applicable).	Sum	1		
M33-134	49.12	Bearing Frame Kit (Ball bearings, moisture seals, retaining rings).	Sum	1		
		Sludge Recirculation Pumps for WAS Holding Tanks				
M33-135		Seal kit (Mechanical seals, volute sels, backplate gasket, seal cap gaskets, impeller cap screw, impeller washer, impeller key, impeller nut), as applicable.	Sum	1		
M33-136		Wear Ring Kit (Wear rings)	Sum	1		
M33-137	49.12	Sleeves (Bronze or stainless steel, whichever is applicable).	Sum	1		
		Sludge Recirculation Pumps for Digesters				
M33-138		Bearing Frame Kit (Ball bearings, moisture seals, retaining rings).	Sum	1		
M33-139	47.11	Seal kit (Mechanical seals, volute sels, backplate gasket, seal cap gaskets, impeller cap screw, impeller washer, impeller key, impeller nut), as applicable.	Sum	1		
M33-140		Wear Ring Kit (Wear rings)	Sum	1		
M33-141		Sleeves (Bronze or stainless steel, whichever is applicable).	Sum	1		
M33-142		Bearing Frame Kit (Ball bearings, moisture seals, retaining rings).	Sum	1		
	47.11	PS Hydro cyclones				
M33-143		Wear liner kit (1 x cone liner, 1 x feed box wear liner, 1 x vortex finder wear liner, 1 x spigot liner)	Sum	1		
M33-144		1 x Spigot (1 size smaller)	No	1		
M33-145		1 x Spigot (1 size bigger)	No	1		
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		Brought forward / ...				
	47.11	WAS Hydro cyclones				
M33-146		Wear liner kit (1 x cone liner, 1 x feed box wear liner , 1 x vortex finder wear liner, 1 x spigot liner)	Sum	1		
M33-147		1 x Spigot (1 size smaller)	No	1		
M33-148		1 x Spigot (1 size bigger)	No	1		
	51.9	Biogas Pipelines				
M33-149		Flame Arresters (1 flame arrester for each size installed on site).	Sum	1		
	62.14	CHP Installation				
M33-150		Supplier recommended spares for Gas Conditioning Facility	Sum	1		
M33-151		Supplier recommended spares for Gas Holding Tanks	Sum	1		
M33-152		Supplier recommended spares for Gas Engines and Heat Recovery Units	Sum	1		
M33-153		Battery	No	1		
M33-154		Battery Charger	No	1		
M33-155		Gas supply instruments (one of each used)	Sum	1		
M33-156		Engine Controller	No	1		
M33-157		complete engine gasket set	No	3		
M33-158		complete engine fanbelt	No	3		
M33-159		complete air filter set	No	6		
M33-160		complete fuel (gas) filter set	No	6		
M33-161		complete oil filter set	No	6		
M33-162		All other spares as per OEM's recommended list	Sum	1		
		WAS Holding tank FBDA (Including Blowers)				
M33-163		Provisional allowance for WAS holding tank FBDA spares (including blowers and diffuser discs, etc)	Prov	1	20 000	20 000.00
M33-164		Charge required by Contractor for above item	%	20 000		
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		Brought forward / ...				
	48.12	Primary Sludge Screening Equipment				
M33-165		Screening zone screen	No	1		
M33-166		Screening zone screw	No	1		
M33-167		Pressing zone screen	No	1		
M33-168		Pressing zone screw	No	1		
M33-169		Pressing zone liner	No	1		
	48.12	Gravity thickener				
M33-170		Spare motor/gearbox	No	1		
	27.14	Odour control (Inlet works)				
M33-171		Set of supplier recommended critical spares	Sum	1		
M33-172		Spare extraction fan	No	1		
	27.14	Odour control (Gravity thickener and main sludge PS)				
M33-173		Set of supplier recommended critical spares	Sum	1		
M33-174		Spare extraction fan	No	1		
	63.17	Odour control (Primary sludge holding tanks and Primary sludge belt presses)				
M33-175		Set of supplier recommended critical spares	Sum	1		
M33-176		Spare extraction fan	No	1		
		EC&I Spares				
M33-177		Primary MV switchgear spares	Sum	1		
M33-178		Secondary MV switchgear spares	Sum	1		
M33-179		Distribution Transformer spares	Sum	1		
M33-180		Isolation Transformer spares	Sum	1		
M33-181		NER and NEC spares, as directed by the Engineer	Prov Sum	1	175 000	175 000.00
M33-182		Percentage adjustment on above item for Contractor's overheads and profit	%	175 000		
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		Brought forward / ...				
M33-183		MV cabling spares	Sum	1		
M33-184		LV Switchgear, control assemblies and VFCs spares	Sum	1		
M33-185		Diesel Generators spares	Sum	1		
M33-186		Instruementation spares	Sum	1		
M33-187		Control and fibre network spares	Sum	1		
M33-188		SCADA spares	Sum	1		
M33-189		PLC spares	Sum	1		
		Other:				
M33-190		All other 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)	Item	-		
TOTAL OF BILL M33 CARRIED TO SUMMARY					R	

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		BILL M34				
		SUNDRIES				
		Allow for all costs and expenses in connection with the following items:				
M34-1		Hazop Study and appointment of independent Consultant	Sum	1		
M34-2		Providing "as built" drawings	Sum	1		
M34-3		Providing 2 draft copies of the Installation, Operation and Maintenance Manual prior to commissioning of the Works	Sum	1		
M34-4		Providing 4 final hard copies of the Installation, Operation and Maintenance Manual prior to the Issue of the Taking-Over Certificate(to include digital copy)	No	4		
M34-5		Signage (plant wide)	Sum	1		
M34-6		Precautions against flooding of the Works	Sum	1		
M34-7		Checking, starting up, testing and pre-commissioning	Sum	1		
M34-8		Commissioning of the Works	Sum	1		
M34-9		Performance Acceptance Testing (Pre-commissioning and Commissioning Testing)	Sum	1		
M34-10		Providing a commissioning test report	Sum	1		
M34-11		Trial Operation Period	Sum	1		
M34-12		Cost fuel (Diesel) for 6 hours including delivery for precommissioning, commissioning and Trial Operation Period	hrs	194 000		
M34-13		All consumables required for item 11 above	Sum	1		
M34-14		Operational and Maintenance Training	Sum	1		
		Storage of equipment where storage space is provided by:				
M34-15		a. The Contractor	m ³ -month	1		
M34-16		b. The Council	m ³ -month	1		
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		Brought forward / ...				
M34-17		Inspection, Tests, etc. of electrical panels and other electrical equipment outside the municipal area other than the contract Site	Item	1		
M34-18		Provision of all Test Certificates and Certificate of Compliance in terms of the Code of Practice for Wiring of Premises	Item	1		
M34-19		Allowance for inspections by Engineer or other sub-consultant	Prov	1	5 000 000	5 000 000.00
M34-20		Charge required by Contractor for above item	%	5 000 000		
M34-21		Provisional allowance for any additional supply only work as directed by the Engineer	Prov	1	8 000 000	8 000 000.00
M34-22		Charge required by Contractor on above item (shall only cover "General Requirements and Conditions" and "Contractor's overhead charges")	%	8 000 000		
M34-23		Provisional allowance for any additional design, supply, install, test and commission work as directed by the Engineer	Prov	1	10 000 000	10 000 000.00
M34-24		Charge required by Contractor on above item (shall only cover "General Requirements and Conditions" and "Contractor's overhead charges")	%	10 000 000		
M34-25		Provisional allowance for any additional design, fabricate, install, test and commission work as directed by the Engineer	Prov	1	10 000 000	10 000 000.00
M34-26		Charge required by Contractor on above item (shall only cover "General Requirements and Conditions" and "Contractor's overhead charges")	%	10 000 000		
M34-27		Allowance for design changes as forthcoming from HAZOP workshop	Prov	1	5 000 000	5 000 000.00
M34-28		Charge required by Contractor for above item	%	5 000 000		
		Decommissioning and removal of existing equipment				
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
M34-29		Brought forward / ... Decommissioning, making safe and removal of all process and mechanical equipment to contractor fenced yard on site Daywork (provisional) Allow for the cost of all labour (at full cost of employment), materials and plant, H&S PPE and induction, overheads and profit, superintendence and management	Sum	1		
M34-30		Project Management (Contractor's representative)	hr	240		
M34-31		Commissioning engineer	hr	80		
M34-32		Project Engineering (Design engineer)	hr	200		
M34-33		Drawing office (Drafting)	hr	200		
M34-34		Construction Management (General foreman)	hr	240		
M34-35		Skilled labour (Artisan)	hr	240		
M34-36		Unskilled labour (Labourer)	hr	400		
TOTAL OF BILL M34 CARRIED TO SUMMARY						R

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		BILL M35				
		PROCESS CONTROL ASSISTANCE, MAINTENANCE AND TRAINING (FULL TIME)				
		Allow for all costs and expenses in connection with the following items:				
		Preliminary and General				
		Preliminary and General Costs (Payment Item OMT1 as per Part C3.4.9.3.d):				
M35-1		Providing insurances for Maintenance for a total period of 12 months after the Trial Operation Period	Sum	1		
M35-2		Health and Safety: General obligations in compliance with the Occupational Health & Safety Act, Construction Regulations 2014 and the Occupational Health and Safety Specification for a total period of twelve months after the Trial Operation Period	Sum	1		
M35-3		Risk assessment	Sum	1		
M35-4		Preparation of Health and Safety Plan	Sum	1		
M35-5		Provision of Health and Safety specialist	Sum	1		
M35-6		Induction training of Employer's and Contractor's staff	Sum	1		
M35-7		Baseline medical assessment of employees before commencing work on site	Sum	1		
M35-8		Site establishment	Sum	1		
M35-9		Removal of site establishment	Sum	1		
M35-10		Other general expenses incurred in complying with the requirements of the Scope of Work not included above (specify):	Item	-		
M35-11		(a) Plant	Sum/ day	5		
M35-12		(b) Labour	Sum/ day	2		
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		Brought forward / ...				
M35-13		(c) Supervision	Sum/ day	1		
M35-14		(d) Other services, facilities, etc. not covered by (a), (b) and (c) above	Sum/ day	2		
		Other general expenses incurred in complying with the requirements of the Scope of Work not included above (specify):				
		Process Control: Assistance, Maintenance of Works (Full time) during Defects Notification Period (Payment Item OMT2 as per Part C3.4.9.3.d)				
M35-15		Inlet Works: Screw pumps, Screening and degritting	Month	12		
M35-16		Emergency tank	Month	12		
M35-17		PSTs	Month	12		
M35-18		Biological Reactor	Month	12		
M35-19		Blower Building	Month	12		
M35-20		SSTs	Month	12		
M35-21		UV Units	Month	12		
M35-22		Chlorination	Month	12		
M35-23		Gravity thickeners	Month	12		
M35-24		Anaerobic digesters	Month	12		
M35-25		Gas holding tanks	Month	12		
M35-26		CHP facility	Month	12		
M35-27		WAS holding tanks	Month	12		
M35-28		Primary sludge holding tanks	Month	12		
M35-29		Main sludge transfer pump station	Month	12		
M35-30		Dewatering building	Month	12		
M35-31		Sludge cake silos	Month	12		
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		Brought forward / ...				
M35-32		All other pump stations (scum pump station, WAS feed pumps, primary sludge feed pumps, RAS pump station, etc)	Month	12		
M35-33		Service water pump station	Month	12		
M35-34		TSE pump station	Month	12		
M35-35		Generator	Month	12		
M35-36		Associated MCC's and associated equipment	Month	12		
M35-37		Provisional Allowance for Spares and Consumables (supply and deliver)	Prov Sum	1	15 000 000	15 000 000.00
M35-38		Charge required by Contractor on above item	%	15 000 000		
		Process control: assistance and Maintenance training of works personnel (including certification)				
		Training of Works Personnel during Defects Notification Period (Payment Item OMT3 as per Part C3.4.9.3.d)				
M35-39		Development of a Syllabus for training of operators and process controllers	Sum	1		
M35-40		Presenting a training course for operators and process controllers	Sum	1		
M35-41		Presenting a training course for maintenance personnel (mechanical and electrical)	Sum	1		
M35-42		Arranging demonstration session(s) for trainees (monthly)	Sum	1		
M35-43		Configuring SCADA based maintenance schedules, logging and integration of maintenance schedules into the asset mangement system	Sum	1		
M35-44		Monthly data analytics for preventative maintenance	Sum	1		
M35-45		Monthly data analytics for plant optimisation	Sum	1		
M35-46		Provisional allowance as directed by the Engineer	Prov	1	2 000 000	2 000 000.00
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
M35-47		Brought forward / ... Charge required by Contractor on above item 46	%	2 000 000		
M35-48		Other general expenses incurred in complying with the requirements of the Scope of Work not included above (specify): 	Item	-		
TOTAL OF BILL M35 CARRIED TO SUMMARY						R

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		BILL M36				
		MAINTENANCE INSPECTIONS (PART TIME)				
		Allow for all costs and expenses in connection with the following items:				
		Preliminary and General				
		Preliminary and General Costs (Payment Item MI1 as per Part C3.4.9.3.d):				
M36-1		Providing insurances for Maintenance for a total period of 6 months after the Defects notification period	Sum	6		
		Health and Safety:				
M36-2		General obligations in compliance with the Occupational Health & Safety Act, Construction Regulations 2014 and the Occupational Health and Safety Specification for a total period of six months after the defects notification period	Month	6		
M36-3		Other general expenses incurred in complying with the requirements of the Scope of Work not included above (specify):	Item	-		
		Maintenance inspections for specific works for a total period of 6 months after defects notification period				
		Weekly Maintenance Inspections of the following Works for a total period of 2 months (Payment Item MI2 as per Part C3.4.9.3.d)				
M36-4		Inlet Works: Screw pumps, Screening and degritting	Month	2		
M36-5		Emergency tank	Month	2		
M36-6		PSTs	Month	2		
M36-7		Biological Reactor	Month	2		
M36-8		Blower Building	Month	2		
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		Brought forward / ...				
M36-9		SSTs	Month	2		
M36-10		UV Units	Month	2		
M36-11		Chlorination	Month	2		
M36-12		Primary sludge screening facility	Month	2		
M36-13		Gravity thickeners	Month	2		
M36-14		Anaerobic digesters	Month	2		
M36-15		Gas holding tanks	Month	2		
M36-16		CHP facility	Month	2		
M36-17		WAS holding tanks	Month	2		
M36-18		Primary sludge holding tanks	Month	2		
M36-19		Main sludge transfer pump station	Month	2		
M36-20		Dewatering building	Month	2		
M36-21		Sludge cake silos	Month	2		
M36-22		All other pump stations (scum pump station, WAS feed pumps, primary sludge feed pumps, RAS pump station, etc)	Month	2		
M36-23		Washwater pump station	Month	2		
M36-24		TSE pump station	Month	2		
M36-25		Generator	Month	2		
M36-26		Generator set and associated MCC's and associated equipment	Month	2		
M36-27		Updating SCADA based maintenance logs, analysing predictive analysis from data and updating maintenance logs based on analytics results	Month	2		
		Bi weekly Maintenance Inspections of the following Works for a total period of 2 months (Payment Item MI2 as per Part C3.4.9.3.d)				
M36-28		Inlet Works: Screw pumps, Screening and degritting	Month	2		
M36-29		Emergency tank	Month	2		
M36-30		PSTs	Month	2		
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		Brought forward / ...				
M36-31		Biological Reactor	Month	2		
M36-32		Blower Building	Month	2		
M36-33		SSTs	Month	2		
M36-34		UV Units	Month	2		
M36-35		Chlorination	Month	2		
M36-36		Primary sludge screening facility	Month	2		
M36-37		Gravity thickeners	Month	2		
M36-38		Anaerobic digesters	Month	2		
M36-39		Gas holding tanks	Month	2		
M36-40		CHP facility	Month	2		
M36-41		WAS holding tanks	Month	2		
M36-42		Primary sludge holding tanks	Month	2		
M36-43		Main sludge transfer pump station	Month	2		
M36-44		Dewatering building	Month	2		
M36-45		Sludge cake silos	Month	2		
M36-46		All other pump stations (scum pump station, WAS feed pumps, primary sludge feed pumps, RAS pump station, etc)	Month	2		
M36-47		Washwater pump station	Month	2		
M36-48		TSE pump station	Month	2		
M36-49		Generator	Month	2		
M36-50		Generator set and associated MCC's and associated equipment	Month	2		
M36-51		Updating SCADA based maintenance logs, analysing predictive analysis from data and updating maintenance logs based on analytics results	Month	2		
		Monthly Maintenance Inspections of the following Works for a total period of 2 months (Payment Item MI2 as per Part C3.4.9.3.d)				
M36-52		Inlet Works: Screw pumps, Screening and degritting	Month	2		
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		Brought forward / ...				
M36-53		Emergency tank	Month	2		
M36-54		PSTs	Month	2		
M36-55		Biological Reactor	Month	2		
M36-56		Blower Building	Month	2		
M36-57		SSTs	Month	2		
M36-58		UV Units	Month	2		
M36-59		Chlorination	Month	2		
M36-60		Primary sludge screening facility	Month	2		
M36-61		Gravity thickeners	Month	2		
M36-62		Anaerobic digesters	Month	2		
M36-63		Gas holding tanks	Month	2		
M36-64		CHP facility	Month	2		
M36-65		WAS holding tanks	Month	2		
M36-66		Primary sludge holding tanks	Month	2		
M36-67		Main sludge transfer pump station	Month	2		
M36-68		Dewatering building	Month	2		
M36-69		Sludge cake silos	Month	2		
M36-70		All other pump stations (scum pump station, WAS feed pumps, primary sludge feed pumps, RAS pump station, etc)	Month	2		
M36-71		Washwater pump station	Month	2		
M36-72		TSE pump station	Month	2		
M36-73		Generator	Month	2		
M36-74		Generator set and associated MCC's and associated equipment	Month	2		
M36-75		Updating SCADA based maintenance logs, analysing predictive analysis from data and updating maintenance logs based on analytics results	Month	2		
M36-76		Call-out charge in response to a breakdown (payment item MI3 as per Part C3.4.9.3.d)	No	36		
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
M36-77		Brought forward / ... Charge for actual repair work done in response to a breakdown (payment item MI4 as per Part C3.4.9.3.d)	Hours	250		
M36-78		Other general expenses incurred in complying with the requirements of the Scope of Work not included above (specify): 	Item	-		
TOTAL OF BILL M36 CARRIED TO SUMMARY						R

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
	Vol 3B Section B1	BILL E1				
	5	SUPPLY AND LOCAL AUTHORITY LIASON				
E1-1		General Eskom liaison	Sum	1		
E1-2		NERSA liaison and cogeneration license application/registration	Sum	1		
E1-3		City of Cape Town liaison and SSEG registration	Sum	1		
E1-4	6, 12	City of Cape Town EAM / MV department liaison and interaction for switching and implementation; risk assessments; method statements; wayleave applications, and obtaining working permits	Sum	1		
E1-5	6.4	Switching by Contractor's responsible person in absense of Employer MV personnel	Sum	1		
E1-6		CoCT civil departments wayleave application for MV cable installation	Sum	1		
E1-7		Western Cape Provisional government dept wayleave application for access road up to plant	Sum	1		
E1-8	5.3	Load flow and Power Quality logging and analysis	Sum	1		
E1-9	5.3.3	Eskom Self-Build design and documents, and proof of compliance	Sum	1		
		Provisional Sums				
E1-10		Additional requirements / costs related to cogeneration requirements, including potential PV options	Prov Sum	-	175 000	175 000.00
E1-11		Overheads, charges and profit on item above	%	175 000		
		Other:-				
E1-12		All other 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)	Item	-		
TOTAL OF BILL E1 CARRIED TO SUMMARY					R	

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
	Vol 3B Section B1	BILL E2				
	7	PRIMARY MV SWITCHGEAR				
		Allow for all the costs and expenses in connection with the manufacture, painting, testing, supplying, delivery, offloading and storage of the following materials and equipment:				
		Eskom Paardevlei Substation				
E2-1		Actom AMV12 switchboard panels	No	2		
E2-2		Off-board protection equipment and systems, including fibre optic cable	Sum	1		
		Eskom Annenprop Substation				
E2-3		Actom AMV12 switchboard panel	No	1		
E2-4		Off-board protection equipment and systems, including fibre optic cable	Sum	1		
		Maccassar WWTW - Eskom Incoming Switching Station				
E2-5		Protection schemes and protection coordination report for upgrade to Eskom supply sub-stations and new switching station	Sum	1		
E2-6		Maccassar WWTW - Eskom Incoming Switchboard	Sum	1		
E2-7	9	Battery Tripping Unit	No	1		
E2-8		110VDC Distribution Board	No	1		
E2-9		Sub-station automation: hardware, cabling, engineering and commissioning	Sum	1		
E2-10		Protection scheme to Eskom supply sub-stations: RED 615 protection system, including fibre patch panel and lead	No	3		
E2-11		Metering	Sum	1		
E2-12		Circuit breaker trolleys	No	2		
E2-13		Padlocks	Sum	1		
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
E2-14		Sump pump, complete with power supply, switch-disconnector and piping	Sum	1		
E2-15		32mm high open GRP trench covers for Eskom Incoming switching station room, complete with all mounting accessories	Sum	1		
		Maccassar WWTW Main Incomers				
E2-16		Protection settings study, report and configuration by specialist	Sum	1		
E2-17		Maccassar WWTW Main Incomers switchboard	No	2		
E2-18		Sub-station automation: hardware, cabling, engineering and commissioning	Sum	1		
E2-19		Digital Power meter	No	2		
E2-20		32mm high open GRP trench covers for Isolation Transformer feeder room and metering room, complete with all mounting accessories	Sum	1		
		Maccassar WWTW Main Intake Switchboard				
E2-21		Protection settings study, report and configuration by specialist	Sum	1		
E2-22		Maccassar WWTW Main Intake Switchboard	Sum	1		
E2-23		Battery Tripping Unit	No	2		
E2-24	9	110VDC Distribution Board	No	2		
E2-25	14	NER / NEC / Aux transformer (NERCT) combination	No	2		
E2-26		NER / NEC / Aux transformer (NERCT) pre-cast plinth	No	2		
E2-27		Sub-station automation: hardware, cabling, engineering and commissioning	Sum	1		
E2-28		Digital Power meter	No	6		
E2-29		Quality of Supply power meter	No	2		
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		Brought forward / ...				
E2-30	9	Quality of Supply power meter sim and data subscription plus reporting of data	Month	48		
E2-31		Protection scheme to Eskom supply sub-station: RED 615 protection system, including fibre patch panel and lead	No	2		
E2-32		Extra over, for VAMP arc protection scheme, including master and slave units, cabling and commissioning	Sum	1		
E2-33		Circuit breaker trolleys	No	4		
E2-34		Sump pump, complete with power supply, switch-disconnector and piping	Sum	1		
E2-35		32mm high open GRP trench covers for Main Intake Switchboar room, NECRT rooms and Auxilliary Transformer room, complete with all mounting accessories	Sum	1		
		Diesel Generators Collector Switchboard				
E2-36		Diesel Generator Collector Switchboard	Sum	1		
E2-37		Battery Tripping Unit	No	1		
E2-38		110VDC Distribution Board	No	1		
E2-39		Sub-station automation: hardware, cabling, engineering and commissioning	Sum	1		
E2-40		Circuit breaker trolleys	No	2		
E2-41		32mm high open GRP trench covers for Diesel Generators Collector switchgear room, complete with all mounting accessories	Sum	1		
		Biogas Generators and Renewables Collector Switchboard				
E2-42		Biogas Generators and Renewables Collector Switchboard	Sum	1		
E2-43		9	Battery Tripping Unit	No	1	
E2-44	110VDC Distribution Board		No	1		
E2-45	Sub-station automation: hardware, cabling, engineering and commissioning		Sum	1		
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		Brought forward / ...				
E2-46		Circuit breaker trolleys	No	2		
E2-47		32mm high open GRP trench covers for Biogas Generators Collector switchgear room, complete with all mounting accessories	Sum	1		
		Allow for all costs and expenses in connection with the Site installation of the following:-				
E2-48		All materials and equipment summarized in BILL E2 complete	Sum	1		
		Provisional Sums				
E2-49		Additional MV infrastructure for Eskom switchgear and protection as required during Eskom self-build design	Prov Sum	1	175 000	175 000.00
E2-50		Percentage adjustment on above item for Contractor's overheads and profit	%	175 000		
E2-51		Additional MV infrastructure for upgrading to Eskom most recent Grid Access code and design standards	Prov Sum	1	175 000	175 000.00
E2-52		Percentage adjustment on above item for Contractor's overheads and profit	%	175 000		
E2-53		Additional relay and protection equipment to optimise arc and protection sytem	Prov Sum	1	175 000	175 000.00
E2-54		Percentage adjustment on above item for Contractor's overheads and profit	%	175 000		
E2-55		Additional MV infrastructure for upgrading to CoCT MV department most recent design standards	Prov Sum	1	175 000	175 000.00
E2-56		Percentage adjustment on above item for Contractor's overheads and profit	%	175 000		
		Other:-				
E2-57		All other 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)	Item	-		
TOTAL OF BILL E2 CARRIED TO SUMMARY					R	

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
	Vol 3B Section B1	BILL E3				
	8	SECONDARY MV SWITCHGEAR				
		Allow for all the costs and expenses in connection with the manufacture, painting, testing, supplying, delivery, offloading and storage of the following materials and equipment:				
		Secondary Switchgear				
E3-1		Protection settings study, report and configuration by specialist	Sum	1		
E3-2		4-way 12kV CCFF switchboard complete	No	2		
E3-3		4-way 12kV CCVV switchboard complete	No	4		
E3-4		Battery Tripping Unit	No	4		
E3-5		Sub-station automation: hardware, cabling, engineering and commissioning	No	6		
E3-6		Padlocks	Sum	1		
E3-7		32mm high open GRP trench covers for secondary switchgear room, complete with all mounting accessories	No	6		
		Allow for all costs and expenses in connection with the Site installation of the following:-				
E3-8		All materials and equipment summarized in BILL E3 complete	Sum	1		
		Other:-				
E3-9		All other 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)	Item	-		
						
						
						
						
						
TOTAL OF BILL E3 CARRIED TO SUMMARY					R	

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
	Vol 3B Section B1	BILL E4				
	10	DISTRIBUTION TRANSFORMERS Allow for all the costs and expenses in connection with the manufacture, painting, testing, supplying, delivery, offloading and storage of the following materials and equipment: Distribution Transformers				
E4-1		0.8 MVA 11.5 / 0.42 kV transformer	No	1		Rate Only
E4-2		1.0 MVA 11.5 / 0.42 kV transformer	No	2		
E4-3		1.25 MVA 11.5 / 0.42 kV transformer	No	1		Rate Only
E4-4		1.6 MVA 11.5 / 0.42 kV transformer	No	4		
E4-5		2.0 MVA 11.5 / 0.42 kV transformer	No	1		Rate Only
E4-6		2.5 MVA 11.5 / 0.42 kV transformer	No	1		Rate Only
E4-7		2.0 MVA 11.5 / 0.42 kV transformer (including NER)	No	2		
E4-8		2.5 MVA 11.5 / 0.42 kV transformer (including NER)	No	4		
E4-9		32mm high open GRP trench covers for transformer rooms, complete with all mounting accessories	No	12		
		Step-up Transformers				
E4-10		2.0 MVA 0.4 / 11.5 kV transformer	No	9		
E4-11		Cast Resinencapsulated, overhead mounted busbar trunking, from engine alternator to transformer LV terminals, including all mounting accessories, bends, terminations, complete.	No	9		
E4-12		8-way 12kV earthing switchboard complete	Sum	1		
E4-13		6-way 12kV earthing switchboard complete	Sum	1		
E4-14		Neutral Earth Resistors (NER)	No	2		
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
E4-15		Brought forward / ... 32mm high open GRP trench covers for earthing switchboard switchgear room, complete with all mounting accessories	No	2		
E4-16		Foundation earthing and earth cabling for centralised earthing system	Sum	1		
E4-17		Padlocks	Sum	1		
		Auxilliary Transformer				
E4-18		0.315 MVA 11.5 / 0.42 kV transformer	No	1		
E4-19		0.315 MVA 11.5 / 0.42 kV mini-sub, with CCF RMU and plinth complete	No	1		Rate Only
		Allow for all costs and expenses in connection with the Site installation of the following:-				
E4-20		All materials and equipment summarized in BILL E4 complete	Sum	1		
		Other:-				
E4-21		All other 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)	Item	-		
TOTAL OF BILL E4 CARRIED TO SUMMARY					R	

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
	BILL E5					
	Vol 3B					
	Section B1					
	11	ISOLATION TRANSFORMERS				
		Allow for all the costs and expenses in connection with the manufacture, painting, testing, supplying, delivery, offloading and storage of the following materials and equipment:				
E5-1		7.5 MVA 11.5 / 11.5 kV transformer	No	2		
E5-2		Neutral Earth Resistors (NER)	No	2		
E5-3		Steel fire barrier between transformers, including concrete founding and footing	Sum	1		
		Allow for all costs and expenses in connection with the Site installation of the following:-				
E5-4		All materials and equipment summarized in BILL E5 complete	Sum	1		
		Other:-				
E5-5		All other 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)	Item	-		
						
						
						
						
						
TOTAL OF BILL E5 CARRIED TO SUMMARY					R	

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
	Vol 3B Section B1	BILL E6				
	12	MV CABLING				
		Allow for all the costs and expenses in connection with the manufacture, painting, testing, supplying, delivery, offloading and storage of the following materials and equipment:				
E6-1		300mm ² Al XLPE insulated 3-core 6,35/11 kV screened conductor (Eskom Water block cable type)	m	16 000		
E6-2		300mm ² Al XLPE 3-core terminations (Eskom water block cable type)	No	6		
E6-3		300mm ² Al XLPE 3-core joints (Eskom water block cable type)	No	64		
E6-4		48-core Single Mode Fibre optic cable (Eskom spec)	m	8 000		
E6-5		48-core Single Mode Fibre optic cable patch with enclosure complete	No	192		
E6-6		Fibre optic cable - draw pit	No	24		
E6-7		300mm ² Al PILC 3-core insulated 6,35/11 kV screened conductor	m	3 800		
E6-8		300mm ² Al PILC 3-core terminations	No	36		
E6-9		300mm ² Al PILC 3-core joints	No	12		
E6-10		300mm ² Al PILC 3-core to 3x300mm ² Al PILC 1-core trifurcating joint	No	36		
E6-11		300mm ² Al PILC 1-core insulated 6,35/11 kV conductor	m	720		
E6-12		300mm ² Al PILC 1-core terminations	No	108		
E6-13		120mm ² Al PILC 3-core insulated 6,35/11 kV screened conductor	m	100		
E6-14		120mm ² Al PILC 3-core terminations	No	1		
E6-15		120mm ² Al PILC 3-core joints	No	1		
E6-16		50mm ² Al PILC 3-core insulated 6,35/11 kV screened conductor	m	500		
E6-17		50mm ² Al PILC 3-core terminations	No	46		
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		Brought forward / ...				
E6-18		50mm ² Al PILC 3-core joints	No	2		
E6-19		95mm ² Cu PILC 3-core insulated 6,35/11 kV screened conductor	m	500		
E6-20		95mm ² Cu PILC 3-core terminations	No	4		
E6-21		95mm ² Cu PILC 3-core joints	No	6		
E6-22		70mm ² bare copper earth conductor with stranded conductors	m	20 100		
E6-23		70mm ² bare copper earth conductor terminations	No	32		
		Allow for all costs and expenses in connection with the Site installation of the following:-				
E6-24		All materials and equipment summarized in BILL E6 complete	Sum	1		
E6-25		Excavation and backfill	m	20 400		
E6-26		260mm deep bedding around cable	m	20 400		
E6-27		300mm deep soil crete mixture for backfill	m	7 200		
E6-28		Pipe drilling DN160 sleeve underneath road or river	m	1 250		
E6-29		Security during installation	Sum	1		
E6-30		Underground cable ancillaries (danger tape, 400mm wide, overlapping)	m	20 400		
E6-31		Underground cable ancillaries (cement slabs)	m	5 100		
E6-32		Cable markers (with engraved aluminium plate)	No	160		
E6-33		Scanning / Radio detection survey of newly installed cables, mapping to GIS coordinates and MV cable and joint route layout with co-ordinates	Sum	1		
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		Brought forward / ...				
		Provisional Sums				
E6-34		Relocation and extension of MV cables, overhead lines and internal WWTW fibre ring during changeover to new substation and/or construction of civil structures	Prov Sum	1	175 000	175 000.00
E6-35		Percentage adjustment on above item for Contractor's overheads and profit	%	175 000		
		Other:-				
E6-36		All other 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)	Item	-		
						
						
						
						
						
TOTAL OF BILL E6 CARRIED TO SUMMARY					R	

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
	Vol 3B Section B1	BILL E7				
	15, 16, 17	LV SWITCHGEAR AND CONTROL ASSEMBLIES				
		Allow for all the costs and expenses in connection with the manufacture, painting, testing, supplying, delivery, offloading and storage of the following materials and equipment:				
E7-1	14.2	Inlet Works MCC 92EI03-PNL01 complete.	Sum	1		
E7-2	14.2	Bioreactor MCC 92EI04-PNL01 complete.	Sum	1		
E7-3	14.2	Blower MCC 92EI02-PNL01 complete.	Sum	1		
E7-4	14.2	Dewatering MCC 92EI01-PNL01 complete.	Sum	1		
E7-5	14.2	Service Water MCC 92EI06-PNL01 complete.	Sum	1		
E7-6	14.2	Ultraviolet MCC 92EI02-PNL01 complete.	Sum	1		
E7-7	14.2	Primary Settling Tank MCC 92EI03-PNL02 complete.	Sum	1		
E7-8	14.2	Secondary Settling Tank MCC 92EI02-PNL02 complete.	Sum	1		
E7-9	14.2	Primary Sludge 1 MCC 92EI01-PNL09 complete.	Sum	1		
E7-10	14.2	Primary Sludge 2 MCC 92EI01-PNL10 complete.	Sum	1		
E7-11	14.2	Primary Sludge 3 MCC 92EI01-PNL11 complete.	Sum	1		
E7-12	14.2	Waste Activated Sludge 1 MCC 92EI01-PNL02 complete.	Sum	1		
E7-13	14.2	Waste Activated Sludge 2 MCC 92EI01-PNL03 complete.	Sum	1		
E7-14	14.2	Waste Activated Sludge 3 MCC 92EI01-PNL04 complete.	Sum	1		
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		Brought forward / ...				
E7-15	14.2	Waste Activated Sludge 4 MCC 92EI01-PNL05 complete.	Sum	1		
E7-16	14.2	Waste Activated Sludge 5 MCC 92EI01-PNL06 complete.	Sum	1		
E7-17	14.2	Waste Activated Sludge 6 MCC 92EI01-PNL07 complete.	Sum	1		
E7-18	14.2	Waste Activated Sludge 7 MCC 92EI01-PNL08 complete.	Sum	1		
E7-19	14.2	TSE MCC 92EI06-PNL02 complete.	Sum	1		
E7-20	15.6	Motor Field Control Stations	No	380		
E7-21		Bioreactor MCC 92EI04-PNL01 resin encapsulated copper incomer busbars from 97VX06-TRF01& 97VX06-TRF02 including all associated costs	m	160		
E7-22		Blower MCC 92EI02-PNL01 resin encapsulated copper incomer busbars from 97VX07-TRF01 & 97VX07-TRF02 including all associated costs	m	70		
E7-23		Dewatering MCC 92EI01-PNL01 resin encapsulated copper incomer busbars from 97VX03-TRF01 & 97VX03-TRF02 including all associated costs	m	70		
E7-24	16	Inlet Works MCC 92EI03-PNL01 Power factor correction.	No	2		
E7-25	16	Bioreactor MCC 92EI04-PNL01 Power factor correction	No	2		
E7-26	16	Blower MCC 92EI02-PNL01 Power Factor correction	No	2		
E7-27	16	Dewatering MCC 92EI01-PNL01 Power factor Correction	No	2		
E7-28	16	Service Water MCC 92EI06-PNL01 Power factor correction	No	2		
E7-29	16	Ultraviolet MCC 92EI02-PNL01 Power factor correction	No	2		
E7-30		Dewatering MCC 92EI01-PNL01 Static Harmonic Filter	No	2		
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		Brought forward / ...				
E7-31		Service Water MCC 92EI06-PNL01 Static Harmonic Filter	No	2		
E7-32		Cast resin encapsulated copper busbars 3000 A	m	1		Rate Only
E7-33		Cast resin encapsulated copper busbars 3500A	m	1		Rate Only
E7-34		Cast resin encapsulated copper busbars 4000A	m	1		Rate Only
E7-35		Air circuit breaker 2500 A	No	1		Rate Only
E7-36		Air circuit breaker 3200A	No	1		Rate Only
E7-37		Air circuit breaker 4000A	No	1		Rate Only
E7-38		Air circuit breaker 5000A	No	1		Rate Only
E7-39		GRP grid 38 mm high, 850 mm wide trench covers for Inlet Works Electrical building complete with all mounting accessories	Sum	1		
E7-40		GRP grid 38 mm high, 850 mm wide trench covers for PST Electrical Building complete with all mounting accessories	Sum	1		
E7-41		GRP grid 38 mm high, 850 mm wide trench covers for Bioreactor Electrical Building complete with all mounting accessories	Sum	1		
E7-42		GRP grid 38 mm high, 850 mm wide trench covers for Ultraviolet Electrical Building complete with all mounting accessories	Sum	1		
E7-43		GRP grid 38 mm high, 850 mm wide trench covers for Service Water Electrical Building complete with all mounting accessories	Sum	1		
E7-44		GRP grid 38 mm high, 850 mm wide trench covers for Blower Electrical Building and Blower room complete with all mounting accessories	Sum	1		
E7-45		GRP grid 38 mm high, 850 mm wide trench covers for Dewatering electrical room complete with all mounting accessories	Sum	1		
E7-46		GRP grid 38 mm high, 850 mm wide trench covers for TSE and Filter Building complete with all mounting accessories	Sum	1		
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		Brought forward / ...				
		Allow for all costs and expenses in connection with the Site installation of the following:-				
E7-47		Inlet Works MCC 92EI03-PNL01 complete.	Sum	1		
E7-48		Bioreactor MCC 92EI04-PNL01 complete.	Sum	1		
E7-49		Blower MCC 92EI02-PNL01 complete.	Sum	1		
E7-50		Dewatering MCC 92EI01-PNL01 complete.	Sum	1		
E7-51		Service Water MCC 92EI06-PNL01 complete.	Sum	1		
E7-52		Ultraviolet MCC 92EI02-PNL01 complete.	Sum	1		
E7-53		Primary Settling Tank MCC 92EI03-PNL02 complete.	Sum	1		
E7-54		Secondary Settling Tank MCC 92EI02-PNL02 complete.	Sum	1		
E7-55		Primary Sluge 1 MCC 92EI01-PNL09 complete.	Sum	1		
E7-56		Primary Sluge 2 MCC 92EI01-PNL10 complete.	Sum	1		
E7-57		Primary Sluge 3 MCC 92EI01-PNL11 complete.	Sum	1		
E7-58		Waste Activated Sludge 1 MCC 92EI01-PNL02 complete.	Sum	1		
E7-59		Waste Activated Sludge 2 MCC 92EI01-PNL03 complete.	Sum	1		
E7-60		Waste Activated Sludge 3 MCC 92EI01-PNL04 complete.	Sum	1		
E7-61		Waste Activated Sludge 4 MCC 92EI01-PNL05 complete.	Sum	1		
E7-62		Waste Activated Sludge 5 MCC 92EI01-PNL06 complete.	Sum	1		
E7-63		Waste Activated Sludge 6 MCC 92EI01-PNL07 complete.	Sum	1		
E7-64		Waste Activated Sludge 7 MCC 92EI01-PNL08 complete.	Sum	1		
E7-65		TSE MCC 92EI06-PNL02 complete.	Sum	1		
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		Brought forward / ...				
E7-66		Motor Field Control Stations	Sum	380		
E7-67		Bioreactor MCC 92EI04-PNL01 resin encapsulated copper incomer busbars from 97VX06-TRF01 & 97VX06-TRF02 including all associated costs	Sum	160		
E7-68		Blower MCC 92EI02-PNL01 resin encapsulated copper incomer busbars from 97VX07-TRF01 & 97VX07-TRF02 including all associated costs	Sum	70		
E7-69		Dewatering MCC 92EI01-PNL01 resin encapsulated copper incomer busbars from 97VX03-TRF01 & 97VX03-TRF02 including all associated costs	Sum	70		
E7-70		Inlet Works MCC 92EI03-PNL01 Power factor correction.	No	2		
E7-71		Bioreactor MCC 92EI04-PNL01 Power factor correction	No	2		
E7-72		Blower MCC 92EI02-PNL01 Power Factor correction	No	2		
E7-73		Dewatering MCC 92EI01-PNL01 Power factor Correction	No	2		
E7-74		Service Water MCC 92EI06-PNL01 Power factor correction	No	2		
E7-75		Ultraviolet MCC 92EI02-PNL01 Power factor correction	No	2		
E7-76		Dewatering MCC 92EI01-PNL01 Static Harmonic Filter	No	2		
E7-77		Service Water MCC 92EI06-PNL01 Static Harmonic Filter	No	2		
E7-78		Cast resin encapsulated copper busbars 3000 A	m	1		Rate Only
E7-79		Cast resin encapsulated copper busbars 3500A	m	1		Rate Only
E7-80		Cast resin encapsulated copper busbars 4000A	m	1		Rate Only
E7-81		Air circuit breaker 2500 A	No	1		Rate Only
E7-82		Air circuit breaker 3200A	No	1		Rate Only
E7-83		Air circuit breaker 4000A	No	1		Rate Only
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		Brought forward / ...				
E7-84		Air circuit breaker 5000A	No	1		Rate Only
E7-85		GRP grid 38 mm high, 850 mm wide trench covers for Inlet Works Electrical building complete with all mounting accessories	Sum	1		
E7-86		GRP grid 38 mm high, 850 mm wide trench covers for PST Electrical Building complete with all mounting accessories	Sum	1		
E7-87		GRP grid 38 mm high, 850 mm wide trench covers for Bioreactor Electrical Building complete with all mounting accessories	Sum	1		
E7-88		GRP grid 38 mm high, 850 mm wide trench covers for Ultraviolet Electrical Building complete with all mounting accessories	Sum	1		
E7-89		GRP grid 38 mm high, 850 mm wide trench covers for Service Water Electrical Building complete with all mounting accessories	Sum	1		
E7-90		GRP grid 38 mm high, 850 mm wide trench covers for Blower Electrical Building and Blower room complete with all mounting accessories	Sum	1		
E7-91		GRP grid 38 mm high, 850 mm wide trench covers for Dewatering electrical room complete with all mounting accessories	Sum	1		
E7-92		GRP grid 38 mm high, 850 mm wide trench covers for TSE and Filter Building complete with all mounting accessories	Sum	1		
E7-93		Switchgear changes as directed by the Engineer brought on by process design changes	Prov Sum	1	175 000	175 000.00
E7-94		Percentage adjustment on above item for Contractor's overheads and profit	%	175 000		
		Other:-				
E7-95		All other 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)	Item	-		
TOTAL OF BILL E7 CARRIED TO SUMMARY					R	

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
	Vol 3B Section B1	BILL E8				
	23	LV CABLES				
		Allow for all costs and expenses in connection with the supply, delivery, offloading and storage of the following:				
		Cu/PVC Insulated/PVC Bedded/SWA/PVC Sheathed 600/1000V multicore cable with stranded conductors.				
E8-1		1.5mm ² x 3 core	m	1		Rate Only
E8-2		2.5mm ² x 3 core	m	72 680		
E8-3		1.5mm ² x 4 core	m	1		Rate Only
E8-4		2.5mm ² x 4 core	m	60 550		
E8-5		4mm ² x 4 core	m	16 510		
E8-6		6mm ² x 4 core	m	18 670		
E8-7		10mm ² x 4 core	m	2 120		
E8-8		16mm ² x 4 core	m	4 000		
E8-9		25mm ² x 4 core	m	15 195		
E8-10		35mm ² x 4 core	m	18 560		
E8-11		50mm ² x 4 core	m	3 590		
E8-12		70mm ² x 4 core	m	7 540		
E8-13		95mm ² x 4 core	m	6 100		
E8-14		120mm ² x 4 core	m	6 140		
E8-15		150mm ² x 4 core	m	680		
E8-16		185mm ² x 4 core	m	1		Rate Only
E8-17		240mm ² x 4 core	m	1		Rate Only
E8-18		300mm ² x 4 core	m	1		Rate Only
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		Brought forward / ...				
		Cable terminations for Cu/PVC Insulated/PVC Bedded/SWA/PVC Sheathed 600/1000V multicore cables, complete, including gland shroud, lugs, tag numbers, etc and connection.				
E8-19		1.5mm ² x 3 core	No	1		Rate Only
E8-20		2.5mm ² x 3 core	No	674		
E8-21		1.5mm ² x 4 core	No	1		Rate Only
E8-22		2.5mm ² x 4 core	No	586		
E8-23		4mm ² x 4 core	No	100		
E8-24		6mm ² x 4 core	No	132		
E8-25		10mm ² x 4 core	No	26		
E8-26		16mm ² x 4 core	No	54		
E8-27		25mm ² x 4 core	No	134		
E8-28		35mm ² x 4 core	No	158		
E8-29		50mm ² x 4 core	No	46		
E8-30		70mm ² x 4 core	No	66		
E8-31		95mm ² x 4 core	No	64		
E8-32		120mm ² x 4 core	No	62		
E8-33		150mm ² x 4 core	No	8		
E8-34		185mm ² x 4 core	No	1		Rate Only
E8-35		240mm ² x 4 core	No	1		Rate Only
E8-36		300mm ² x 4 core	No	1		Rate Only
		Cu/PVC Insulated/PVC Bedded/AWA/PVC Sheathed 600/1000V single core cable with stranded conductors. Cable fixed to cable tray, drawn into sleeves or laid into trenches.				
E8-37		95mm ² x 1 core	m	1		Rate Only
E8-38		120mm ² x 1 core	m	120		
E8-39		150mm ² x 1 core	m	3 360		
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		Brought forward / ...				
E8-40		185mm ² x 1 core	m	1		Rate Only
E8-41		240mm ² x 1 core	m	1		Rate Only
E8-42		300mm ² x 1 core	m	120		
E8-43		400mm ² x 1 core	m	1		Rate Only
E8-44		500mm ² x 1 core	m	1		Rate Only
		Cable terminations for Cu/PVC Insulated/PVC Bedded/AWA/PVC Sheathed 600/1000V single core cables, complete, including gland shroud, lugs, tag numbers, etc and connection.				
E8-45		95mm ² x 1 core	No	1		Rate Only
E8-46		120mm ² x 1 core	No	16		
E8-47		150mm ² x 1 core	No	24		
E8-48		185mm ² x 1 core	No	1		Rate Only
E8-49		240mm ² x 1 core	No	1		Rate Only
E8-50		300mm ² x 1 core	No	16		
E8-51		400mm ² x 1 core	No	1		Rate Only
E8-52		500mm ² x 1 core	No	1		Rate Only
		Bare Copper Earth cable with stranded conductors.				
E8-53		1.5mm ²	m	1		Rate Only
E8-54		2.5mm ²	m	33 810		
E8-55		4mm ²	m	2 150		
E8-56		6mm ²	m	6 430		
E8-57		10mm ²	m	120		
E8-58		16mm ²	m	1 155		
E8-59		25mm ²	m	840		
E8-60		35mm ²	m	1 840		
E8-61		50mm ²	m	1		Rate Only
E8-62		70mm ²	m	480		
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		Brought forward / ...				
E8-63		95mm ²	m	280		
E8-64		120mm ²	m	120		
E8-65		150mm ²	m	30		
E8-66		185mm ²	m	1		Rate Only
E8-67		240mm ²	m	1		Rate Only
E8-68		300mm ²	m	1		Rate Only
		Cable terminations for bare copper earth cables, complete, including gland shroud, lugs, tag numbers, etc and connection.				
E8-69		1.5mm ²	No	1		Rate Only
E8-70		2.5mm ²	No	310		
E8-71		4mm ²	No	14		
E8-72		6mm ²	No	26		
E8-73		10mm ²	No	2		
E8-74		16mm ²	No	20		
E8-75		25mm ²	No	18		
E8-76		35mm ²	No	18		
E8-77		50mm ²	No	1		Rate Only
E8-78		70mm ²	No	8		
E8-79		95mm ²	No	2		
E8-80		120mm ²	No	2		
E8-81		150mm ²	No	4		
E8-82		185mm ²	No	1		Rate Only
E8-83		240mm ²	No	1		Rate Only
E8-84		300mm ²	No	1		Rate Only
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		Brought forward / ...				
		Allow for all costs and expenses in connection with the site installation of the following:				
		Cu/PVC Insulated/PVC Bedded/SWA/PVC Sheathed 600/1000V multicore cable with stranded conductors.				
E8-85		1.5mm ² x 3 core	m	1		Rate Only
E8-86		2.5mm ² x 3 core	m	72 680		
E8-87		1.5mm ² x 4 core	m	1		Rate Only
E8-88		2.5mm ² x 4 core	m	60 550		
E8-89		4mm ² x 4 core	m	16 510		
E8-90		6mm ² x 4 core	m	18 670		
E8-91		10mm ² x 4 core	m	2 120		
E8-92		16mm ² x 4 core	m	4 000		
E8-93		25mm ² x 4 core	m	15 195		
E8-94		35mm ² x 4 core	m	18 560		
E8-95		50mm ² x 4 core	m	3 590		
E8-96		70mm ² x 4 core	m	7 540		
E8-97		95mm ² x 4 core	m	6 100		
E8-98		120mm ² x 4 core	m	6 140		
E8-99		150mm ² x 4 core	m	680		
E8-100		185mm ² x 4 core	m	1		Rate Only
E8-101		240mm ² x 4 core	m	1		Rate Only
E8-102		300mm ² x 4 core	m	1		Rate Only
		Cable terminations for Cu/PVC Insulated/PVC Bedded/SWA/PVC Sheathed 600/1000V multicore cables, complete, including gland shroud, lugs, number tags, etc and connection.				
E8-103		1.5mm ² x 3 core	No	1		Rate Only
E8-104		2.5mm ² x 3 core	No	674		
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		Brought forward / ...				
E8-105		1.5mm ² x 4 core	No	1		Rate Only
E8-106		2.5mm ² x 4 core	No	586		
E8-107		4mm ² x 4 core	No	100		
E8-108		6mm ² x 4 core	No	132		
E8-109		10mm ² x 4 core	No	26		
E8-110		16mm ² x 4 core	No	54		
E8-111		25mm ² x 4 core	No	134		
E8-112		35mm ² x 4 core	No	158		
E8-113		50mm ² x 4 core	No	46		
E8-114		70mm ² x 4 core	No	66		
E8-115		95mm ² x 4 core	No	64		
E8-116		120mm ² x 4 core	No	62		
E8-117		150mm ² x 4 core	No	8		
E8-118		185mm ² x 4 core	No	1		Rate Only
E8-119		240mm ² x 4 core	No	1		Rate Only
E8-120		300mm ² x 4 core	No	1		Rate Only
		Cu/PVC Insulated/PVC Bedded/AWA/PVC Sheathed 600/1000V single core cable with stranded conductors. Cable fixed to cable tray, drawn into sleeves or laid into trenches.				
E8-121		95mm ² x 1 core	m	1		Rate Only
E8-122		120mm ² x 1 core	m	120		
E8-123		150mm ² x 1 core	m	1		Rate Only
E8-124		185mm ² x 1 core	m	1		Rate Only
E8-125		240mm ² x 1 core	m	1		Rate Only
E8-126		300mm ² x 1 core	m	120		
E8-127		400mm ² x 1 core	m	1		Rate Only
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
E8-128		Brought forward / ... 500mm ² x 1 core Cable terminations for Cu/PVC Insulated/PVC Bedded/AWA/PVC Sheathed 600/1000V single core cables, complete, including gland shroud, lugs, tag numbers, etc and connection.	m	1		Rate Only
E8-129		95mm ² x 1 core	No	1		Rate Only
E8-130		120mm ² x 1 core	No	16		
E8-131		150mm ² x 1 core	No	1		Rate Only
E8-132		185mm ² x 1 core	No	1		Rate Only
E8-133		240mm ² x 1 core	No	1		Rate Only
E8-134		300mm ² x 1 core	No	16		
E8-135		400mm ² x 1 core	No	1		Rate Only
E8-136		500mm ² x 1 core Bare Copper Earth cable with stranded conductors.	No	1		Rate Only
E8-137		1.5mm ²	m	1		Rate Only
E8-138		2.5mm ²	m	33 810		
E8-139		4mm ²	m	2 150		
E8-140		6mm ²	m	6 430		
E8-141		10mm ²	m	120		
E8-142		16mm ²	m	1 155		
E8-143		25mm ²	m	840		
E8-144		35mm ²	m	1 840		
E8-145		50mm ²	m	1		Rate Only
E8-146		70mm ²	m	480		
E8-147		95mm ²	m	1		Rate Only
E8-148		120mm ²	m	120		
E8-149		150mm ²	m	30		
E8-150		185mm ²	m	1		Rate Only
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		Brought forward / ...				
E8-151		240mm ²	m	1		Rate Only
E8-152		300mm ²	m	1		Rate Only
		Cable terminations for bare copper earth cables, complete, including gland shroud, lugs, tag numbers, etc and connection.				
E8-153		1.5mm ²	No	1		Rate Only
E8-154		2.5mm ²	No	310		
E8-155		4mm ²	No	14		
E8-156		6mm ²	No	26		
E8-157		10mm ²	No	2		
E8-158		16mm ²	No	20		
E8-159		25mm ²	No	18		
E8-160		35mm ²	No	18		
E8-161		50mm ²	No	1		Rate Only
E8-162		70mm ²	No	8		
E8-163		95mm ²	No	2		
E8-164		120mm ²	No	2		
E8-165		150mm ²	No	4		
E8-166		185mm ²	No	1		Rate Only
E8-167		240mm ²	No	1		Rate Only
E8-168		300mm ²	No	1		Rate Only
E8-169		Additional cables as requested by the Engineer due to process design changes	Prov Sum	1	200 000	200 000.00
E8-170		Percentage adjustment on above item for Contractor's overheads and profit	%	200 000		
		EXCAVATIONS				
		Excavate and set excavated material aside for re-use as filling for cable or sleeve trench not exceeding 1m deep				
E8-171		In earth	m	8 620		
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		Brought forward / ...				
E8-172		In soft rock	m	240		Rate Only
E8-173		In rock	m	1		
E8-174		Selected and approved material for backfilling, bedding and cover	m	4 240		
E8-175		Surplus excavated material spread and levelled on site as directed	m	500		
E8-176		Danger tape - 400mm wide overlapping	m	17 720		
E8-177		Cable marker, with engraved aluminium plate	No	250		
E8-178		Fire stopping material for penetrative areas and cable box outs	m³	200		
E8-179		Cable coating as fire stopping for cables (1m per cable)	m³	800		
E8-180		Additional specialist fire stopping measures as directed by the Engineer	Prov Sum	1	175 000	175 000.00
E8-181		Percentage adjustment on above item for Contractor's overheads and profit	%	175 000		
		Other:-				
		All other 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):-				
						
						
						
						
						
TOTAL OF BILL E8 CARRIED TO SUMMARY					R	

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
	Vol 3B Section B1	BILL E9				
	23	CABLE SUPPORTS				
		Allow for all costs and expenses in connection with the supply and delivery of the following:				
		Stainless steel 316 cable ladder, 3mm thick side rails, channel cross rungs at 300mm centres, complete with couplers, clamps, threaded rods, hangers, cantilevers, brackets etc. to fix to trusses, walls for large installations				
E9-1		All equipment associated with Inlet Works MCC 92EI03-PNL01	Sum	1		
E9-2		All equipment associated with Bioreactor MCC 92EI04-PNL01	Sum	1		
E9-3		All equipment associated with Blower MCC 92EI02-PNL01	Sum	1		
E9-4		All equipment associated with Dewatering MCC 92EI01-PNL01	Sum	1		
E9-5		All equipment associated with Service Water MCC 92EI06-PNL01	Sum	1		
E9-6		All equipment associated with Ultraviolet MCC 92EI02-PNL01	Sum	1		
		Stainless steel 316 welded wire mesh cable tray, 50 x 50mm base aperture, 25 x 50mm side aperture, complete with splices, couplers, clamps, threaded rods, hangers, brackets etc to fix to trusses, walls etc for small installations				
E9-7		All equipment associated with Inlet Works MCC 92EI03-PNL01	Sum	1		
E9-8		All equipment associated with Bioreactor MCC 92EI04-PNL01	Sum	1		
E9-9		All equipment associated with Blower MCC 92EI02-PNL01	Sum	1		
E9-10		All equipment associated with Dewatering MCC 92EI01-PNL01	Sum	1		
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
E9-11		Brought forward / ... All equipment associated with Service Water MCC 92EI06-PNL01	Sum	1		
E9-12		All equipment associated with Ultraviolet MCC 92EI02-PNL01 Allow for all costs and expenses in connection with the installation of the following: Stainless steel 316 cable ladder, 3mm thick side rails, channel cross rungs at 300mm centres, complete with couplers, clamps, threaded rods, hangers, cantilevers, brackets etc. to fix to trusses, walls for large installations	Sum	1		
E9-13		All equipment associated with Inlet Works MCC 92EI03-PNL01	Sum	1		
E9-14		All equipment associated with Bioreactor MCC 92EI04-PNL01	Sum	1		
E9-15		All equipment associated with Blower MCC 92EI02-PNL01	Sum	1		
E9-16		All equipment associated with Dewatering MCC 92EI01-PNL01	Sum	1		
E9-17		All equipment associated with Service Water MCC 92EI06-PNL01	Sum	1		
E9-18		All equipment associated with Ultraviolet MCC 92EI02-PNL01 Stainless steel 316 welded wire mesh cable tray, 50 x 50mm base aperture, 25 x 50mm side aperture, complete with splices, couplers, clamps, threaded rods, hangers, brackets etc to fix to trusses, walls etc for small installations	Sum	1		
E9-19		All equipment associated with Inlet Works MCC 92EI03-PNL01	Sum	1		
E9-20		All equipment associated with Bioreactor MCC 92EI04-PNL01	Sum	1		
E9-21		All equipment associated with Blower MCC 92EI02-PNL01	Sum	1		
E9-22		All equipment associated with Dewatering MCC 92EI01-PNL01	Sum	1		
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
E9-23		Brought forward / ... All equipment associated with Service Water MCC 92EI06-PNL01	Sum	1		
E9-24		All equipment associated with Ultraviolet MCC 92EI02-PNL01 Other:- All other 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		
TOTAL OF BILL E9 CARRIED TO SUMMARY						R

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
	Vol 3B Section B1	BILL E10				
	22	AREA LIGHTING				
		Allow for all the costs and expenses in connection with the design, manufacture, routine testing, factory acceptance testing (if indicated), supply, delivery, offloading and storage of the following materials and equipment:				
		Lighting				
E10-1		Type D: LED Streetlight	No	160		
E10-2		Type E: LED Floodlight	No	275		
		GRP streetlight pole complete with brackets and accessories etc.				
E10-3		4.6m GRP for 2 x LED Streetlights	No	35		
E10-4		4.6m GRP for 1 x LED Streetlight	No	50		
E10-5		8m GRP for 1 x LED Streetlight/Floodlight	No	90		
E10-6		8m GRP for 1 x LED Streetlight and 1 x LED Floodlight	No	44		
E10-7		11.6m GRP for 6 x LED Floodlight	No	34		
E10-8		Beka Sozella 420 or equivalent (with movement sensor) and pole	No	4		
		Electrical kiosks				
E10-9		Kiosk together with plinth	No	8		
		Cables				
		Cu/PVC Insulated/PVC Bedded/SWA/PVC Sheathed 600/1000V multicore cable with stranded conductors.				
E10-10		2.5mm ² x 4 core	m	3 450		
E10-11		4mm ² x 4 core	m	1 050		
E10-12		6mm ² x 4 core	m	3 350		
E10-13		10mm ² x 4 core	m	2 000		
E10-14		16mm ² x 4 core	m	1		Rate Only
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
E10-15		Brought forward / ... 25mm ² x 4 core Cable terminations for Cu/PVC Insulated/PVC Bedded/SWA/PVC Sheathed 600/1000V multicore cables, complete, including gland shroud, lugs, number tags, etc and connection.	m	1		Rate Only
E10-16		2.5mm ² x 4 core	No	93		
E10-17		4mm ² x 4 core	No	18		
E10-18		6mm ² x 4 core	No	70		
E10-19		10mm ² x 4 core	No	42		
E10-20		16mm ² x 4 core	No	1		Rate Only
E10-21		25mm ² x 4 core Bare copper earth cable with stranded conductors.	No	1		Rate Only
E10-22		2.5mm ²	m	3 450		
E10-23		4mm ²	m	1 050		
E10-24		6mm ²	m	3 350		
E10-25		10mm ²	m	2 000		
E10-26		16mm ²	m	1		Rate Only
E10-27		25mm ² Cable terminations for bare copper earth cables, complete, including gland shroud, lugs, number tags, etc and connection.	m	1		Rate Only
E10-28		2.5mm ²	No	93		
E10-29		4mm ²	No	18		
E10-30		6mm ²	No	70		
E10-31		10mm ²	No	42		
E10-32		16mm ²	No	1		Rate Only
E10-33		25mm ² Allow for all costs and expenses in connection with the Site installation of the following:	No	1		Rate Only
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		Brought forward / ...				
		Lighting				
E10-34		Type D: LED Streetlight	No	160		
E10-35		Type E: LED Floodlight	No	275		
		GRP streetlight pole complete with brackets and accessories etc.				
E10-36		4.6m GRP for 2 x LED Streetlights	No	35		
E10-37		4.6m GRP for 1 x LED Streetlight	No	50		
E10-38		8m GRP for 1 x LED Streetlight	No	90		
E10-39		8m GRP for 1 x LED Streetlight and 1 x LED Floodlight	No	44		
E10-40		11.6m GRP for 6 x LED Floodlight	No	34		
E10-41		Beka Sozella 420 or equivalent (with movement sensor) and pole	No	4		
		Electrical kiosks				
E10-42		Kiosk together with plinth	No	8		
		Cables				
		Cu/PVC Insulated/PVC Bedded/SWA/PVC Sheathed 600/1000V multicore cable with stranded conductors.				
E10-43		2.5mm ² x 4 core	m	3 450		
E10-44		4mm ² x 4 core	m	1 050		
E10-45		6mm ² x 4 core	m	3 350		
E10-46		10mm ² x 4 core	m	2 000		
E10-47		16mm ² x 4 core	m	1		Rate Only
E10-48		25mm ² x 4 core	m	1		Rate Only
		Cable terminations for Cu/PVC Insulated/PVC Bedded/SWA/PVC Sheathed 600/1000V multicore cables, complete, including gland shroud, lugs, number tags, etc and connection.				
E10-49		2.5mm ² x 4 core	No	93		
E10-50		4mm ² x 4 core	No	18		
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		Brought forward / ...				
E10-51		6mm ² x 4 core	No	70		
E10-52		10mm ² x 4 core	No	42		
E10-53		16mm ² x 4 core	No	1		Rate Only
E10-54		25mm ² x 4 core	No	1		Rate Only
		Bare copper earth cable with stranded conductors.				
E10-55		2.5mm ²	m	3 450		
E10-56		4mm ²	m	1 050		
E10-57		6mm ²	m	3 350		
E10-58		10mm ²	m	2 000		
E10-59		16mm ²	m	1		Rate Only
E10-60		25mm ²	m	1		Rate Only
		Cable terminations for bare copper earth cables, complete, including gland shroud, lugs, number tags, etc and connection.				
E10-61		2.5mm ²	No	93		
E10-62		4mm ²	No	18		
E10-63		6mm ²	No	70		
E10-64		10mm ²	No	42		
E10-65		16mm ²	No	1		Rate Only
E10-66		25mm ²	No	1		Rate Only
E10-67		Additional area lighting as requested by the Engineer due to road / site layout changes	Prov Sum	1	200 000	200 000.00
E10-68		Percentage adjustment on above item for Contractor's overheads and profit	%	200 000		
		Other:-				
E10-69		All other 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)	Item			
TOTAL OF BILL E10 CARRIED TO SUMMARY					R	

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
	Vol 3B Section B1	BILL E11				
	13, 24	EARTHING				
		Allow for all the costs and expenses in connection with the manufacture, painting, testing, supplying, delivery, offloading and storage of the following materials and equipment:				
E11-1		Ground Resistivity Survey and report	sum	1		
E11-2		MV Primary Substation foundation earth mat	No	3		
E11-3		MV Secondary Substation foundation earth mat	No	6		
E11-4		Isolation Transformer earth matt	No	2		
E11-5		Distribution Transformer earth mat and earthing	No	23		
E11-6		MV earthing and MV eletrodes	Sum	1		
E11-7		Earthing arrangement and equipotential bonding for installation	Sum	1		
		Earth bars				
E11-8		All earth bars associated with Inlet Works MCC 92EI03-PNL01	Sum	1		
E11-9		All earth bars associated with Bioreactor MCC 92EI04-PNL01	Sum	1		
E11-10		All earth bars associated with Blower MCC 92EI02-PNL01	Sum	1		
E11-11		All earth bars associated with Dewatering MCC 92EI01-PNL01	Sum	1		
E11-12		All earth bars associated with Service Water MCC 92EI06-PNL01	Sum	1		
E11-13		All earth bars associated with Ultraviolet MCC 92EI02-PNL01	Sum	1		
E11-14		All earth bars associated with Primary Settling Tank MCC 92EI03-PNL02	Sum	1		
		Building earth rings				
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		Brought forward / ...				
E11-15		Inlet Works Electrical Building earth ring	Sum	1		
E11-16		Bioreactor Building earth ring	Sum	1		
E11-17		Blower Building earth ring	Sum	1		
E11-18		Dewatering Building earth ring	Sum	1		
E11-19		Service Water Building earth ring	Sum	1		
E11-20		Ultraviolet Electrical Building earth ring	Sum	1		
E11-21		Primary Settling Tank Electrical Building earth ring	Sum	1		
		Allow for all costs and expenses in connection with the Site installation of the following:-				
E11-22		MV Primary Substation foudation earth mat	No	3		
E11-23		MV Secondary Substation foudation earth mat	No	6		
E11-24		Transformer earth mat and earthing	No	23		
E11-25		MV earthing and MV electrodes	Sum	1		
E11-26		Earthing arrangement and equipotential bonding for installation	Sum	1		
		Earth bars				
E11-27		All earth bars associated with Inlet Works MCC 92EI03-PNL01	Sum	1		
E11-28		All earth bars associated with Bioreactor MCC 92EI04-PNL01	Sum	1		
E11-29		All earth bars associated with Dewatering MCC 92EI01-PNL01	Sum	1		
E11-30		All earth bars associated with Service Water MCC 92EI06-PNL01	Sum	1		
E11-31		All earth bars associated with Ultraviolet MCC 92EI02-PNL01	Sum	1		
E11-32		All earth bars associated with Primary Settling Tank MCC 92EI03-PNL02	Sum	1		
		Building earth rings				
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		Brought forward / ...				
E11-33		Inlet Works Electrical Building earth ring	Sum	1		
E11-34		Bioreactor Building earth ring	Sum	1		
E11-35		Blower Building earth ring	Sum	1		
E11-36		Dewatering Building earth ring	Sum	1		
E11-37		Service Water Building earth ring	Sum	1		
E11-38		Ultraviolet Electrical Building earth ring	Sum	1		
E11-39		Primary Settling Tank Electrical Building earth ring	Sum	1		
E11-40		Additional earthing as requested by the Engineer due to road / site layout changes	Prov Sum	1	200 000	200 000.00
E11-41		Percentage adjustment on above item for Contractor's overheads and profit	%	200 000		
		Other:-				
E11-42		All other 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)	Item	-		
TOTAL OF BILL E11 CARRIED TO SUMMARY					R	

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
	Vol 3B Section B1	BILL E12				
	12	DIESEL GENERATORS Allow for all the costs and expenses in connection with the manufacture, painting, testing, supplying, delivery, offloading and storage of the following materials and equipment: Centralised Diesel Generator Sets				
E12-1		Diesel generator - 1250 kW Prime Power	No	6		Rate Only
E12-2		Diesel generator - alternative solution (1250 kW)	No	1		
E12-3		Modified Exhaust System	No	6		
E12-4		Radiator Ducting	No	6		
E12-5		Overhead busbar trunking	No	6		
E12-6		Sound Attenuated Inlet Louvres	No	7		
E12-7		Sound Attenuated Outlet Louvres	No	7		
E12-8		Fire extinguishers	No	14		
E12-9		Generator controllers (engine and master sync) and integrated control system, control cabling, network system, generator auxiliary power cabling and integration of generator controller with PCS and collector substation	Sum	1		
E12-10		32mm high open GRP trench covers for Diesel Generators rooms, complete with all mounting accessories	Sum	1		
		Fuel System				
E12-11		Bulk Diesel 24,000 liter Storage Tank, complete with instrumentation	No	2		
E12-12		Bulk Fuel polishing system complete	No	2		
E12-13		Fuel transfer pumps complete	No	2		
E12-14		Fuel transfer pumps control panel	Sum	1		
E12-15		Fuel pipework and valves	Sum	1		
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		Brought forward / ...				
E12-16		Filtering and relocation of fuel from existing genset to new fuel tanks	liter	1 000		
E12-17		Fuel filling delivery coupling system	No	2		
		Allow for all costs and expenses in connection with the Site installation of the following:-				
E12-18		All materials and equipment summarized in BILL E12 complete	Sum	1		
E12-19		Regular servicing of generators	No	6		
		Provisional Sums				
E12-20		Provisional Sum for provision of additional temporary power during construction or changeover	Prov Sum	1	200 000	200 000.00
E12-21		Percentage adjustment on above item for Contractor's overheads and profit	%	200 000		
		Other:-				
E12-22		All other 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)	Item	-		
TOTAL OF BILL E12 CARRIED TO SUMMARY						R

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
	Vol 3B Section B2	BILL E13				
	16	INSTRUMENTATION AND FIELD BUS CABLES				
		Allow for all costs and expenses in connection with the supply, delivery, offloading and storage of the following:				
		Inlet Works				
E13-1		1,5 mm ² 1-pair scr	m	1		Rate Only
E13-2		1,5 mm ² 2-pair o/all scr	m	9 500		
E13-3		1,5 mm ² 2-pair ind scr, o/all scr	m	1		Rate Only
E13-4		1,5 mm ² 4-pair o/all scr	m	1		Rate Only
E13-5		1,5 mm ² 4-pair ind scr, o/all scr	m	1		Rate Only
E13-6		1,5 mm ² 8-pair o/all scr	m	9 000		
E13-7		1,5 mm ² 8-pair ind scr, o/all scr	m	1		Rate Only
E13-8		1,5 mm ² 12-pair o/all scr	m	1		Rate Only
E13-9		1,5 mm ² 12-pair ind scr, o/all scr	m	1		Rate Only
E13-10		1,5 mm ² 24-pair o/all scr	m	1		Rate Only
E13-11		1,5 mm ² 24-pair ind scr, o/all scr	m	1		Rate Only
E13-12		CAT6E Network Cable	m	120		
E13-13		2.5mm ² x 3 core	m	4 500		
E13-14		16mm ² x 1 core Insulated Earth wire	m	4 500		
		Bioreactor				
E13-15		1,5 mm ² 1-pair scr	m	1		Rate Only
E13-16		1,5 mm ² 2-pair o/all scr	m	13 000		
E13-17		1,5 mm ² 2-pair ind scr, o/all scr	m	1		Rate Only
E13-18		1,5 mm ² 4-pair o/all scr	m	1		Rate Only
E13-19		1,5 mm ² 4-pair ind scr, o/all scr	m	1		Rate Only
E13-20		1,5 mm ² 8-pair o/all scr	m	13 500		
E13-21		1,5 mm ² 8-pair ind scr, o/all scr	m	1		Rate Only
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		Brought forward / ...				
E13-22		1,5 mm ² 12-pair o/all scr	m	1		Rate Only
E13-23		1,5 mm ² 12-pair ind scr, o/all scr	m	1		Rate Only
E13-24		1,5 mm ² 24-pair o/all scr	m	1		Rate Only
E13-25		1,5 mm ² 24-pair ind scr, o/all scr	m	1		Rate Only
E13-26		CAT6E Network Cable	m	40		
E13-27		2.5mm ² x 3 core	m	5 710		
E13-28		16mm ² x 1 core Insulated Earth wire	m	5 710		
		Primary Settling				
E13-29		1,5 mm ² 2-pair o/all scr	m	2 700		
E13-30		1,5 mm ² 2-pair ind scr, o/all scr	m	1		Rate Only
E13-31		1,5 mm ² 4-pair o/all scr	m	1		Rate Only
E13-32		1,5 mm ² 4-pair ind scr, o/all scr	m	1		Rate Only
E13-33		1,5 mm ² 8-pair o/all scr	m	2 000		
E13-34		1,5 mm ² 8-pair ind scr, o/all scr	m	1		Rate Only
E13-35		1,5 mm ² 12-pair o/all scr	m	1		Rate Only
E13-36		1,5 mm ² 12-pair ind scr, o/all scr	m	1		Rate Only
E13-37		1,5 mm ² 24-pair o/all scr	m	1		Rate Only
E13-38		1,5 mm ² 24-pair ind scr, o/all scr	m	1		Rate Only
E13-39		CAT6E Network Cable	m	1		Rate Only
E13-40		2.5mm ² x 3 core	m	1 400		
E13-41		16mm ² x 1 core Insulated Earth wire	m	1 400		
		Secondary Settling				
E13-42		1,5 mm ² 1-pair scr	m	1		Rate Only
E13-43		1,5 mm ² 2-pair o/all scr	m	9 500		
E13-44		1,5 mm ² 2-pair ind scr, o/all scr	m	1		Rate Only
E13-45		1,5 mm ² 4-pair o/all scr	m	1		Rate Only
E13-46		1,5 mm ² 4-pair ind scr, o/all scr	m	1		Rate Only
E13-47		1,5 mm ² 8-pair o/all scr	m	5 000		
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		Brought forward / ...				
E13-48		1,5 mm ² 8-pair ind scr, o/all scr	m	1		Rate Only
E13-49		1,5 mm ² 12-pair o/all scr	m	1		Rate Only
E13-50		1,5 mm ² 12-pair ind scr, o/all scr	m	1		Rate Only
E13-51		1,5 mm ² 24-pair o/all scr	m	1		Rate Only
E13-52		CAT6E Network Cable	m	400		
E13-53		2.5mm ² x 3 core	m	11 000		
E13-54		16mm ² x 1 core Insulated Earth wire	m	11 000		
		Blowers				
E13-55		1,5 mm ² 1-pair scr	m	1		Rate Only
E13-56		1,5 mm ² 2-pair o/all scr	m	1		Rate Only
E13-57		1,5 mm ² 2-pair ind scr, o/all scr	m	1		Rate Only
E13-58		1,5 mm ² 4-pair o/all scr	m	1		Rate Only
E13-59		1,5 mm ² 4-pair ind scr, o/all scr	m	1		Rate Only
E13-60		1,5 mm ² 8-pair o/all scr	m	1		Rate Only
E13-61		1,5 mm ² 8-pair ind scr, o/all scr	m	1		Rate Only
E13-62		1,5 mm ² 12-pair o/all scr	m	1		Rate Only
E13-63		1,5 mm ² 12-pair ind scr, o/all scr	m	1		Rate Only
E13-64		1,5 mm ² 24-pair o/all scr	m	1		Rate Only
E13-65		1,5 mm ² 24-pair ind scr, o/all scr	m	1		Rate Only
E13-66		CAT6E Network Cable	m	400		
E13-67		2.5mm ² x 3 core	m	400		
E13-68		16mm ² x 1 core Insulated Earth wire	m	400		
		Dewatering				
E13-69		1,5 mm ² 1-pair scr	m	1		Rate Only
E13-70		1,5 mm ² 2-pair o/all scr	m	16 700		
E13-71		1,5 mm ² 2-pair ind scr, o/all scr	m	450		
E13-72		1,5 mm ² 4-pair o/all scr	m	1		Rate Only
E13-73		1,5 mm ² 4-pair ind scr, o/all scr	m	1		Rate Only
		Carried forward / ...				

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		Brought forward / ...				
E13-74		1,5 mm ² 8-pair o/all scr	m	16 100		
E13-75		1,5 mm ² 8-pair ind scr, o/all scr	m	1		Rate Only
E13-76		1,5 mm ² 12-pair o/all scr	m	1		Rate Only
E13-77		1,5 mm ² 12-pair ind scr, o/all scr	m	1		Rate Only
E13-78		1,5 mm ² 24-pair o/all scr	m	1		Rate Only
E13-79		1,5 mm ² 24-pair ind scr, o/all scr	m	1		Rate Only
E13-80		CAT6E Network Cable	m	600		
E13-81		2.5mm ² x 3 core	m	14 000		
E13-82		16mm ² x 1 core Insulated Earth wire	m	14 000		
		Primary Sludge				
E13-83		1,5 mm ² 1-pair scr	m	1		Rate Only
E13-84		1,5 mm ² 2-pair o/all scr	m	5 000		
E13-85		1,5 mm ² 2-pair ind scr, o/all scr	m	1		Rate Only
E13-86		1,5 mm ² 4-pair o/all scr	m	1		Rate Only
E13-87		1,5 mm ² 4-pair ind scr, o/all scr	m	1		Rate Only
E13-88		1,5 mm ² 8-pair o/all scr	m	5 500		
E13-89		1,5 mm ² 8-pair ind scr, o/all scr	m	1		Rate Only
E13-90		1,5 mm ² 12-pair o/all scr	m	1		Rate Only
E13-91		1,5 mm ² 12-pair ind scr, o/all scr	m	1		Rate Only
E13-92		1,5 mm ² 24-pair o/all scr	m	1		Rate Only
E13-93		1,5 mm ² 24-pair ind scr, o/all scr	m	1		Rate Only
E13-94		CAT6E Network Cable	m	150		
E13-95		2.5mm ² x 3 core	m	2 400		
E13-96		16mm ² x 1 core Insulated Earth wire	m	2 400		
		Waste Activated Sludge				
E13-97		1,5 mm ² 1-pair scr	m	1		Rate Only
E13-98		1,5 mm ² 2-pair o/all scr	m	15 000		
E13-99		1,5 mm ² 2-pair ind scr, o/all scr	m	1		Rate Only
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		Brought forward / ...				
E13-100		1,5 mm ² 4-pair o/all scr	m	1		Rate Only
E13-101		1,5 mm ² 4-pair ind scr, o/all scr	m	1		Rate Only
E13-102		1,5 mm ² 8-pair o/all scr	m	15 000		
E13-103		1,5 mm ² 8-pair ind scr, o/all scr	m	1		Rate Only
E13-104		1,5 mm ² 12-pair o/all scr	m	1		Rate Only
E13-105		1,5 mm ² 12-pair ind scr, o/all scr	m	1		Rate Only
E13-106		1,5 mm ² 24-pair o/all scr	m	1		Rate Only
E13-107		1,5 mm ² 24-pair ind scr, o/all scr	m	1		Rate Only
E13-108		CAT6E Network Cable	m	450		
E13-109		2.5mm ² x 3 core	m	8 500		
E13-110		16mm ² x 1 core Insulated Earth wire	m	8 500		
		Ultra Violet Filtration				
E13-111		1,5 mm ² 1-pair scr	m	1		Rate Only
E13-112		1,5 mm ² 2-pair o/all scr	m	700		
E13-113		1,5 mm ² 2-pair ind scr, o/all scr	m	1		Rate Only
E13-114		1,5 mm ² 4-pair o/all scr	m	1		Rate Only
E13-115		1,5 mm ² 4-pair ind scr, o/all scr	m	1		Rate Only
E13-116		1,5 mm ² 8-pair o/all scr	m	7 500		
E13-117		1,5 mm ² 8-pair ind scr, o/all scr	m	1		Rate Only
E13-118		1,5 mm ² 12-pair o/all scr	m	1		Rate Only
E13-119		1,5 mm ² 12-pair ind scr, o/all scr	m	1		Rate Only
E13-120		1,5 mm ² 24-pair o/all scr	m	1		Rate Only
E13-121		1,5 mm ² 24-pair ind scr, o/all scr	m	1		Rate Only
E13-122		CAT6E Network Cable	m	700		
E13-123		2.5mm ² x 3 core	m	3 500		
E13-124		16mm ² x 1 core Insulated Earth wire	m	3 500		
		Service Water				
E13-125		1,5 mm ² 1-pair scr	m	1		Rate Only
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		Brought forward / ...				
E13-126		1,5 mm ² 2-pair o/all scr	m	3 500		
E13-127		1,5 mm ² 2-pair ind scr, o/all scr	m	1		Rate Only
E13-128		1,5 mm ² 4-pair o/all scr	m	1		Rate Only
E13-129		1,5 mm ² 4-pair ind scr, o/all scr	m	1		Rate Only
E13-130		1,5 mm ² 8-pair o/all scr	m	1		Rate Only
E13-131		1,5 mm ² 8-pair ind scr, o/all scr	m	1		Rate Only
E13-132		1,5 mm ² 12-pair o/all scr	m	1		Rate Only
E13-133		1,5 mm ² 12-pair ind scr, o/all scr	m	1		Rate Only
E13-134		1,5 mm ² 24-pair o/all scr	m	1		Rate Only
E13-135		1,5 mm ² 24-pair ind scr, o/all scr	m	1		Rate Only
E13-136		CAT6E Network Cable	m	500		
E13-137		2.5mm ² x 3 core	m	5 500		
E13-138		16mm ² x 1 core Insulated Earth wire	m	5 500		
		TSE Pump station				
E13-139		1,5 mm ² 1-pair scr	m	1		Rate Only
E13-140		1,5 mm ² 2-pair o/all scr	m	1 160		
E13-141		1,5 mm ² 2-pair ind scr, o/all scr	m	1		Rate Only
E13-142		1,5 mm ² 4-pair o/all scr	m	1		Rate Only
E13-143		1,5 mm ² 4-pair ind scr, o/all scr	m	1		Rate Only
E13-144		1,5 mm ² 8-pair o/all scr	m	350		
E13-145		1,5 mm ² 8-pair ind scr, o/all scr	m	1		Rate Only
E13-146		1,5 mm ² 12-pair o/all scr	m	1		Rate Only
E13-147		1,5 mm ² 12-pair ind scr, o/all scr	m	1		Rate Only
E13-148		1,5 mm ² 24-pair o/all scr	m	1		Rate Only
E13-149		1,5 mm ² 24-pair ind scr, o/all scr	m	1		Rate Only
E13-150		CAT6E Network Cable	m	20		
E13-151		2.5mm ² x 3 core	m	470		
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
E13-152		Brought forward / ... 16mm ² x 1 core Insulated Earth wire Cable terminations for instrument multicore cables, complete, including gland shroud, lugs, tag numbers, etc and connection. Inlet Works	m	470		
E13-153		1,5 mm ² 1-pair scr	No	1		Rate Only
E13-154		1,5 mm ² 2-pair o/all scr	No	295		
E13-155		1,5 mm ² 2-pair ind scr, o/all scr	No	1		Rate Only
E13-156		1,5 mm ² 4-pair o/all scr	No	1		Rate Only
E13-157		1,5 mm ² 4-pair ind scr, o/all scr	No	1		Rate Only
E13-158		1,5 mm ² 8-pair o/all scr	No	100		
E13-159		1,5 mm ² 8-pair ind scr, o/all scr	No	1		Rate Only
E13-160		1,5 mm ² 12-pair o/all scr	No	1		Rate Only
E13-161		1,5 mm ² 12-pair ind scr, o/all scr	No	1		Rate Only
E13-162		1,5 mm ² 24-pair o/all scr	No	1		Rate Only
E13-163		1,5 mm ² 24-pair ind scr, o/all scr	No	1		Rate Only
E13-164		CAT6E Network Cable	No	12		
E13-165		2.5mm ² x 3 core	No	62		
E13-166		16mm ² x 1 core Insulated Earth wire Bioreactor	No	62		
E13-167		1,5 mm ² 1-pair scr	No	1		Rate Only
E13-168		1,5 mm ² 2-pair o/all scr	No	264		
E13-169		1,5 mm ² 2-pair ind scr, o/all scr	No	1		Rate Only
E13-170		1,5 mm ² 4-pair o/all scr	No	1		Rate Only
E13-171		1,5 mm ² 4-pair ind scr, o/all scr	No	1		Rate Only
E13-172		1,5 mm ² 8-pair o/all scr	No	135		
E13-173		1,5 mm ² 8-pair ind scr, o/all scr	No	1		Rate Only
E13-174		1,5 mm ² 12-pair o/all scr	No	1		Rate Only
E13-175		1,5 mm ² 12-pair ind scr, o/all scr	No	1		Rate Only
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		Brought forward / ...				
E13-176		1,5 mm ² 24-pair o/all scr	No	1		Rate Only
E13-177		1,5 mm ² 24-pair ind scr, o/all scr	No	1		Rate Only
E13-178		CAT6E Network Cable	m	6		
E13-179		2.5mm ² x 3 core	No	102		
E13-180		16mm ² x 1 core Insulated Earth wire	No	102		
		Primary Settling				
E13-181		1,5 mm ² 1-pair scr	No	1		Rate Only
E13-182		1,5 mm ² 2-pair o/all scr	No	70		
E13-183		1,5 mm ² 2-pair ind scr, o/all scr	No	1		Rate Only
E13-184		1,5 mm ² 4-pair o/all scr	No	1		Rate Only
E13-185		1,5 mm ² 4-pair ind scr, o/all scr	No	1		Rate Only
E13-186		1,5 mm ² 8-pair o/all scr	No	12		
E13-187		1,5 mm ² 8-pair ind scr, o/all scr	No	1		Rate Only
E13-188		1,5 mm ² 12-pair o/all scr	No	1		Rate Only
E13-189		1,5 mm ² 12-pair ind scr, o/all scr	No	1		Rate Only
E13-190		1,5 mm ² 24-pair o/all scr	No	1		Rate Only
E13-191		1,5 mm ² 24-pair ind scr, o/all scr	No	1		Rate Only
E13-192		CAT6E Network Cable	m	1		Rate Only
E13-193		2.5mm ² x 3 core	No	12		
E13-194		16mm ² x 1 core Insulated Earth wire	No	12		
		Secondary Settling				
E13-195		1,5 mm ² 1-pair scr	No	1		Rate Only
E13-196		1,5 mm ² 2-pair o/all scr	No	242		
E13-197		1,5 mm ² 2-pair ind scr, o/all scr	No	1		Rate Only
E13-198		1,5 mm ² 4-pair o/all scr	No	1		Rate Only
E13-199		1,5 mm ² 4-pair ind scr, o/all scr	No	1		Rate Only
E13-200		1,5 mm ² 8-pair o/all scr	No	36		
E13-201		1,5 mm ² 8-pair ind scr, o/all scr	No	1		Rate Only
		Carried forward / ...				

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		Brought forward / ...				
E13-202		1,5 mm ² 12-pair o/all scr	No	1		Rate Only
E13-203		1,5 mm ² 12-pair ind scr, o/all scr	No	1		Rate Only
E13-204		1,5 mm ² 24-pair o/all scr	No	1		Rate Only
E13-205		1,5 mm ² 24-pair ind scr, o/all scr	No	1		Rate Only
E13-206		CAT6E Network Cable	m	40		
E13-207		2.5mm ² x 3 core	No	68		
E13-208		16mm ² x 1 core Insulated Earth wire	No	68		
		Dewatering				
E13-209		1,5 mm ² 1-pair scr	No	1		Rate Only
E13-210		1,5 mm ² 2-pair o/all scr	No	650		
E13-211		1,5 mm ² 2-pair ind scr, o/all scr	No	1		Rate Only
E13-212		1,5 mm ² 4-pair o/all scr	No	1		Rate Only
E13-213		1,5 mm ² 4-pair ind scr, o/all scr	No	1		Rate Only
E13-214		1,5 mm ² 8-pair o/all scr	No	160		
E13-215		1,5 mm ² 8-pair ind scr, o/all scr	No	1		Rate Only
E13-216		1,5 mm ² 12-pair o/all scr	No	1		Rate Only
E13-217		1,5 mm ² 12-pair ind scr, o/all scr	No	1		Rate Only
E13-218		1,5 mm ² 24-pair o/all scr	No	1		Rate Only
E13-219		1,5 mm ² 24-pair ind scr, o/all scr	No	1		Rate Only
E13-220		CAT6E Network Cable	m	45		
E13-221		2.5mm ² x 3 core	No	45		
E13-222		16mm ² x 1 core Insulated Earth wire	No	45		
		Primary Sludge				
E13-223		1,5 mm ² 1-pair scr	No	1		Rate Only
E13-224		1,5 mm ² 2-pair o/all scr	No	162		
E13-225		1,5 mm ² 2-pair ind scr, o/all scr	No	1		Rate Only
E13-226		1,5 mm ² 4-pair o/all scr	No	1		Rate Only
E13-227		1,5 mm ² 4-pair ind scr, o/all scr	No	1		Rate Only
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		Brought forward / ...				
E13-228		1,5 mm² 8-pair o/all scr	No	84		
E13-229		1,5 mm² 8-pair ind scr, o/all scr	No	1		Rate Only
E13-230		1,5 mm² 12-pair o/all scr	No	1		Rate Only
E13-231		1,5 mm² 12-pair ind scr, o/all scr	No	1		Rate Only
E13-232		1,5 mm² 24-pair o/all scr	No	1		Rate Only
E13-233		1,5 mm² 24-pair ind scr, o/all scr	No	1		Rate Only
E13-234		CAT6E Network Cable	m	12		
E13-235		2.5mm² x 3 core	No	120		
E13-236		16mm² x 1 core Insulated Earth wire	No	120		
		Waste Activated Sludge				
E13-237		1,5 mm² 1-pair scr	No	1		Rate Only
E13-238		1,5 mm² 2-pair o/all scr	No	600		
E13-239		1,5 mm² 2-pair ind scr, o/all scr	No	1		Rate Only
E13-240		1,5 mm² 4-pair o/all scr	No	1		Rate Only
E13-241		1,5 mm² 4-pair ind scr, o/all scr	No	1		Rate Only
E13-242		1,5 mm² 8-pair o/all scr	No	140		
E13-243		1,5 mm² 8-pair ind scr, o/all scr	No	1		Rate Only
E13-244		1,5 mm² 12-pair o/all scr	No	1		Rate Only
E13-245		1,5 mm² 12-pair ind scr, o/all scr	No	1		Rate Only
E13-246		1,5 mm² 24-pair o/all scr	No	1		Rate Only
E13-247		1,5 mm² 24-pair ind scr, o/all scr	No	1		Rate Only
E13-248		CAT6E Network Cable	m	30		
E13-249		2.5mm² x 3 core	No	30		
E13-250		16mm² x 1 core Insulated Earth wire	No	30		
		Ultra Violet Filtration				
E13-251		1,5 mm² 1-pair scr	No	1		Rate Only
E13-252		1,5 mm² 2-pair o/all scr	No	70		
E13-253		1,5 mm² 2-pair ind scr, o/all scr	No	1		Rate Only
		Carried forward / ...				

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		Brought forward / ...				
E13-254		1,5 mm² 4-pair o/all scr	No	1		Rate Only
E13-255		1,5 mm² 4-pair ind scr, o/all scr	No	1		Rate Only
E13-256		1,5 mm² 8-pair o/all scr	No	80		
E13-257		1,5 mm² 8-pair ind scr, o/all scr	No	1		Rate Only
E13-258		1,5 mm² 12-pair o/all scr	No	1		Rate Only
E13-259		1,5 mm² 12-pair ind scr, o/all scr	No	1		Rate Only
E13-260		1,5 mm² 24-pair o/all scr	No	1		Rate Only
E13-261		1,5 mm² 24-pair ind scr, o/all scr	No	1		Rate Only
E13-262		CAT6E Network Cable	m	24		
E13-263		2.5mm² x 3 core	No	20		
E13-264		16mm² x 1 core Insulated Earth wire	No	20		
		Service Water				
E13-265		1,5 mm² 1-pair scr	No	1		Rate Only
E13-266		1,5 mm² 2-pair o/all scr	No	160		
E13-267		1,5 mm² 2-pair ind scr, o/all scr	No	1		Rate Only
E13-268		1,5 mm² 4-pair o/all scr	No	1		Rate Only
E13-269		1,5 mm² 4-pair ind scr, o/all scr	No	1		Rate Only
E13-270		1,5 mm² 8-pair o/all scr	No	8		
E13-271		1,5 mm² 8-pair ind scr, o/all scr	No	1		Rate Only
E13-272		1,5 mm² 12-pair o/all scr	No	1		Rate Only
E13-273		1,5 mm² 12-pair ind scr, o/all scr	No	1		Rate Only
E13-274		1,5 mm² 24-pair o/all scr	No	1		Rate Only
E13-275		1,5 mm² 24-pair ind scr, o/all scr	No	1		Rate Only
E13-276		CAT6E Network Cable	m	42		
E13-277		2.5mm² x 3 core	No	50		
E13-278		16mm² x 1 core Insulated Earth wire	No	50		
		TSE Pump station				
E13-279		1,5 mm² 1-pair scr	m	1		Rate Only
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		Brought forward / ...				
E13-280		1,5 mm ² 2-pair o/all scr	m	58		
E13-281		1,5 mm ² 2-pair ind scr, o/all scr	m	1		Rate Only
E13-282		1,5 mm ² 4-pair o/all scr	m	1		Rate Only
E13-283		1,5 mm ² 4-pair ind scr, o/all scr	m	1		Rate Only
E13-284		1,5 mm ² 8-pair o/all scr	m	8		
E13-285		1,5 mm ² 8-pair ind scr, o/all scr	m	1		Rate Only
E13-286		1,5 mm ² 12-pair o/all scr	m	1		Rate Only
E13-287		1,5 mm ² 12-pair ind scr, o/all scr	m	1		Rate Only
E13-288		1,5 mm ² 24-pair o/all scr	m	1		Rate Only
E13-289		1,5 mm ² 24-pair ind scr, o/all scr	m	1		Rate Only
E13-290		CAT6E Network Cable	m	1		
E13-291		2.5mm ² x 3 core	m	20		
E13-292		16mm ² x 1 core Insulated Earth wire	m	20		
		Allow for all costs and expenses in connection with the site installation of the following:				
		Inlet Works				
E13-293		1,5 mm ² 1-pair scr	m	1		Rate Only
E13-294		1,5 mm ² 2-pair o/all scr	m	2 500		
E13-295		1,5 mm ² 2-pair ind scr, o/all scr	m	1		Rate Only
E13-296		1,5 mm ² 4-pair o/all scr	m	1		Rate Only
E13-297		1,5 mm ² 4-pair ind scr, o/all scr	m	1		Rate Only
E13-298		1,5 mm ² 8-pair o/all scr	m	15 500		
E13-299		1,5 mm ² 8-pair ind scr, o/all scr	m	1		Rate Only
E13-300		1,5 mm ² 12-pair o/all scr	m	1 000		
E13-301		1,5 mm ² 12-pair ind scr, o/all scr	m	1		Rate Only
E13-302		1,5 mm ² 24-pair o/all scr	m	1		Rate Only
E13-303		1,5 mm ² 24-pair ind scr, o/all scr	m	1		Rate Only
E13-304		CAT6E Network Cable	m	150		
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		Brought forward / ...				
E13-305		2.5mm ² x 3 core	m	3 220		
E13-306		16mm ² x 1 core Insulated Earth wire	m	3 220		
		Bioreactor				
E13-307		1,5 mm ² 1-pair scr	m	1		Rate Only
E13-308		1,5 mm ² 2-pair o/all scr	m	13 000		
E13-309		1,5 mm ² 2-pair ind scr, o/all scr	m	1 560		
E13-310		1,5 mm ² 4-pair o/all scr	m	1		Rate Only
E13-311		1,5 mm ² 4-pair ind scr, o/all scr	m	1		Rate Only
E13-312		1,5 mm ² 8-pair o/all scr	m	13 500		
E13-313		1,5 mm ² 8-pair ind scr, o/all scr	m	1		Rate Only
E13-314		1,5 mm ² 12-pair o/all scr	m	1		Rate Only
E13-315		1,5 mm ² 12-pair ind scr, o/all scr	m	1		Rate Only
E13-316		1,5 mm ² 24-pair o/all scr	m	1		Rate Only
E13-317		1,5 mm ² 24-pair ind scr, o/all scr	m	1		Rate Only
E13-318		CAT6E Network Cable	m	40		
E13-319		2.5mm ² x 3 core	m	5 710		
E13-320		16mm ² x 1 core Insulated Earth wire	m	5 710		
		Primary Settling				
E13-321		1,5 mm ² 1-pair scr	m	1		Rate Only
E13-322		1,5 mm ² 2-pair o/all scr	m	2 700		
E13-323		1,5 mm ² 2-pair ind scr, o/all scr	m	1		Rate Only
E13-324		1,5 mm ² 4-pair o/all scr	m	1		Rate Only
E13-325		1,5 mm ² 4-pair ind scr, o/all scr	m	1		Rate Only
E13-326		1,5 mm ² 8-pair o/all scr	m	2 000		
E13-327		1,5 mm ² 8-pair ind scr, o/all scr	m	1		Rate Only
E13-328		1,5 mm ² 12-pair o/all scr	m	1		Rate Only
E13-329		1,5 mm ² 12-pair ind scr, o/all scr	m	1		Rate Only
E13-330		1,5 mm ² 24-pair o/all scr	m	1		Rate Only
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		Brought forward / ...				
E13-331		1,5 mm ² 24-pair ind scr, o/all scr	m	1		Rate Only
E13-332		CAT6E Network Cable	m	1		Rate Only
E13-333		2.5mm ² x 3 core	m	1 400		
E13-334		16mm ² x 1 core Insulated Earth wire	m	1 400		
		Secondary Settling				
E13-335		1,5 mm ² 1-pair scr	m	1		Rate Only
E13-336		1,5 mm ² 2-pair o/all scr	m	9 500		
E13-337		1,5 mm ² 2-pair ind scr, o/all scr	m	1		Rate Only
E13-338		1,5 mm ² 4-pair o/all scr	m	1		Rate Only
E13-339		1,5 mm ² 4-pair ind scr, o/all scr	m	1		Rate Only
E13-340		1,5 mm ² 8-pair o/all scr	m	6 000		
E13-341		1,5 mm ² 8-pair ind scr, o/all scr	m	1		Rate Only
E13-342		1,5 mm ² 12-pair o/all scr	m	1		Rate Only
E13-343		1,5 mm ² 12-pair ind scr, o/all scr	m	1		Rate Only
E13-344		1,5 mm ² 24-pair o/all scr	m	1		Rate Only
E13-345		1,5 mm ² 24-pair ind scr, o/all scr	m	1		Rate Only
E13-346		CAT6E Network Cable	m	1		Rate Only
E13-347		2.5mm ² x 3 core	m	11 000		
E13-348		16mm ² x 1 core Insulated Earth wire	m	11 000		
		Blowers				
E13-349		1,5 mm ² 1-pair scr	m	1		Rate Only
E13-350		1,5 mm ² 2-pair o/all scr	m	1		Rate Only
E13-351		1,5 mm ² 2-pair ind scr, o/all scr	m	1		Rate Only
E13-352		1,5 mm ² 4-pair o/all scr	m	1		Rate Only
E13-353		1,5 mm ² 4-pair ind scr, o/all scr	m	1		Rate Only
E13-354		1,5 mm ² 8-pair o/all scr	m	1		Rate Only
E13-355		1,5 mm ² 8-pair ind scr, o/all scr	m	1		Rate Only
E13-356		1,5 mm ² 12-pair o/all scr	m	1		Rate Only
		Carried forward / ...				

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		Brought forward / ...				
E13-357		1,5 mm ² 12-pair ind scr, o/all scr	m	1		Rate Only
E13-358		1,5 mm ² 24-pair o/all scr	m	1		Rate Only
E13-359		1,5 mm ² 24-pair ind scr, o/all scr	m	1		Rate Only
E13-360		CAT6E Network Cable	m	400		
E13-361		2.5mm ² x 3 core	m	400		
E13-362		16mm ² x 1 core Insulated Earth wire	m	400		
		Dewatering				
E13-363		1,5 mm ² 1-pair scr	m	1		Rate Only
E13-364		1,5 mm ² 2-pair o/all scr	m	16 700		
E13-365		1,5 mm ² 2-pair ind scr, o/all scr	m	450		
E13-366		1,5 mm ² 4-pair o/all scr	m	1		Rate Only
E13-367		1,5 mm ² 4-pair ind scr, o/all scr	m	1		Rate Only
E13-368		1,5 mm ² 8-pair o/all scr	m	16 100		
E13-369		1,5 mm ² 8-pair ind scr, o/all scr	m	1		Rate Only
E13-370		1,5 mm ² 12-pair o/all scr	m	1		Rate Only
E13-371		1,5 mm ² 12-pair ind scr, o/all scr	m	1		Rate Only
E13-372		1,5 mm ² 24-pair o/all scr	m	1		Rate Only
E13-373		1,5 mm ² 24-pair ind scr, o/all scr	m	1		Rate Only
E13-374		CAT6E Network Cable	m	600		
E13-375		2.5mm ² x 3 core	m	14 000		
E13-376		16mm ² x 1 core Insulated Earth wire	m	14 000		
		Primary Sludge				
E13-377		1,5 mm ² 1-pair scr	m	1		Rate Only
E13-378		1,5 mm ² 2-pair o/all scr	m	5 000		
E13-379		1,5 mm ² 2-pair ind scr, o/all scr	m	40		
E13-380		1,5 mm ² 4-pair o/all scr	m	1		Rate Only
E13-381		1,5 mm ² 4-pair ind scr, o/all scr	m	1		Rate Only
E13-382		1,5 mm ² 8-pair o/all scr	m	5 500		
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		Brought forward / ...				
E13-383		1,5 mm ² 8-pair ind scr, o/all scr	m	1		Rate Only
E13-384		1,5 mm ² 12-pair o/all scr	m	1		Rate Only
E13-385		1,5 mm ² 12-pair ind scr, o/all scr	m	1		Rate Only
E13-386		1,5 mm ² 24-pair o/all scr	m	1		Rate Only
E13-387		1,5 mm ² 24-pair ind scr, o/all scr	m	1		Rate Only
E13-388		CAT6E Network Cable	m	150		
E13-389		2.5mm ² x 3 core	m	2 400		
E13-390		16mm ² x 1 core Insulated Earth wire	m	2 400		
		Waste Activated Sludge				
E13-391		1,5 mm ² 1-pair scr	m	1		Rate Only
E13-392		1,5 mm ² 2-pair o/all scr	m	15 000		
E13-393		1,5 mm ² 2-pair ind scr, o/all scr	m	300		
E13-394		1,5 mm ² 4-pair o/all scr	m	1		Rate Only
E13-395		1,5 mm ² 4-pair ind scr, o/all scr	m	1		Rate Only
E13-396		1,5 mm ² 8-pair o/all scr	m	15 000		
E13-397		1,5 mm ² 8-pair ind scr, o/all scr	m	1		Rate Only
E13-398		1,5 mm ² 12-pair o/all scr	m	1		Rate Only
E13-399		1,5 mm ² 12-pair ind scr, o/all scr	m	1		Rate Only
E13-400		1,5 mm ² 24-pair o/all scr	m	1		Rate Only
E13-401		1,5 mm ² 24-pair ind scr, o/all scr	m	1		Rate Only
E13-402		CAT6E Network Cable	m	450		
E13-403		2.5mm ² x 3 core	m	8 500		
E13-404		16mm ² x 1 core Insulated Earth wire	m	8 500		
		Ultra Violet Filtration				
E13-405		1,5 mm ² 1-pair scr	m	1		Rate Only
E13-406		1,5 mm ² 2-pair o/all scr	m	700		
E13-407		1,5 mm ² 2-pair ind scr, o/all scr	m	1		Rate Only
E13-408		1,5 mm ² 4-pair o/all scr	m	1		Rate Only
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		Brought forward / ...				
E13-409		1,5 mm ² 4-pair ind scr, o/all scr	m	1		Rate Only
E13-410		1,5 mm ² 8-pair o/all scr	m	7 500		
E13-411		1,5 mm ² 8-pair ind scr, o/all scr	m	1		Rate Only
E13-412		1,5 mm ² 12-pair o/all scr	m	1		Rate Only
E13-413		1,5 mm ² 12-pair ind scr, o/all scr	m	1		Rate Only
E13-414		1,5 mm ² 24-pair o/all scr	m	1		Rate Only
E13-415		1,5 mm ² 24-pair ind scr, o/all scr	m	1		Rate Only
E13-416		CAT6E Network Cable	m	700		
E13-417		2.5mm ² x 3 core	m	3 500		
E13-418		16mm ² x 1 core Insulated Earth wire	m	3 500		
		Service Water				
E13-419		1,5 mm ² 1-pair scr	m	1		Rate Only
E13-420		1,5 mm ² 2-pair o/all scr	m	3 500		
E13-421		1,5 mm ² 2-pair ind scr, o/all scr	m	200		
E13-422		1,5 mm ² 4-pair o/all scr	m	1		Rate Only
E13-423		1,5 mm ² 4-pair ind scr, o/all scr	m	1		Rate Only
E13-424		1,5 mm ² 8-pair o/all scr	m	800		
E13-425		1,5 mm ² 8-pair ind scr, o/all scr	m	1		Rate Only
E13-426		1,5 mm ² 12-pair o/all scr	m	1		Rate Only
E13-427		1,5 mm ² 12-pair ind scr, o/all scr	m	1		Rate Only
E13-428		1,5 mm ² 24-pair o/all scr	m	1		Rate Only
E13-429		1,5 mm ² 24-pair ind scr, o/all scr	m	1		Rate Only
E13-430		CAT6E Network Cable	m	500		
E13-431		2.5mm ² x 3 core	m	5 500		
E13-432		16mm ² x 1 core Insulated Earth wire	m	5 500		
		TSE Pump station				
E13-433		1,5 mm ² 1-pair scr	m	1		Rate Only
E13-434		1,5 mm ² 2-pair o/all scr	m	1 160		
		Carried forward / ...				

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		Brought forward / ...				
E13-435		1,5 mm ² 2-pair ind scr, o/all scr	m	723		
E13-436		1,5 mm ² 4-pair o/all scr	m	1		Rate Only
E13-437		1,5 mm ² 4-pair ind scr, o/all scr	m	1		Rate Only
E13-438		1,5 mm ² 8-pair o/all scr	m	350		
E13-439		1,5 mm ² 8-pair ind scr, o/all scr	m	1		Rate Only
E13-440		1,5 mm ² 12-pair o/all scr	m	1		Rate Only
E13-441		1,5 mm ² 12-pair ind scr, o/all scr	m	1		Rate Only
E13-442		1,5 mm ² 24-pair o/all scr	m	1		Rate Only
E13-443		1,5 mm ² 24-pair ind scr, o/all scr	m	1		Rate Only
E13-444		CAT6E Network Cable	m	20		
E13-445		2.5mm ² x 3 core	m	470		
E13-446		16mm ² x 1 core Insulated Earth wire	m	470		
		EXCAVATIONS				
		Excavate and set excavated material aside for re-use as filling for cable or sleeve trench not exceeding 1m deep				
E13-447		In earth	m ³	500		
E13-448		In soft rock	m ³	20		
E13-449		In rock	m ³	1		Rate Only
E13-450		Selected and approved material for backfilling, bedding and cover	m ³	700		
E13-451		Surplus excavated material spread and levelled on site as directed	m ³	500		
E13-452		Danger tape - 400mm wide overlapping	m	4 220		
E13-453		Cable marker, with engraved aluminium plate	No	250		
TOTAL OF BILL E13 CARRIED TO SUMMARY					R	

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
	Vol 3B Section B2 14	BILL E14 MEASURING INSTRUMENTS Allow for all the costs and expenses in connection with the manufacture, painting, testing, supplying, delivery, offloading and storage of the following materials and equipment: Inlet Works				
E14-1		Ultrasonic Level Transmitter (Weir and Flume Flow), sensor, and sensor cable complete.	No	16		
E14-2		Electro magnetic flow transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-3		Averaging pitot flow instruments	No	1		Rate Only
E14-4		Flow switches	No	6		
E14-5		Pressure transmitter, sensor, and sensor cable complete.	No	6		
E14-6		Pressure switches	No	1		Rate Only
E14-7		Differential pressure flow instruments	No	1		Rate Only
E14-8		Differential pressure switches	No	1		Rate Only
E14-9		Ultrasonic level transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-10		Hydro Static Level transmitter, sensor, and sensor cable complete.	No	6		
E14-11		Sludge Blanket transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-12		Proximity switches	No	18		
E14-13		Dissolved oxygen measurement transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-14		Temperature instruments transducer	No	80		
E14-15		Vibration transmitter, sensor, and sensor cable complete.	No	1		Rate Only
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
E14-16		Brought forward / ... Solenoid Valve Set of bottom bearings and stub shaft/Return mechanism suitable for the screen supplied. All wearing parts to be supplied	No	1		Rate Only
E14-17		Actuated Valve	No	1		Rate Only
E14-18		Analyser transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-19		Pneumatic Valve	No	1		Rate Only
E14-20		Weight transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-21		Rupture Disk Sensor	No	1		Rate Only
E14-22		Level Switch Bioreactor	No	1		
E14-23		Ultrasonic Level Transmitter (Weir and Flume Flow), sensor, and sensor cable complete.	No	3		
E14-24		Electro magnetic flow transmitter, sensor, and sensor cable complete.	No	1		
E14-25		Averaging pitot flow instruments	No	1		Rate Only
E14-26		Flow switches	No	1		Rate Only
E14-27		Pressure transmitter, sensor, and sensor cable complete.	No	1		
E14-28		Pressure switches	No	1		Rate Only
E14-29		Differential pressure flow instruments	No	1		Rate Only
E14-30		Differential pressure switches	No	1		Rate Only
E14-31		Ultrasonic level transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-32		Hydro Static Level transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-33		Sludge Blanket transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-34		Proximity switches	No	38		
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		Brought forward / ...				
E14-35		Dissolved oxygen measurement transmitter, sensor, and sensor cable complete.	No	24		
E14-36		Temperature instruments transducer	No	165		
E14-37		Vibration transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-38		Solenoid Valve	No	1		Rate Only
E14-39		Actuated Valve	No	1		Rate Only
E14-40		Analyser transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-41		Pneumatic Valve	No	1		Rate Only
E14-42		Weight transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-43		Rupture Disk Sensor	No	1		Rate Only
E14-44		Level Switch	No	1		Rate Only
		Primary settling				
E14-45		Ultrasonic Level Transmitter (Weir and Flume Flow), sensor, and sensor cable complete.	No	1		Rate Only
E14-46		Electro magnetic flow transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-47		Averaging pitot flow instruments	No	1		Rate Only
E14-48		Flow switches	No	1		Rate Only
E14-49		Pressure transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-50		Pressure switches	No	1		Rate Only
E14-51		Differential pressure flow instruments	No	1		Rate Only
E14-52		Differential pressure switches	No	1		Rate Only
E14-53		Ultrasonic level transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-54		Hydro Static Level transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-55		Sludge Blanket transmitter, sensor, and sensor cable complete.	No	4		
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		Brought forward / ...				
E14-56		Proximity switches	No	12		
E14-57		Dissolved oxygen measurement transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-58		Temperature instruments transducer	No	1		Rate Only
E14-59		Vibration transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-60		Solenoid Valve	No	1		Rate Only
E14-61		Actuated Valve	No	1		Rate Only
E14-62		Analyser transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-63		Pneumatic Valve	No	1		Rate Only
E14-64		Weight transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-65		Rupture Disk Sensor	No	1		Rate Only
E14-66		Level Switch	No	1		Rate Only
		Secondary Settling				
E14-67		Ultrasonic Level Transmitter (Weir and Flume Flow), sensor, and sensor cable complete.	No	1		Rate Only
E14-68		Electro magnetic flow transmitter, sensor, and sensor cable complete.	No	2		
E14-69		Averaging pitot flow instruments	No	1		Rate Only
E14-70		Flow switches	No	4		
E14-71		Pressure transmitter, sensor, and sensor cable complete.	No	2		
E14-72		Pressure switches	No	2		
E14-73		Differential pressure flow instruments	No	1		Rate Only
E14-74		Differential pressure switches	No	1		Rate Only
E14-75		Ultrasonic level transmitter, sensor, and sensor cable complete.	No	2		
E14-76		Hydro Static Level transmitter, sensor, and sensor cable complete.	No	1		Rate Only
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		Brought forward / ...				
E14-77		Sludge Blanket transmitter, sensor, and sensor cable complete.	No	18		
E14-78		Proximity switches	No	86		
E14-79		Dissolved oxygen measurement transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-80		Temperature instruments transducer	No	2		
E14-81		Vibration transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-82		Solenoid Valve	No	1		Rate Only
E14-83		Actuated Valve	No	1		Rate Only
E14-84		Analyser transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-85		Pneumatic Valve	No	1		Rate Only
E14-86		Weight transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-87		Rupture Disk Sensor	No	1		Rate Only
E14-88		Level Switch	No	1		
		Blower				
E14-89		Ultrasonic Level Transmitter (Weir and Flume Flow), sensor, and sensor cable complete.	No	1		Rate Only
E14-90		Electro magnetic flow transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-91		Averaging pitot flow instruments	No	1		Rate Only
E14-92		Flow switches	No	1		Rate Only
E14-93		Pressure transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-94		Pressure switches	No	1		Rate Only
E14-95		Differential pressure flow instruments	No	1		Rate Only
E14-96		Differential pressure switches	No	1		Rate Only
E14-97		Ultrasonic level transmitter, sensor, and sensor cable complete.	No	1		Rate Only
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		Brought forward / ...				
E14-98		Hydro Static Level transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-99		Sludge Blanket transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-100		Proximity switches	No	1		Rate Only
E14-101		Dissolved oxygen measurement transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-102		Temperature instruments transducer	No	1		Rate Only
E14-103		Vibration transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-104		Solenoid Valve	No	1		Rate Only
E14-105		Actuated Valve	No	1		Rate Only
E14-106		Analyser transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-107		Pneumatic Valve	No	1		Rate Only
E14-108		Weight transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-109		Rupture Disk Sensor	No	1		Rate Only
E14-110		Level Switch	No	1		Rate Only
		Dewatering				
E14-111		Ultrasonic Level Transmitter (Weir and Flume Flow), sensor, and sensor cable complete.	No	25		
E14-112		Electro magnetic flow transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-113		Averaging pitot flow instruments	No	1		Rate Only
E14-114		Flow switches	No	44		
E14-115		Pressure transmitter, sensor, and sensor cable complete.	No	28		
E14-116		Pressure switches	No	43		
E14-117		Differential pressure flow instruments	No	1		Rate Only
E14-118		Differential pressure switches	No	1		Rate Only
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		Brought forward / ...				
E14-119		Ultrasonic level transmitter, sensor, and sensor cable complete.	No	15		
E14-120		Hydro Static Level transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-121		Sludge Blanket transmitter, sensor, and sensor cable complete.	No	2		
E14-122		Proximity switches	No	38		
E14-123		Dissolved oxygen measurement transmitter, sensor, and sensor cable complete.	No	8		
E14-124		Temperature instruments transducer	No	214		
E14-125		Vibration transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-126		Solenoid Valve	No	1		Rate Only
E14-127		Actuated Valve	No	1		Rate Only
E14-128		Analyser transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-129		Pneumatic Valve	No	1		Rate Only
E14-130		Weight transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-131		Rupture Disk Sensor	No	1		Rate Only
E14-132		Level Switch	No	1		Rate Only
		Primary Sludge				
E14-133		Ultrasonic Level Transmitter (Weir and Flume Flow), sensor, and sensor cable complete.	No	1		Rate Only
E14-134		Electro magnetic flow transmitter, sensor, and sensor cable complete.	No	6		
E14-135		Averaging pitot flow instruments	No	1		Rate Only
E14-136		Flow switches	No	6		
E14-137		Pressure transmitter, sensor, and sensor cable complete.	No	9		
E14-138		Pressure switches	No	6		
E14-139		Differential pressure flow instruments	No	1		Rate Only
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		Brought forward / ...				
E14-140		Differential pressure switches	No	1		Rate Only
E14-141		Ultrasonic level transmitter, sensor, and sensor cable complete.	No	12		
E14-142		Hydro Static Level transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-143		Sludge Blanket transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-144		Proximity switches	No	90		
E14-145		Dissolved oxygen measurement transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-146		Temperature instruments transducer	No	6		
E14-147		Vibration transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-148		Solenoid Valve	No	1		Rate Only
E14-149		Actuated Valve	No	1		Rate Only
E14-150		Analyser transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-151		Pneumatic Valve	No	1		Rate Only
E14-152		Weight transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-153		Rupture Disk Sensor	No	1		Rate Only
E14-154		Level Switch	No	1		Rate Only
		Waste Activated Sludge				
E14-155		Ultrasonic Level Transmitter (Weir and Flume Flow), sensor, and sensor cable complete.	No	14		
E14-156		Electro magnetic flow transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-157		Averaging pitot flow instruments	No	1		Rate Only
E14-158		Flow switches	No	14		
E14-159		Pressure transmitter, sensor, and sensor cable complete.	No	7		
E14-160		Pressure switches	No	14		
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		Brought forward / ...				
E14-161		Differential pressure flow instruments	No	1		Rate Only
E14-162		Differential pressure switches	No	1		Rate Only
E14-163		Ultrasonic level transmitter, sensor, and sensor cable complete.	No	28		
E14-164		Hydro Static Level transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-165		Sludge Blanket transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-166		Proximity switches	No	140		
E14-167		Dissolved oxygen measurement transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-168		Temperature instruments transducer	No	14		
E14-169		Vibration transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-170		Solenoid Valve	No	1		Rate Only
E14-171		Actuated Valve	No	1		Rate Only
E14-172		Analyser transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-173		Pneumatic Valve	No	1		Rate Only
E14-174		Weight transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-175		Rupture Disk Sensor	No	1		Rate Only
E14-176		Level Switch	No	7		
		Ultra Violet Filtration				
E14-177		Ultrasonic Level Transmitter (Weir and Flume Flow), sensor, and sensor cable complete.	No	1		Rate Only
E14-178		Electro magnetic flow transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-179		Averaging pitot flow instruments	No	1		Rate Only
E14-180		Flow switches	No	1		Rate Only
E14-181		Pressure transmitter, sensor, and sensor cable complete.	No	1		Rate Only
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		Brought forward / ...				
E14-182		Pressure switches	No	1		Rate Only
E14-183		Differential pressure flow instruments	No	1		Rate Only
E14-184		Differential pressure switches	No	1		Rate Only
E14-185		Ultrasonic level transmitter, sensor, and sensor cable complete.	No	6		
E14-186		Hydro Static Level transmitter, sensor, and sensor cable complete.	No	2		
E14-187		Sludge Blanket transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-188		Proximity switches	No	36		
E14-189		Dissolved oxygen measurement transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-190		Temperature instruments transducer	No	1		Rate Only
E14-191		Vibration transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-192		Solenoid Valve	No	1		Rate Only
E14-193		Actuated Valve	No	1		Rate Only
E14-194		Analyser transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-195		Pneumatic Valve	No	1		Rate Only
E14-196		Weight transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-197		Rupture Disk Sensor	No	1		Rate Only
E14-198		Level Switch	No	1		Rate Only
		Service Water				
E14-199		Ultrasonic Level Transmitter (Weir and Flume Flow), sensor, and sensor cable complete.	No	5		
E14-200		Electro magnetic flow transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-201		Averaging pitot flow instruments	No	1		Rate Only
E14-202		Flow switches	No	7		
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		Brought forward / ...				
E14-203		Pressure transmitter, sensor, and sensor cable complete.	No	16		
E14-204		Pressure switches	No	3		
E14-205		Differential pressure flow instruments	No	1		Rate Only
E14-206		Differential pressure switches	No	1		Rate Only
E14-207		Ultrasonic level transmitter, sensor, and sensor cable complete.	No	4		
E14-208		Hydro Static Level transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-209		Sludge Blanket transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-210		Proximity switches	No	6		
E14-211		Dissolved oxygen measurement transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-212		Temperature instruments transducer	No	35		
E14-213		Vibration transmitter, sensor, and sensor cable complete.	No	20		
E14-214		Solenoid Valve	No	1		Rate Only
E14-215		Actuated Valve	No	1		Rate Only
E14-216		Analyser transmitter, sensor, and sensor cable complete.	No	1		
E14-217		Pneumatic Valve	No	1		Rate Only
E14-218		Weight transmitter, sensor, and sensor cable complete.	No	15		
E14-219		Rupture Disk Sensor	No	1		Rate Only
		TSE Pump Station				
E14-220		Ultrasonic Level Transmitter (Weir and Flume Flow), sensor, and sensor cable complete.	No	1		Rate Only
E14-221		Electro magnetic flow transmitter, sensor, and sensor cable complete.	No	2		
E14-222		Averaging pitot flow instruments	No	1		Rate Only
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		Brought forward / ...				
E14-223		Flow switches	No	5		
E14-224		Pressure transmitter, sensor, and sensor cable complete.	No	2		
E14-225		Pressure switches	No	1		Rate Only
E14-226		Differential pressure flow instruments	No	1		Rate Only
E14-227		Differential pressure switches	No	1		Rate Only
E14-228		Ultrasonic level transmitter, sensor, and sensor cable complete.	No	12		
E14-229		Hydro Static Level transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-230		Sludge Blanket transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-231		Proximity switches	No	90		
E14-232		Dissolved oxygen measurement transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-233		Temperature instruments transducer	No	70		
E14-234		Vibration transmitter, sensor, and sensor cable complete.	No	28		
E14-235		Solenoid Valve	No	1		Rate Only
E14-236		Actuated Valve	No	1		Rate Only
E14-237		Analyser transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-238		Pneumatic Valve	No	1		Rate Only
E14-239		Weight transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-240		Rupture Disk Sensor	No	1		Rate Only
E14-241		Level Switch	No	1		Rate Only
		Allow for all the costs and expenses in connection with the installation commisioning and testing of the following equipment:				
		Inlet Works				
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		Brought forward / ...				
E14-242		Ultrasonic Level Transmitter (Weir and Flume Flow), sensor, and sensor cable complete.	No	16		
E14-243		Electro magnetic flow transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-244		Averaging pitot flow instruments	No	1		Rate Only
E14-245		Flow switches	No	6		
E14-246		Pressure transmitter, sensor, and sensor cable complete.	No	6		
E14-247		Pressure switches	No	1		Rate Only
E14-248		Differential pressure flow instruments	No	1		Rate Only
E14-249		Differential pressure switches	No	1		Rate Only
E14-250		Ultrasonic level transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-251		Hydro Static Level transmitter, sensor, and sensor cable complete.	No	6		
E14-252		Sludge Blanket transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-253		Proximity switches	No	18		
E14-254		Dissolved oxygen measurement transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-255		Temperature instruments transducer	No	80		
E14-256		Vibration transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-257		Solenoid Valve	No	1		Rate Only
E14-258		Actuated Valve	No	1		Rate Only
E14-259		Analyser transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-260		Pneumatic Valve	No	1		Rate Only
E14-261		Weight transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-262		Rupture Disk Sensor	No	1		Rate Only
E14-263		Level Switch	No	1		
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		Brought forward / ...				
		Bioreactor				
E14-264		Ultrasonic Level Transmitter (Weir and Flume Flow), sensor, and sensor cable complete.	No	3		
E14-265		Electro magnetic flow transmitter, sensor, and sensor cable complete.	No	1		
E14-266		Averaging pitot flow instruments	No	1		Rate Only
E14-267		Flow switches	No	1		Rate Only
E14-268		Pressure transmitter, sensor, and sensor cable complete.	No	1		
E14-269		Pressure switches	No	1		Rate Only
E14-270		Differential pressure flow instruments	No	1		Rate Only
E14-271		Differential pressure switches	No	1		Rate Only
E14-272		Ultrasonic level transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-273		Hydro Static Level transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-274		Sludge Blanket transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-275		Proximity switches	No	54		
E14-276		Dissolved oxygen measurement transmitter, sensor, and sensor cable complete.	No	36		
E14-277		Temperature instruments transducer	No	247		
E14-278		Vibration transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-279		Solenoid Valve	No	1		Rate Only
E14-280		Actuated Valve	No	1		Rate Only
E14-281		Analyser transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-282		Pneumatic Valve	No	1		Rate Only
E14-283		Weight transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-284		Rupture Disk Sensor	No	1		Rate Only
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		Brought forward / ...				
E14-285		Level Switch	No	1		Rate Only
		Primary settling				
E14-286		Ultrasonic Level Transmitter (Weir and Flume Flow), sensor, and sensor cable complete.	No	1		Rate Only
E14-287		Electro magnetic flow transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-288		Averaging pitot flow instruments	No	1		Rate Only
E14-289		Flow switches	No	1		Rate Only
E14-290		Pressure transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-291		Pressure switches	No	1		Rate Only
E14-292		Differential pressure flow instruments	No	1		Rate Only
E14-293		Differential pressure switches	No	1		Rate Only
E14-294		Ultrasonic level transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-295		Hydro Static Level transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-296		Sludge Blanket transmitter, sensor, and sensor cable complete.	No	4		
E14-297		Proximity switches	No	12		
E14-298		Dissolved oxygen measurement transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-299		Temperature instruments transducer	No	1		Rate Only
E14-300		Vibration transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-301		Solenoid Valve	No	1		Rate Only
E14-302		Actuated Valve	No	1		Rate Only
E14-303		Analyser transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-304		Pneumatic Valve	No	1		Rate Only
E14-305		Weight transmitter, sensor, and sensor cable complete.	No	1		Rate Only
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		Brought forward / ...				
E14-306		Rupture Disk Sensor	No	1		Rate Only
E14-307		Level Switch	No	1		Rate Only
		Secondary Settling				
E14-308		Ultrasonic Level Transmitter (Weir and Flume Flow), sensor, and sensor cable complete.	No	1		Rate Only
E14-309		Electro magnetic flow transmitter, sensor, and sensor cable complete.	No	2		
E14-310		Averaging pitot flow instruments	No	1		Rate Only
E14-311		Flow switches	No	4		
E14-312		Pressure transmitter, sensor, and sensor cable complete.	No	2		
E14-313		Pressure switches	No	1		Rate Only
E14-314		Differential pressure flow instruments	No	1		Rate Only
E14-315		Differential pressure switches	No	2		
E14-316		Ultrasonic level transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-317		Hydro Static Level transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-318		Sludge Blanket transmitter, sensor, and sensor cable complete.	No	18		
E14-319		Proximity switches	No	86		
E14-320		Dissolved oxygen measurement transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-321		Temperature instruments transducer	No	2		
E14-322		Vibration transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-323		Solenoid Valve	No	1		Rate Only
E14-324		Actuated Valve	No	1		Rate Only
E14-325		Analyser transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-326		Pneumatic Valve	No	1		Rate Only
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		Brought forward / ...				
E14-327		Weight transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-328		Rupture Disk Sensor	No	1		Rate Only
E14-329		Level Switch	No	1		
		Blower				
E14-330		Ultrasonic Level Transmitter (Weir and Flume Flow), sensor, and sensor cable complete.	No	1		Rate Only
E14-331		Electro magnetic flow transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-332		Averaging pitot flow instruments	No	1		Rate Only
E14-333		Flow switches	No	1		Rate Only
E14-334		Pressure transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-335		Pressure switches	No	1		Rate Only
E14-336		Differential pressure flow instruments	No	1		Rate Only
E14-337		Differential pressure switches	No	1		Rate Only
E14-338		Ultrasonic level transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-339		Hydro Static Level transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-340		Sludge Blanket transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-341		Proximity switches	No	1		Rate Only
E14-342		Dissolved oxygen measurement transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-343		Temperature instruments transducer	No	1		Rate Only
E14-344		Vibration transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-345		Solenoid Valve	No	1		Rate Only
E14-346		Actuated Valve	No	1		Rate Only
E14-347		Analyser transmitter, sensor, and sensor cable complete.	No	1		Rate Only
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		Brought forward / ...				
E14-348		Pneumatic Valve	No	1		Rate Only
E14-349		Weight transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-350		Rupture Disk Sensor	No	1		Rate Only
E14-351		Level Switch	No	1		Rate Only
		Dewatering				
E14-352		Ultrasonic Level Transmitter (Weir and Flume Flow), sensor, and sensor cable complete.	No	25		
E14-353		Electro magnetic flow transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-354		Averaging pitot flow instruments	No	1		Rate Only
E14-355		Flow switches	No	44		
E14-356		Pressure transmitter, sensor, and sensor cable complete.	No	28		
E14-357		Pressure switches	No	43		
E14-358		Differential pressure flow instruments	No	1		Rate Only
E14-359		Differential pressure switches	No	1		Rate Only
E14-360		Ultrasonic level transmitter, sensor, and sensor cable complete.	No	15		
E14-361		Hydro Static Level transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-362		Sludge Blanket transmitter, sensor, and sensor cable complete.	No	2		
E14-363		Proximity switches	No	38		
E14-364		Dissolved oxygen measurement transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-365		Temperature instruments transducer	No	214		
E14-366		Vibration transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-367		Solenoid Valve	No	1		Rate Only
E14-368		Actuated Valve	No	1		Rate Only
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		Brought forward / ...				
E14-369		Analyser transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-370		Pneumatic Valve	No	1		Rate Only
E14-371		Weight transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-372		Rupture Disk Sensor	No	1		Rate Only
E14-373		Level Switch	No	1		Rate Only
		Primary Sludge				
E14-374		Ultrasonic Level Transmitter (Weir and Flume Flow), sensor, and sensor cable complete.	No	1		Rate Only
E14-375		Electro magnetic flow transmitter, sensor, and sensor cable complete.	No	6		
E14-376		Averaging pitot flow instruments	No	1		Rate Only
E14-377		Flow switches	No	6		
E14-378		Pressure transmitter, sensor, and sensor cable complete.	No	9		
E14-379		Pressure switches	No	6		
E14-380		Differential pressure flow instruments	No	1		Rate Only
E14-381		Differential pressure switches	No	1		Rate Only
E14-382		Ultrasonic level transmitter, sensor, and sensor cable complete.	No	12		
E14-383		Hydro Static Level transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-384		Sludge Blanket transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-385		Proximity switches	No	90		
E14-386		Dissolved oxygen measurement transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-387		Temperature instruments transducer	No	6		
E14-388		Vibration transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-389		Solenoid Valve	No	1		Rate Only
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		Brought forward / ...				
E14-390		Actuated Valve	No	1		Rate Only
E14-391		Analyser transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-392		Pneumatic Valve	No	1		Rate Only
E14-393		Weight transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-394		Rupture Disk Sensor	No	1		Rate Only
E14-395		Level Switch	No	1		Rate Only
		Waste Activate Sludge				
E14-396		Ultrasonic Level Transmitter (Weir and Flume Flow), sensor, and sensor cable complete.	No	14		
E14-397		Electro magnetic flow transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-398		Averaging pitot flow instruments	No	1		Rate Only
E14-399		Flow switches	No	14		
E14-400		Pressure transmitter, sensor, and sensor cable complete.	No	7		
E14-401		Pressure switches	No	14		
E14-402		Differential pressure flow instruments	No	1		Rate Only
E14-403		Differential pressure switches	No	1		Rate Only
E14-404		Ultrasonic level transmitter, sensor, and sensor cable complete.	No	28		
E14-405		Hydro Static Level transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-406		Sludge Blanket transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-407		Proximity switches	No	140		
E14-408		Dissolved oxygen measurement transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-409		Temperature instruments transducer	No	14		
E14-410		Vibration transmitter, sensor, and sensor cable complete.	No	1		Rate Only
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		Brought forward / ...				
E14-411		Solenoid Valve	No	1		Rate Only
E14-412		Actuated Valve	No	1		Rate Only
E14-413		Analyser transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-414		Pneumatic Valve	No	1		Rate Only
E14-415		Weight transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-416		Rupture Disk Sensor	No	1		Rate Only
E14-417		Level Switch	No	7		
		Ultra Violet Filtration				
E14-418		Ultrasonic Level Transmitter (Weir and Flume Flow), sensor, and sensor cable complete.	No	1		Rate Only
E14-419		Electro magnetic flow transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-420		Averaging pitot flow instruments	No	1		Rate Only
E14-421		Flow switches	No	1		Rate Only
E14-422		Pressure transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-423		Pressure switches	No	1		Rate Only
E14-424		Differential pressure flow instruments	No	1		Rate Only
E14-425		Differential pressure switches	No	1		Rate Only
E14-426		Ultrasonic level transmitter, sensor, and sensor cable complete.	No	6		
E14-427		Hydro Static Level transmitter, sensor, and sensor cable complete.	No	2		
E14-428		Sludge Blanket transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-429		Proximity switches	No	36		
E14-430		Dissolved oxygen measurement transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-431		Temperature instruments transducer	No	1		Rate Only
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		Brought forward / ...				
E14-432		Vibration transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-433		Solenoid Valve	No	1		Rate Only
E14-434		Actuated Valve	No	1		Rate Only
E14-435		Analyser transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-436		Pneumatic Valve	No	1		Rate Only
E14-437		Weight transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-438		Rupture Disk Sensor	No	1		Rate Only
E14-439		Level Switch	No	1		Rate Only
		Service Water				
E14-440		Ultrasonic Level Transmitter (Weir and Flume Flow), sensor, and sensor cable complete.	No	5		
E14-441		Electro magnetic flow transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-442		Averaging pitot flow instruments	No	1		Rate Only
E14-443		Flow switches	No	7		
E14-444		Pressure transmitter, sensor, and sensor cable complete.	No	16		
E14-445		Pressure switches	No	3		
E14-446		Differential pressure flow instruments	No	1		Rate Only
E14-447		Differential pressure switches	No	1		Rate Only
E14-448		Ultrasonic level transmitter, sensor, and sensor cable complete.	No	4		
E14-449		Hydro Static Level transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-450		Sludge Blanket transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-451		Proximity switches	No	6		
E14-452		Dissolved oxygen measurement transmitter, sensor, and sensor cable complete.	No	1		Rate Only
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		Brought forward / ...				
E14-453		Temperature instruments transducer	No	35		
E14-454		Vibration transmitter, sensor, and sensor cable complete.	No	20		
E14-455		Solenoid Valve	No	1		Rate Only
E14-456		Actuated Valve	No	1		Rate Only
E14-457		Analyser transmitter, sensor, and sensor cable complete.	No	1		
E14-458		Pneumatic Valve	No	1		Rate Only
E14-459		Weight transmitter, sensor, and sensor cable complete.	No	15		
E14-460		Rupture Disk Sensor	No	1		Rate Only
E14-461		Level Switch	No	1		Rate Only
		TSE Pump Station				
E14-462		Ultrasonic Level Transmitter (Weir and Flume Flow), sensor, and sensor cable complete.	No	1		Rate Only
E14-463		Electro magnetic flow transmitter, sensor, and sensor cable complete.	No	2		
E14-464		Averaging pitot flow instruments	No	1		Rate Only
E14-465		Flow switches	No	5		
E14-466		Pressure transmitter, sensor, and sensor cable complete.	No	2		
E14-467		Pressure switches	No	1		Rate Only
E14-468		Differential pressure flow instruments	No	1		Rate Only
E14-469		Differential pressure switches	No	1		Rate Only
E14-470		Ultrasonic level transmitter, sensor, and sensor cable complete.	No	12		
E14-471		Hydro Static Level transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-472		Sludge Blanket transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-473		Proximity switches	No	90		
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
E14-474		Brought forward / ... Dissolved oxygen measurement transmitter, sensor, and sensor cable complete.	No	1		
E14-475		Temperature instruments transducer	No	70		
E14-476		Vibration transmitter, sensor, and sensor cable complete.	No	28		
E14-477		Solenoid Valve	No	1		Rate Only
E14-478		Actuated Valve	No	1		Rate Only
E14-479		Analyser transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-480		Pneumatic Valve	No	1		Rate Only
E14-481		Weight transmitter, sensor, and sensor cable complete.	No	1		Rate Only
E14-482		Rupture Disk Sensor	No	1		Rate Only
E14-483		Level Switch	No	1		Rate Only
E14-484		Switchgear changes as directed by the Engineer brought on by process design changes	Prov Sum	1	175 000	175 000.00
E14-485		Percentage adjustment on above item for Contractor's overheads and profit	%	175 000		
		Provisional Sums				
E14-486		Additional Field instrumentation as directed by the Engineer	Prov Sum	1	200 000	200 000.00
E14-487		Percentage adjustment on above item for Contractor's overheads and profit	%	200 000		
E14-488		Additional Field instrumentation as forthcoming from HAZOP workshops	Prov Sum	1	200 000	200 000.00
E14-489		Percentage adjustment on above item for Contractor's overheads and profit	%	200 000		
TOTAL OF BILL E14 CARRIED TO SUMMARY					R	

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
	Vol 3B Section B2 8	BILL E15 CONTROL & INSTRUMENTATION CABINETS AND JUNCTION BOXES Allow for all the costs and expenses in connection with the manufacture, painting, testing, supplying, delivery, offloading and storage of the following materials and equipment: Inlet Works				
E15-1		Instrumentation Remote Junction Box (Incl. Steel Work and mounting accessories)	No	15		
E15-2		Solenoid Valve Bank Panel (Incl. Steel Work and mounting accessories)	No	2		
		Bioreactor				
E15-3		Instrumentation Remote Junction Box (Incl. Steel Work and mounting accessories)	No	51		
E15-4		Solenoid Valve Bank Panel (Incl. Steel Work and mounting accessories)	No	1		Rate Only
		Primary Settling				
E15-5		Instrumentation Remote Junction Box (Incl. Steel Work and mounting accessories)	No	6		
E15-6		Solenoid Valve Bank Panel (Incl. Steel Work and mounting accessories)	No	1		Rate Only
		Secondary Settling				
E15-7		Instrumentation Remote Junction Box (Incl. Steel Work and mounting accessories)	No	32		
E15-8		Solenoid Valve Bank Panel (Incl. Steel Work and mounting accessories)	No	1		Rate Only
		Blower				
E15-9		Instrumentation Remote Junction Box (Incl. Steel Work and mounting accessories)	No	1		Rate Only
E15-10		Solenoid Valve Bank Panel (Incl. Steel Work and mounting accessories)	No	1		Rate Only
		Dewatering				
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		Brought forward / ...				
E15-11		Instrumentation Remote Junction Box (Incl. Steel Work and mounting accessories)	No	57		
E15-12		Solenoid Valve Bank Panel (Incl. Steel Work and mounting accessories)	No	3		
		Primary Sludge				
E15-13		Instrumentation Remote Junction Box (Incl. Steel Work and mounting accessories)	No	6		
E15-14		Local Control Panel (Incl. Steel Work and mounting accessories)	No	6		
E15-15		Solenoid Valve Bank Panel (Incl. Steel Work and mounting accessories)	No	1		Rate Only
		Waste Activated Sludge				
E15-16		Instrumentation Remote Junction Box (Incl. Steel Work and mounting accessories)	No	14		
E15-17		Local Control Panel (Incl. Steel Work and mounting accessories)	No	14		
E15-18		Solenoid Valve Bank Panel (Incl. Steel Work and mounting accessories)	No	1		Rate Only
		Ultra Violet Filtration				
E15-19		Instrumentation Remote Junction Box (Incl. Steel Work and mounting accessories)	No	9		
E15-20		Solenoid Valve Bank Panel (Incl. Steel Work and mounting accessories)	No	1		
		Service Water				
E15-21		Instrumentation Remote Junction Box (Incl. Steel Work and mounting accessories)	No	15		
E15-22		Solenoid Valve Bank Panel (Incl. Steel Work and mounting accessories)	No	3		
		TSE Pump Station				
E15-23		Instrumentation Remote Junction Box (Incl. Steel Work and mounting accessories)	No	8		
E15-24		Solenoid Valve Bank Panel (Incl. Steel Work and mounting accessories)	No	1		
		Allow for all costs and expenses in connection with the installation of the following:-				
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		Brought forward / ...				
		Inlet Works				
E15-25		Instrumentation Remote Junction Box (Incl. Steel Work and mounting accessories)	No	15		
E15-26		Solenoid Valve Bank Panel (Incl. Steel Work and mounting accessories)	No	2		
		Bioreactor				
E15-27		Instrumentation Remote Junction Box (Incl. Steel Work and mounting accessories)	No	51		
E15-28		Solenoid Valve Bank Panel (Incl. Steel Work and mounting accessories)	No	1		Rate Only
		Primary Settling				
E15-29		Instrumentation Remote Junction Box (Incl. Steel Work and mounting accessories)	No	6		
E15-30		Solenoid Valve Bank Panel (Incl. Steel Work and mounting accessories)	No	1		Rate Only
		Secondary Settling				
E15-31		Instrumentation Remote Junction Box (Incl. Steel Work and mounting accessories)	No	32		
E15-32		Solenoid Valve Bank Panel (Incl. Steel Work and mounting accessories)	No	1		Rate Only
		Blower				
E15-33		Instrumentation Remote Junction Box (Incl. Steel Work and mounting accessories)	No	1		Rate Only
E15-34		Solenoid Valve Bank Panel (Incl. Steel Work and mounting accessories)	No	1		Rate Only
		Dewatering				
E15-35		Instrumentation Remote Junction Box (Incl. Steel Work and mounting accessories)	No	57		
E15-36		Solenoid Valve Bank Panel (Incl. Steel Work and mounting accessories)	No	3		
		Primary Sludge				
E15-37		Instrumentation Remote Junction Box (Incl. Steel Work and mounting accessories)	No	6		
E15-38		Local Control Panel (Incl. Steel Work and mounting accessories)	No	6		
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
E15-39		Brought forward / ... Solenoid Valve Bank Panel (Incl. Steel Work and mounting accessories)	No	1		Rate Only
E15-40		Waste Activated Sludge Instrumentation Remote Junction Box (Incl. Steel Work and mounting accessories)	No	14		
E15-41		Local Control Panel (Incl. Steel Work and mounting accessories)	No	14		
E15-42		Solenoid Valve Bank Panel (Incl. Steel Work and mounting accessories)	No	1		Rate Only
E15-43		Ultra Violet Filtration Instrumentation Remote Junction Box (Incl. Steel Work and mounting accessories)	No	9		
E15-44		Solenoid Valve Bank Panel (Incl. Steel Work and mounting accessories)	No	1		
E15-45		Service Water Instrumentation Remote Junction Box (Incl. Steel Work and mounting accessories)	No	15		
E15-46		Solenoid Valve Bank Panel (Incl. Steel Work and mounting accessories)	No	3		
E15-47		Service Water Instrumentation Remote Junction Box (Incl. Steel Work and mounting accessories)	No	8		
E15-48		Solenoid Valve Bank Panel (Incl. Steel Work and mounting accessories)	No	1		
E15-49		Other:- All other 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)	Item	-		
TOTAL OF BILL E15 CARRIED TO SUMMARY					R	

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
	Vol 3B Section B2	BILL E16				
	16	FIBRE OPTIC COMMUNICATION SYSTEMS				
		Allow for all costs and expenses in connection with the supply, delivery, offloading and storage of the following:				
		Steel Tape Armoured Multi-Mode Fibre Cable				
		Main Site Fibre Ring				
E16-1		6 core MM armoured cable	m	1 000		
E16-2		12 core MM armoured cable	m	6 200		
		Inlet Works				
E16-3		6 core MM armoured cable	m	1		Rate Only
E16-4		12 core MM armoured cable	m	3 300		
		Bioreactor				
E16-5		6 core MM armoured cable	m	1		Rate Only
E16-6		12 core MM armoured cable	m	4 200		
		Primary Settling				
E16-7		6 core MM armoured cable	m	1		Rate Only
E16-8		12 core MM armoured cable	m	1 900		
		Secondary Settling				
E16-9		6 core MM armoured cable	m	1		Rate Only
E16-10		12 core MM armoured cable	m	4 800		
		Blowers				
E16-11		6 core MM armoured cable	m	1		Rate Only
E16-12		12 core MM armoured cable	m	1		Rate Only
		Dewatering				
E16-13		6 core MM armoured cable	m	1		Rate Only
E16-14		12 core MM armoured cable	m	6 100		
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		Brought forward / ...				
		Primary Sludge				
E16-15		6 core MM armoured cable	m	1		Rate Only
E16-16		12 core MM armoured cable	m	2 400		
		Waste Activated Sludge				
E16-17		6 core MM armoured cable	m	1		Rate Only
E16-18		12 core MM armoured cable	m	5 600		
		Ultra Violet Filtration				
E16-19		6 core MM armoured cable	m	1		Rate Only
E16-20		12 core MM armoured cable	m	3 200		
		Service Water				
E16-21		12 core MM armoured cable	m	3 300		
		TSE Pump Station				
E16-22		6 core MM armoured cable	m	1		Rate Only
E16-23		12 core MM armoured cable	m	900		
		Cable terminations for Fibre Cable Splices, complete, including gland shroud, lugs, tag numbers, etc and connection.				
		Main Site Fibre Ring				
E16-24		6 core MM armoured cable	m	24		
E16-25		12 core MM armoured cable	m	176		
		Inlet Works				
E16-26		6 core MM armoured cable	m	1		Rate Only
E16-27		12 core MM armoured cable	m	136		
		Bioreactor				
E16-28		6 core MM armoured cable	m	1		Rate Only
E16-29		12 core MM armoured cable	m	408		
		Primary Settling				
E16-30		6 core MM armoured cable	m	1		Rate Only
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
E16-31		Brought forward / ... 12 core MM armoured cable	m	48		
E16-32		Secondary Settling 6 core MM armoured cable	m	1		Rate Only
E16-33		12 core MM armoured cable	m	248		
E16-34		Blowers 6 core MM armoured cable	m	1		Rate Only
E16-35		12 core MM armoured cable	m	1		
E16-36		Dewatering 6 core MM armoured cable	m	1		Rate Only
E16-37		12 core MM armoured cable	m	480		
E16-38		Primary Sludge 6 core MM armoured cable	m	1		Rate Only
E16-39		12 core MM armoured cable	m	96		
E16-40		Waste Activated Sludge 6 core MM armoured cable	m	1		Rate Only
E16-41		12 core MM armoured cable	m	224		
E16-42		Ultra Violet Filtration 6 core MM armoured cable	m	1		Rate Only
E16-43		12 core MM armoured cable	m	80		
E16-44		Service Water 6 core MM armoured cable	m	1		Rate Only
E16-45		12 core MM armoured cable	m	144		
E16-46		TSE Pump Station 6 core MM armoured cable	m	1		Rate Only
E16-47		12 core MM armoured cable	m	216		
		Allow for all costs and expenses in connection with the site installation of the following:				
		Inlet Works				
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		Brought forward / ...				
E16-48		6 core MM armoured cable	m	1		Rate Only
E16-49		12 core MM armoured cable	m	3 300		
		Bioreactor				
E16-50		6 core MM armoured cable	m	1		Rate Only
E16-51		12 core MM armoured cable	m	4 200		
		Primary Settling				
E16-52		6 core MM armoured cable	m	1		Rate Only
E16-53		12 core MM armoured cable	m	1 900		
		Secondary Settling				
E16-54		6 core MM armoured cable	m	1		Rate Only
E16-55		12 core MM armoured cable	m	4 800		
		Blowers				
E16-56		6 core MM armoured cable	m	1		Rate Only
E16-57		12 core MM armoured cable	m	1		Rate Only
		Dewatering				
E16-58		6 core MM armoured cable	m	1		Rate Only
E16-59		12 core MM armoured cable	m	6 100		
		Primary Sludge				
E16-60		6 core MM armoured cable	m	1		Rate Only
E16-61		12 core MM armoured cable	m	2 400		
		Waste Activated Sludge				
E16-62		6 core MM armoured cable	m	1		Rate Only
E16-63		12 core MM armoured cable	m	5 600		
		Ultra Violet Filtration				
E16-64		6 core MM armoured cable	m	1		Rate Only
E16-65		12 core MM armoured cable	m	3 200		
		Service Water				
E16-66		6 core MM armoured cable	m	1		Rate Only
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
E16-67		Brought forward / ... 12 core MM armoured cable	m	3 300		
		Allow for all the costs and expenses in connection with the execution of the following equipment tests:				
E16-68		Perform OTDR tests on the optical fibre LAN	Sum	1		
E16-69		Perform PMLS tests on the optical fibre LAN	Sum	1		
		Other:-				
E16-70		All other 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)	Item	-		
TOTAL OF BILL E16 CARRIED TO SUMMARY					R	

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
	BILL E17					
	Vol 3B					
	Section B2					
	11	TELEMETRY EQUIPMENT				
		Allow for all costs and expenses in connection with the supply, delivery, offloading and storage of the following:				
E17-1		Macassar Pump Sation communication Panel	No	1		
E17-2		Helderberg Pump Sation communication Panel	No	1		
E17-3		Macassar WWTW communication Panel	No	1		
		Allow for all costs and expenses in connection with the Site installation of the following:-				
E17-4		Macassar Pump Sation communication Panel	No	1		
E17-5		Helderberg Pump Sation communication Panel	No	1		
E17-6		Macassar WWTW communication Panel	No	1		
		Other:-				
E17-7		All other 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)	Item	-		
						
						
						
						
						
TOTAL OF BILL E17 CARRIED TO SUMMARY					R	

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
	BILL E18					
	Vol 3B					
	Section B2					
	10	DATA ARCHITECTURE, SCADA, HISTORIAN AND REPORTING				
		Allow for all the costs and expenses in connection with the manufacture, testing, supplying, delivery, offloading and storage of the following materials and equipment:				
E18-1		SCADA, Historian and Reporting Hardware (inc. Dewatering and Weighbridge Operator Stations)	Sum	1		
E18-2		SCADA, Historian and Reporting Software	Sum	1		
E18-3		SCADA and Historian Software Development (inc. Dewatering and Weighbridge Operator Stations)	Sum	1		
E18-4		Reporting (Datawarehouse, dashboards and visualisation) development	Sum	1		
		Allow for all costs and expenses in connection with the Site installation of the following:-				
E18-5		SCADA and Historian Hardware (inc. Dewatering and Weighbridge Operator Stations)	Sum	1		
		Provisional Sums				
E18-6		Additional SCADA updates or mimics refinement during DNP as directed by the Engineer	Prov Sum	1	175 000	175 000.00
E18-7		Percentage adjustment on above item for Contractor's overheads and profit	%	175 000		
E18-8		Integration with COCT DSS as directed by the Engineer	Prov Sum	1	175 000	175 000.00
E18-9		Percentage adjustment on above item for Contractor's overheads and profit	%	175 000		
E18-10		Predictive Maintenance Software	Prov Sum	1	175 000	175 000.00
E18-11		Percentage adjustment on above item for Contractor's overheads and profit	%	175 000		
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
E18-12		Brought forward / ... Other:- All other 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) 	Item	-		
TOTAL OF BILL E18 CARRIED TO SUMMARY						R

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
	Vol 3B Section B2	BILL E19				
	8	PROGRAMMABLE LOGIC CONTROLLER(PLC)				
		Allow for all the costs and expenses in connection with the manufacture, painting, testing, supplying, delivery, offloading and storage of the following materials and equipment:				
E19-1		PLC Software Licensing	No	1		
E19-2		Network Management Software Licensing	No	1		
E19-3		Condition Software Licensing	No	1		
		Inlet Works				
E19-4		PLC Panel (Excl Steel Work) - Main PLC Panel Type Double Door Hot-Standby - With HMI	No	1		
E19-5		PLC Panel (Excl Steel Work) - Main PLC Panel Type Double Door Hot-Standby - Without HMI	No	1		
E19-6		Conditonal Monitoring Equipment	No	4		
		Bioreactor				
E19-7		PLC Panel (Excl Steel Work) - Main PLC Panel Type Double Door Standard PLC - With HMI	No	1		
E19-8		PLC Panel (Excl Steel Work) - Main PLC Panel Type Double Door No PLC - Without HMI	No	1		
E19-9		Conditonal Monitoring Equipment	No	1		Rate Only
		Primary Settling				
E19-10		PLC Panel (Excl Steel Work) - Main PLC Panel Type Single Door Standard PLC - With HMI	No	1		
E19-11		Conditonal Monitoring Equipment	No	1		Rate Only
		Secondary Settling				
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
E19-12		Brought forward / ... PLC Panel (Excl Steel Work) - Main PLC Panel Type Single Door Standard PLC - With HMI	No	1		
E19-13		Conditonal Monitoring Equipment Blower	No	1		Rate Only
E19-14		PLC Panel (Excl Steel Work) - Main PLC Panel Type Single Door Standard PLC - With HMI	No	1		
E19-15		Conditonal Monitoring Equipment Dewatering	No	1		Rate Only
E19-16		PLC Panel (Excl Steel Work) - Main PLC Panel Type Double Door Standard PLC - With HMI	No	1		
E19-17		PLC Panel (Excl Steel Work) - Main PLC Panel Type Double Door No PLC - Without HMI	No	1		
E19-18		Conditonal Monitoring Equipment Primary Sludge	No	1		Rate Only
E19-19		PLC Panel (Excl Steel Work) - Main PLC Panel Type Single Door Standard PLC - Without HMI	No	3		
E19-20		Conditonal Monitoring Equipment Waste Activated Sludge	No	1		Rate Only
E19-21		PLC Panel (Excl Steel Work) - Main PLC Panel Type Single Door Standard PLC - Without HMI	No	7		
E19-22		Conditonal Monitoring Equipment Ultra Violet Filtration	No	1		Rate Only
E19-23		Condition Monitoring Equipment Service Water	No	1		Rate Only
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
E19-24		Brought forward / ... PLC Panel (Excl Steel Work) - Main PLC Panel Type Single Door Standard PLC - With HMI	No	1		Rate Only
E19-25		Conditonal Monitoring Equipment	No	1		
E19-26		TSE Pump Station PLC Panel (Excl Steel Work) - Main PLC Panel Type Single Door Standard PLC - With HMI	No	1		
E19-27		Conditonal Monitoring Equipment	No	7		
		Allow for all costs and expenses in connection with the installation of the following:-				
		Inlet Works				
E19-28		PLC Panel (Excl Steel Work) - Main PLC Panel Type Double Door Hot-Standby - With HMI	No	1		
E19-29		PLC Panel (Excl Steel Work) - Main PLC Panel Type Double Door Hot-Standby - Without HMI	No	1		
E19-30		Conditonal Monitoring Equipment	No	4		
E19-31		PLC Software Development	Sum	1		
		Bioreactor				
E19-32		PLC Panel (Excl Steel Work) - Main PLC Panel Type Double Door Standard PLC - With HMI	No	1		
E19-33		PLC Panel (Excl Steel Work) - Main PLC Panel Type Double Door No PLC - Without HMI	No	1		
E19-34		Conditonal Monitoring Equipment	No	1		
E19-35		PLC Software Development	Sum	1		
		Primary Settling				
E19-36		PLC Panel (Excl Steel Work) - Main PLC Panel Type Single Door Standard PLC - With HMI	No	1		Rate Only
E19-37		Conditonal Monitoring Equipment	No	1		
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
E19-38		Brought forward / ... PLC Software Development	Sum	1		
E19-39		Secondary Settling PLC Panel (Excl Steel Work) - Main PLC Panel Type Single Door Standard PLC - With HMI	No	1		
E19-40		Conditonal Monitoring Equipment	No	1		Rate Only
E19-41		PLC Software Development	Sum	1		
E19-42		Blower PLC Panel (Excl Steel Work) - Main PLC Panel Type Single Door Standard PLC - With HMI	No	1		
E19-43		Conditonal Monitoring Equipment	No	1		Rate Only
E19-44		PLC Software Development	Sum	1		
E19-45		Dewatering PLC Panel (Excl Steel Work) - Main PLC Panel Type Double Door No PLC - Without HMI	No	1		
E19-46		Conditonal Monitoring Equipment	No	1		Rate Only
E19-47		PLC Software Development	Sum	1		
E19-48		Primary Sludge PLC Panel (Excl Steel Work) - Main PLC Panel Type Single Door Standard PLC - Without HMI	No	3		
E19-49		Conditonal Monitoring Equipment	No	1		Rate Only
E19-50		PLC Software Development	Sum	1		
E19-51		Waste Activated Sludge PLC Panel (Excl Steel Work) - Main PLC Panel Type Single Door Standard PLC - Without HMI	No	7		
E19-52		Conditonal Monitoring Equipment	No	1		Rate Only
E19-53		PLC Software Development	Sum	1		
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		Brought forward / ...				
		Ultra Violet Filtration				
E19-54		PLC Panel (Excl Steel Work) - Main PLC Panel Type Single Door Standard PLC - With HMI	No	1		
E19-55		Conditonal Monitoring Equipment	No	1		Rate Only
E19-56		PLC Software Development	Sum	1		
		Service Water				
E19-57		PLC Panel (Excl Steel Work) - Main PLC Panel Type Single Door Standard PLC - With HMI	No	1		
E19-58		Conditonal Monitoring Equipment	No	1		Rate Only
E19-59		PLC Software Development	Sum	1		
		TSE Pump Station				
E19-60		PLC Panel (Excl Steel Work) - Main PLC Panel Type Single Door Standard PLC - With HMI	No	1		
E19-61		Conditonal Monitoring Equipment	No	1		Rate Only
E19-62		PLC Software Development	Sum	1		
E19-63		Additional programming or software modifications required, as directed by the Engineer, due to process changes	Prov Sum	1	175 000	175 000.00
E19-64		Percentage adjustment on above item for Contractor's overheads and profit	%	175 000		
		Other:-				
E19-65		All other 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)	Item	-		
						
						
						
						
						
						
TOTAL OF BILL E19 CARRIED TO SUMMARY					R	

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
	Vol 3B Section B1 & B2	BILL E20				
		MISCELLANEOUS AND SUNDRIES				
		Boardroom/VR Room Equipment				
E20-1		70" LED screen, with wall mounting	Sum	1		
E20-2		50" touch screen (for reception visitor interaction) with mounting	Sum	1		
E20-3		Refinement of BIM model for post construction purposes	Prov Sum	1	175 000	175 000.00
E20-4		Percentage adjustment on above item for Contractor's overheads and profit	%	175 000		
		Witnessed Factory Acceptance Testing				
E20-5		Primary MV switchgear	Sum	1		
E20-6		Substation Automation	Sum	1		
E20-7		Secondary MV switchgear	Sum	1		
E20-8		Distribution Transformers	Sum	1		
E20-9		Isolation Transformers	Sum	1		
E20-10		MV cables	Sum	1		
E20-11		LV Switchgear, control assemblies and VFCs	Sum	1		
E20-12		Diesel Generators	Sum	1		
E20-13		Instrumentation	Sum	1		
E20-14		PLCs and Control hardware and panels	Sum	1		
E20-15		PLCs and Control system: software and functionality	Sum	1		
E20-16		Instrumentation Junction Box, Valve Bank, Local Control Panel and Communication Panel Control Harware and Steelwork	Sum	1		
E20-17	SCADA, Historian and Reporting	Sum	1			
E20-18	Additional factory testing and factory inspections as directed by the Engineer	Prov Sum	1	100 000	100 000.00	
E20-19	Percentage adjustment on above item for Contractor's overheads and profit	%	100 000			
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
		Brought forward / ...				
		Independent inspector				
		Decommissioning and removal of existing equipment				
E20-20		Decommissioning, making safe and removal of all electrical and electronic equipment to contractor fenced yard on site	Sum	1		
		Daywork (provisional)				
		Allow for the cost of all labour (at full cost of employment), materials and plant, H&S PPE and induction, overheads and profit, superintendence and management				
E20-21		Software engineer / system integrator	hr	800		
E20-22		OEM commissioning engineer	hr	80		
E20-23		Electrical / Electronic design engineer	hr	200		
E20-24		BIM modeller	hr	120		
E20-25		MV cable jointer / ORHVS registered responsible person	hr	200		
E20-26		Electrical foreman	hr	240		
E20-27		Skilled labour (Artisan/Electrician)	hr	240		
		Provisional Sums				
E20-28		Modifications and upgrades to existing electrical infrastructure as directed by the Engineer	Prov Sum	1	175 000	175 000.00
E20-29		Percentage adjustment on above item for Contractor's overheads and profit	%	175 000		
E20-30		Upgrade and provision of ICT network or general IT infrastructure, at the Macassar WWTW as directed by the Engineer	Prov Sum	1	175 000	175 000.00
E20-31		Percentage adjustment on above item for Contractor's overheads and profit	%	175 000		
E20-32		Visualisation models for training and plant familiarisation	Prov Sum	1	175 000	175 000.00
E20-33		Percentage adjustment on above item for Contractor's overheads and profit	%	175 000		
Carried forward / ...						

Item No	Chief Reference	Short Description	Unit	Quantity	Rate	Amount
E20-34		Brought forward / ... Other:- All other 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) 	Item	-		
TOTAL OF BILL E20 CARRIED TO SUMMARY						R

BOQ SUMMARY		
MECHANICAL		
BILL P&Gs	GENERAL REQUIREMENTS AND CONDITIONS	R
BILL M1	ARCHIMEDEAN SCREW PUMPS	R
BILL M2	SCREENS & WASHING SCREW PRESSES	R
BILL M3	GRIT REMOVAL EQUIPMENT	R
BILL M4	SLUICE GATES, HAND STOPS AND WEIRS	R
BILL M5	ODOUR CONTROL & COVERS	R
BILL M6	PRIMARY SETTLING TANKS	R
BILL M7	VERTICAL SHAFT MIXERS	R
BILL M8	FINE BUBBLE DIFFUSED AERATION	R
BILL M9	INTERNAL RECYCLE PUMPS	R
BILL M10	RETURN ACTIVATED SLUDGE PUMPS	R
BILL M11	SECONDARY SETTLING TANKS	R
BILL M12	ULTRAVIOLET DISINFECTION EQUIPMENT	R
BILL M13	CHLORINE BUILDING	R
BILL M14	CHEMICAL DOSING EQUIPMENT	R
BILL M15	COMPRESSED AIR SYSTEMS (INSTRUMENT AIR)	R
BILL M16	SCUM PUMP STATION	R
BILL M17	TSE PUMP STATION	R
BILL M18	SERVICE WATER SUPPLY SYSTEM	R
BILL M19	PRIMARY SLUDGE SCREENING EQUIPMENT	R
BILL M20	MAIN (MULTIPURPOSE) SLUDGE PUMPSTATION	R
BILL M21	GRAVITY THICKENERS	R
BILL M22	HYDROCYCLONES	R
BILL M23	BIOGAS HANDLING EQUIPMENT	R
BILL M24	SLUDGE HEATING EQUIPMENT	R
BILL M25	ANAEROBIC DIGESTER SLUDGE EQUIPMENT	R
BILL M26	SLUDGE HOLDING TANKS EQUIPMENT	R
BILL M27	SLUDGE DEWATERING EQUIPMENT	R
BILL M28	CAKE SILO LIVE BOTTOMS	R
BILL M29	POLYELECTROLYTE PREPARATION EQUIPMENT	R
BILL M30	COMBINED HEAT AND POWER (CHP) PLANT	R
BILL M31	LIFTING EQUIPMENT	R
BILL M32	VENTILATION SYSTEMS	R
BILL M33	SPARES	R
BILL M34	SUNDRIES	R

MECHANICAL (CONTINUED)		
BILL M35	PROCESS CONTROL ASSISTANCE, MAINTENANCE AND TRAINING (FULL TIME)	R
BILL M36	MAINTENANCE INSPECTIONS (PART TIME)	R
ELECTRICAL		
BILL E1	SUPPLY AND LOCAL AUTHORITY LIASON	R
BILL E2	PRIMARY MV SWITCHGEAR	R
BILL E3	SECONDARY MV SWITCHGEAR	R
BILL E4	DISTRIBUTION TRANSFORMERS	R
BILL E5	ISOLATION TRANSFORMERS	R
BILL E6	MV CABLING	R
BILL E7	LV SWITCHGEAR AND CONTROL ASSEMBLIES	R
BILL E8	LV CABLES	R
BILL E9	CABLE SUPPORTS	R
BILL E10	AREA LIGHTING	R
BILL E11	EARTHING	R
BILL E12	DIESEL GENERATORS	R
BILL E13	INSTRUMENTATION AND FIELDBUS CABLES	R
BILL E14	MEASURING INSTRUMENTS	R
BILL E15	CONTROL & INSTRUMENTATION CABINETS AND JUNCTION BOXES	R
BILL E16	FIBRE OPTIC COMMUNICATION SYSTEMS	R
BILL E17	TELEMETRY EQUIPMENT	R
BILL E18	DATA ARCHITECTURE, SCADA, HISTORIAN AND REPORTING	R
BILL E19	PROGRAMMABLE LOGIC CONTROLLER(PLC)	R
BILL E20	MISCELLANEOUS AND SUNDRIES	R
SUMMARY OF MECHANICAL BILL OF QUANTITIES		R
SUMMARY OF ELECTRICAL BILL OF QUANTITIES		R
NET OF WORKS		R

SUMMARY OF BILLS		
BILL	DESCRIPTION	AMOUNT
M1 to M36	SUMMARY OF MECHANICAL BILL OF QUANTITIES	R
E1 to E20	SUMMARY OF ELECTRICAL BILL OF QUANTITIES	R
NET TOTAL OF WORKS		R
ADD CONTINGENCIES: The tenderer shall add 7.5% of the total of Bill of Quantities for Contingencies. The sum provided here for contingencies is under the sole control of the Engineer and may be deducted in whole or in part.		R
SUB-TOTAL		R
PLUS ALLOWANCE FOR ESCALATION		R 300,000,000.00
PLUS ALLOWANCE FOR FOREIGN EXCHANGE ADJUSTMENT		R 105,000,000.00
SUB-TOTAL		R
PLUS ALLOWANCE FOR 15% VAT		R
TENDER SUM INCLUSIVE OF VAT (TENDER AMOUNT CARRIED TO FORM OF OFFER - C1.1)		R

Signature of Tenderer:

Signed on behalf of:

Date:

DECLARATION (In respect of completeness of Tender)

City of Cape Town
Tower Block, Civic Centre
12 Hertzog Boulevard
CAPE TOWN

I/ we, the undersigned, do hereby declare that these are the properly priced Schedules of Quantities forming Part C2.2 of this Contract Document which contains 730 pages numbered ii to iv and 1 to 725 in consecutive order in Volumes 1, 2 and 3 and the number of pages in consecutive order in Volumes 3A and 3B as stated on page iv thereof, upon which my/our tender for **TENDER NO.191Q/2023/24: DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS** has been based. If I/we have submitted a printed version of the Schedules of Quantities, I/we warrant that no amendments have been made to it from the original, other than amendments issued in any Addenda in terms of Clause C.3.2 in Part T1.2 Tender Data.

SIGNED ON BEHALF OF TENDERER:

DATE:

CITY OF CAPE TOWN

DIRECTORATE: WATER AND SANITATION

CONTRACT NO. 191Q/2023/24

DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS

C2.3 Schedule of Rates for Electrical Variations

Not applicable to this tender.

CITY OF CAPE TOWN

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**DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF
THE MACASSAR WASTEWATER TREATMENT WORKS**

T2.2 Returnable Schedules

c) Does the tenderer have a permanent establishment in the Republic of South Africa?	☐ Yes	☐ No
d) Does the tenderer have any source of income in the Republic of South Africa?	☐ Yes	☐ No
e) Is the tenderer liable in the Republic of South Africa for any form of taxation?	☐ Yes	☐ No
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 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 or Database of Restricted Suppliers; 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; and v) confirms that the contents of this questionnaire are within my personal knowledge and are to the best of my belief both true and correct		

Signed _____

Date _____

Name _____

Position _____

Enterprise
Name _____

CITY OF CAPE TOWN

DIRECTORATE: WATER AND SANITATION

CONTRACT NO.191Q/2023/24

DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS

SCHEDULE 2: CERTIFICATE OF INDEPENDENT TENDER DETERMINATION

I, the undersigned, in submitting this tender for Contract No. **191Q/2023/24: DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS**

in response to the invitation for the tender made by the City of Cape Town, do hereby make the following statements that I certify to be true and complete in every respect:

I certify, on behalf of: _____ that:

(Name of Tenderer)

1. I have read and I understand the contents of this Certificate;
2. I understand that this tender will be disqualified if this Certificate is found not to be true and complete in every respect;
3. I am authorized by the tenderer to sign this Certificate, and to submit this tender on behalf of the tenderer;
4. Each person whose signature appears on this tender has been authorized by the tenderer to determine the terms of, and to sign, the tender, on behalf of the tenderer;
5. For the purposes of this Certificate and this tender, I understand that the word "competitor" shall include any individual or organization, other than the tenderer whether or not affiliated with the tenderer, who:
 - (a) has been requested to submit a tender in response to this invitation to tender;
 - (b) could potentially submit a tender in response to this invitation to tender, based on their qualifications, abilities or experience; and
 - (c) provides the same goods and services as the tenderer and/or is in the same line of business as the tenderer;
6. The tenderer has arrived at this tender independently from, and without consultation, communication, agreement or arrangement with any competitor. However, communication between partners in a joint venture or consortium¹ will not be construed as collusive tendering;
7. In particular, without limiting the generality of paragraph 6 above, there has been no consultation, communication, agreement or arrangement with any competitor regarding:
 - (a) prices;
 - (b) geographical area where product or service will be rendered (market allocation);
 - (c) methods, factors or formulas used to calculate prices;
 - (d) the intention or decision to submit or not to submit a tender;

¹ 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.

- (e) the submission of a tender which does not meet the specifications and conditions of the tender;
or
(f) tendering with the intention not to win the tender;
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 invitation to tender relates;
9. The terms of this tender have not been, and will not be, disclosed by the tenderer, directly or indirectly, to any competitor, prior to the date and time of the official tender 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 tenders and contracts, tenders that are suspicious will be reported to the Competition Commission for investigation and possible imposition of administrative penalties in terms of section 59 of the Competition Act No. 89 of 1998 and or may be reported to the National Prosecuting Authority (NPA) for criminal investigation and or may be restricted from conducting business with the public sector for a period not exceeding ten (10) years in terms of the Prevention and Combating of Corrupt Activities Act No. 12 of 2004 or any other applicable legislation.

.....
Signature

.....
Date

.....
Name

.....
Position

CITY OF CAPE TOWN

DIRECTORATE: WATER AND SANITATION

CONTRACT NO. 191Q/2023/24

DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS

SCHEDULE 3: 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

..... authorised signatory of the company,

close corporation or partnership

....., 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.

NAME OF FIRM	ADDRESS	DULY AUTHORISED SIGNATORY
Lead partner		Signature..... Name..... Designation.....
		Signature..... Name..... Designation.....
		Signature..... Name..... Designation.....
		Signature..... Name..... 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.

CITY OF CAPE TOWN

DIRECTORATE: WATER AND SANITATION

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DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS

SCHEDULE 4: DECLARATION OF TENDERER'S PAST SUPPLY CHAIN MANAGEMENT PRACTICES (MBD 8)

Where the entity tendering is a joint venture, each party to the joint venture must sign a declaration in terms of the Municipal Finance Management Act, 56 of 2003, and attach it to this schedule.

- 1 The tender offer of any tenderer may be rejected if that tenderer or any of its directors/members have:**
 - a) abused the municipality's / municipal entity's supply chain management system or committed any improper conduct in relation to such system;
 - b) been convicted for fraud or corruption during the past five years;
 - c) willfully neglected, reneged on or failed to comply with any government, municipal or other public sector contract during the past five years; or
 - d) 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).
- 2 In order to give effect to the above, the following questionnaire must be completed and submitted with the bid.**

Item	Question	Yes	No
2.1	Is the Tenderer or any of its directors listed on the National Treasury's Database of Restricted Suppliers 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 Accounting Officer/Authority of the institution that imposed the restriction after the audi alteram partem rule was applied). The Database of Restricted Suppliers now resides on the National Treasury's website www.treasury.gov.za and can be accessed by clicking on its link at the bottom of the home page.	Yes ☐	No ☐
2.1.1	If so, furnish particulars:		
2.2	Is the Tenderer 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, 12 of 2004? The Register for Tender Defaulters can be accessed on the National Treasury's website (www.treasury.gov.za) by clicking on its link at the bottom of the home page.	Yes ☐	No ☐
2.2.1	If so, furnish particulars:		
2.3	Was the Tenderer 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 ☐
2.3.1	If so, furnish particulars:		
2.4	Does the Tenderer 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 ☐
2.4.1	If so, furnish particulars:		
2.5	Was any contract between the Tenderer 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 ☐
2.5.1	If so, furnish particulars:		

I, _____, the
undersigned,

(full name in block letters)

certify that the information furnished on this declaration form is true and correct, and accept that, in addition to cancellation of a contract, action may be taken against me should this declaration prove to be false.

.....
Signature

.....
Date

.....
Position

.....
Name of Tenderer/Contractor

CITY OF CAPE TOWN

DIRECTORATE: WATER AND SANITATION

CONTRACT NO. 191Q/2023/24

DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS

SCHEDULE 5: DECLARATION OF INTEREST – STATE EMPLOYEES (MBD 4 amended)

1. No bid will be accepted from:
 - 1.1 persons in the service of the state¹, or
 - 1.2 if the person is not a natural person, of which any director, manager or principal shareholder or stakeholder is in the service of the state, or
 - 1.3 from persons, or entities of which any director, manager or principal shareholder or stakeholder, has been in the service of the City of Cape Town during the previous twelve (12) months, or
 - 1.4 from an entity who has employed a former City employee who was at a level of T14 or higher at the time of leaving the City's employ and involved in any of the City's bid committees for the bid submitted, if:
 - 1.4.1 the City employee left the City's employment voluntarily, during the previous twelve (12) months.
 - 1.5 a person who was a City employee or an entity that employs a City employee, if
 - 1.5.1 the City employee left the City's employment whilst under investigation for alleged misconduct, or
 - 1.5.2 was facing disciplinary action or potential disciplinary action by the City, or
 - 1.5.3 was involved in a dispute against the City during the previous thirty six (36) months.
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 tenderer or their authorised representative declare their position in relation to the evaluating/adjudicating authority.
- 3 **In order to give effect to the above, the following questionnaire must be completed and submitted with the bid.**
 - 3.1 Full Name of tenderer or his or her representative:.....
 - 3.2 Identity Number:
 - 3.3 Position occupied in the Company (director, trustee, shareholder²):.....
 - 3.4 Company or Close Corporation Registration Number:
 - 3.5 Tax Reference Number:.....
 - 3.6 VAT Registration Number:
 - 3.7 The names of all directors / trustees / shareholders members, their individual identity numbers and state employee numbers must be indicated in paragraph 4 below.
 - 3.8 Are you presently in the service of the state? **YES / NO**
 - 3.8.1 If yes, furnish particulars.
.....
 - 3.9 Have you been in the service of the state for the past twelve months? **YES / NO**
 - 3.9.1 If yes, furnish particulars
.....
.....

3.10 Do you have any relationship (family, friend, other) with persons in the service of the state and who may be involved with the evaluation and or adjudication of this bid? **YES / NO**

3.10.1 If yes, furnish particulars.

.....
.....

3.11 Are you, aware of any relationship (family, friend, other) between any other supplier and any persons in the service of the state who may be involved with the evaluation and or adjudication of this bid? **YES / NO**

3.11.1 If yes, furnish particulars

.....
.....

3.12 Are any of the company's directors, trustees, managers, principle shareholders or stakeholders in service of the state? **YES / NO**

3.12.1 If yes, furnish particulars.....

3.13 Are any spouse, child or parent of the company's directors, trustees, managers, principle shareholders or stakeholders in service of the state? **YES / NO**

3.13.1 If yes, furnish particulars.

.....
.....

13.4 Do you or any of the directors, trustees, managers, principle shareholders, or stakeholders of this company have any interest in any other related companies or business whether or not they are bidding for this contract? **YES / NO**

3.14.1 If yes, furnish particulars:

.....
.....

3.15 Have you, or any of the directors, trustees, managers, principle shareholders, or stakeholders of this company been in the service of the City of Cape Town in the past twelve months? **YES / NO**

3.15.1 If yes, furnish particulars

3.16 Do you have any employees who was in the service of the City of Cape Town at a level of T14 or higher at the time they left the employ of the City, and who was involved in any of the City's bid committees for this bid? **YES / NO**

3.16.1 If yes, furnish particulars

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

Full Name	Identity Number	State Employee Number

If the above table does not sufficient to provide the details of all directors / trustees / shareholders, please append full details to the tender submission.

The tenderer hereby certifies that the information set out in this schedule and/or attached thereto is true and correct, and 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, restriction of the tenderer or the exercise by the employer of any other remedies available to it

Signature

Date

Name (PRINT)

(For and on behalf of the tenderer, duly authorised)

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.**

CITY OF CAPE TOWN

DIRECTORATE: WATER AND SANITATION

CONTRACT NO. 191Q/2023/24

DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS

SCHEDULE 6: AUTHORISATION FOR THE DEDUCTION OF OUTSTANDING AMOUNTS OWED TO THE CITY OF CAPE TOWN

To: THE CITY MANAGER, CITY OF CAPE TOWN

From: _____
(Name of tenderer)

The tenderer:

- a) hereby acknowledges that according to SCM Regulation 38(1)(d)(i) the City Manager 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 CoCT, or to any other municipality or municipal entity, are in arrears for more than 3 (three) months; and
- b) therefore hereby agrees and authorises the CoCT to deduct the full amount outstanding by the Tenderer or any of its directors/members/partners from any payment due to the tenderer; and
- c) confirms the information as set out in the tables below for the purpose of giving effect to b) above;
- d) The tenderer hereby certifies that the information set out in this schedule and/or attached hereto is true and correct, and acknowledges that failure to properly and truthfully complete this schedule may result in steps being taken against the tenderer, the tender being disqualified, and/or (in the event that the tenderer is successful) the cancellation of the contract and/or steps in terms of abuse of the Supply Chain Management Policy.

Physical Business address of the Tenderer	Municipal Account number(s)

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

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

Signature
Print name:
On behalf of the tenderer (duly authorised)

Date

CITY OF CAPE TOWN

DIRECTORATE: WATER AND SANITATION

CONTRACT NO. 191Q/2023/24

DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS

SCHEDULE 7: DECLARATION IN RESPECT OF COMPLIANCE WITH LABOUR LEGISLATION

Tenderers must be registered with the Metal and Engineering Industries Bargaining Council (MEIBC), as contained in the tender conditions and must append to this schedule a certificate of compliance / letter of good standing in terms of the relevant Government Gazette that indicates compliance / validity at the time of tender award.

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

Declaration in respect of labour legislation

The tenderer, by signing this schedule, declares that it will comply with all labour legislation, as may be applicable.

SIGNED ON BEHALF OF TENDERER:

CITY OF CAPE TOWN

DIRECTORATE: WATER AND SANITATION

CONTRACT NO. 191Q/2023/24

DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS

SCHEDULE 8: CONFIRMATION OF CITY OF CAPE TOWN SUPPLIER DATABASE REGISTRATION

<u>CITY OF CAPE TOWN</u> SUPPLIER DATABASE REGISTRATION		
COMPANY NAME	REGISTERED YES/NO	REGISTRATION NUMBER IF APPLICABLE

SIGNED ON BEHALF OF TENDERER:

CITY OF CAPE TOWN

DIRECTORATE: WATER AND SANITATION

CONTRACT NO. 191Q/2023/24

DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS

SCHEDULE 9: SCHEDULE OF WORK EXPERIENCE OF TENDERER

1. A copy of the Taking Over Certificate, or Performance Certificate must be submitted for each completed project put forward in the table below.
2. The value of work must align with the valued stated on the Taking Over Certificate, or Performance Certificate . The values will be escalated to date of closure of this Tender process by the Employer/Employer's Representative using an escalation factor of 7.5% per annum.
3. In the case of a joint venture, the nature of work and financial contribution must also be listed for the participating firms. The value of work of the participating firms must align with the valued stated on the taking over certificate or performance certificate. The values will be escalated to date of closure of this Tender process by the Employer/Employer's Representative using an escalation factor of 7.5% per annum.
4. The information provided in the table below shall be used for the functionality evaluation. Please refer to Clause C.2.1.4.3 in the Tender Data.
5. If the space provided in the table below is not sufficient, Tenderers should provide the additional information in an appendix of the same format as per the table below, and attach to this schedule.

EMPLOYER (NAME, TEL No. AND FAX No.)	CONSULTING ENGINEER (NAME, TEL No. AND FAX No.)	NATURE OF WORK (WATER/WASTEWATER, NOTABLE PLANT COMPONENTS, INCLUDING AVERAGE CAPACITY OF PLANT Ml/day)	VALUE OF WORK R(m)	START DATE	COMPLETION DATE (ISSUE OF TAKING OVER CERTIFICATE OR PERFORMANCE CERTIFICATE)
COMPLETED CONTRACTS					
		Mechanical Installation (construction) for Wastewater/Water Treatment – Project No. 1			

EMPLOYER (NAME, TEL No. AND FAX No.)	CONSULTING ENGINEER (NAME, TEL No. AND FAX No.)	NATURE OF WORK (WATER/WASTEWATER, NOTABLE PLANT COMPONENTS, INCLUDING AVERAGE CAPACITY OF PLANT Ml/day)	VALUE OF WORK R(m)	START DATE	COMPLETION DATE (ISSUE OF TAKING OVER CERTIFICATE OR PERFORMANCE CERTIFICATE)
COMPLETED CONTRACTS					
		Mechanical Installation (construction) for Wastewater/Water Treatment – Project No. 2			
		Mechanical Installation (construction) for Wastewater/Water Treatment – Project No. 3			
		Mechanical Installation (construction) for Wastewater/Water Treatment – Project No. 4			

EMPLOYER (NAME, TEL No. AND FAX No.)	CONSULTING ENGINEER (NAME, TEL No. AND FAX No.)	NATURE OF WORK (WATER/WASTEWATER, NOTABLE PLANT COMPONENTS, INCLUDING AVERAGE CAPACITY OF PLANT Ml/day)	VALUE OF WORK R(m)	START DATE	COMPLETION DATE (ISSUE OF TAKING OVER CERTIFICATE OR PERFORMANCE CERTIFICATE)
COMPLETED CONTRACTS					
		Mechanical Installation (construction) for Wastewater/Water Treatment – Project No. 5			
		Electrical Installation (construction) for Wastewater/Water Treatment – Project No. 1			
		Electrical Installation (construction) for Wastewater/Water Treatment – Project No. 2			

EMPLOYER (NAME, TEL No. AND FAX No.)	CONSULTING ENGINEER (NAME, TEL No. AND FAX No.)	NATURE OF WORK (WATER/WASTEWATER, NOTABLE PLANT COMPONENTS, INCLUDING AVERAGE CAPACITY OF PLANT Ml/day)	VALUE OF WORK R(m)	START DATE	COMPLETION DATE (ISSUE OF TAKING OVER CERTIFICATE OR PERFORMANCE CERTIFICATE)
COMPLETED CONTRACTS					
		Electrical Installation (construction) for Wastewater/Water Treatment – Project No. 3			
		Electrical Installation (construction) for Wastewater/Water Treatment – Project No. 4			
		Electrical Installation (construction) for Wastewater/Water Treatment – Project No. 5			

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

SIGNED ON BEHALF OF TENDERER:

CITY OF CAPE TOWN

DIRECTORATE: WATER AND SANITATION

CONTRACT NO. 191Q/2023/24

DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS

SCHEDULE 10: SCHEDULE OF EQUIPMENT INSTALLATIONS AND SERVICE HISTORY

The tenderer shall insert in the spaces provided below a list of similar completed contracts and those currently being undertaken where the equipment offered has been supplied. Attach additional pages if more space is required.

MANUFACTURER

EMPLOYER (NAME, TEL No. AND FAX No.)	CONSULTING ENGINEER (NAME, TEL No. AND FAX No.)	NATURE OF PROJECT	VALUE OF WORK R(m)	START DATE	COMPLETION DATE
COMPLETED CONTRACTS					

CURRENT CONTRACTS					

--	--	--	--	--	--

SIGNED ON BEHALF OF TENDERER:

CITY OF CAPE TOWN

DIRECTORATE: WATER AND SANITATION

CONTRACT NO. 191Q/2023/24

DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS

SCHEDULE 11: CONFIRMATION OF CONTRACTOR REGISTRATION / ACCREDITATION

SANS 9001 or ISO 9001

Where a QA system has been approved in terms of SANS 9001, state registration certificate number and standard.

Certificate No:

SANS 14001 or ISO 14001

Where an Environmental Management System has been approved in terms of SANS 14001, state registration certificate number and standard.

Certificate No:

ISO 45001

Where an Occupational Health and Safety (OHS) Management System has been approved in terms of ISO 45001, state registration certificate number and standard.

Certificate No:

Note:

1. The latest accreditation available at the time of tender submission shall be applicable.
2. In the case of a Joint Venture, any one member of the Joint Venture may provide their registration/accreditations, however, if all members of the joint venture have the registrations/accreditations then tenderers must include this.

NRS 040-3:2002

Where a person has been authorised, in writing, to be responsible for ensuring that the work on or near medium and high voltage equipment and installations can be carried out with safety.

	Name of Responsible Person	Certificate Number	Certificate Date	Copy of Certificate (Y/N)
1				
2				

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

SIGNED ON BEHALF OF TENDERER:

CITY OF CAPE TOWN

DIRECTORATE: WATER AND SANITATION

CONTRACT NO. 191Q/2023/24

DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS

SCHEDULE 12: DETAILS OF QUALIFICATIONS AND EXPERIENCE OF STAFF

Tenderers shall set out in the Schedule here under details of the listed staff's experience in work of a similar nature to that for which their Tender is submitted. The successful tenderer shall employ the employees for this specific contract or substitute with employees with similar qualifications and experience. Tenderers must attach the organogram of staff to be employed to this schedule. **Tenderers shall also include the CV's of these key personnel** and indicate on which similar projects they have been involved for the purposes of the functionality evaluation as set out in Clause C.2.1.4.3 of the Tender Data.

CONTRACT MANAGER/DIRECTOR	NAME: QUALIFICATION: NQF LEVEL PROFESSIONAL ACCREDITATION: NO OF YEARS APPLICABLE EXPERIENCE:			
	REQUIREMENTS: Contract Manager/Director appointed by the Contractor (relevant experience refers to experience in the Mechanical and Electrical construction industry). Contract Manager to have a minimum of 15 years' experience ((i.e., post-graduate experience) and a minimum 3-year Diploma in the Built Environment.			
CONTRACT & CLIENT	NATURE OF WORK (Including average capacity of plant in Mℓ/day)	POSITION HELD	VALUE OF WORK	YEAR COMPLETED

CONTRACTOR'S REPRESENTATIVE/ PROJECT MANAGER	NAME: QUALIFICATION: NQF LEVEL PROFESSIONAL ACCREDITATION: NO OF YEARS APPLICABLE EXPERIENCE:			
	REQUIREMENTS: Contractor's Representative appointed by Contractor (relevant experience should include as a minimum, wastewater treatment projects with an average capacity of 20 Ml/d and/or R 100 million or more (per individual project), escalated to date of tender closure by Employer/ Employer's Agent using an escalation factor of 7.5% per annum). Contractor's Representative should include a minimum of two such projects.			
CONTRACT & CLIENT	NATURE OF WORK (Including average capacity of plant in Mℓ/day)	POSITION HELD	VALUE OF WORK	YEAR COMPLETED

MECHANICAL DESIGN ENGINEER	NAME: QUALIFICATION: NQF LEVEL PROFESSIONAL ACCREDITATION: NO OF YEARS APPLICABLE EXPERIENCE:			
	REQUIREMENTS: Mechanical Design Engineer (relevant experience should include as a minimum, wastewater treatment projects with an average capacity of 20 Ml/d and/or R 100 million or more (per individual project), escalated to date of tender closure by Employer/ Employer's Agent using an escalation factor of 7.5% per annum). Mechanical Design Engineer should include a minimum of two such projects.			
CONTRACT & CLIENT	NATURE OF WORK (Including average capacity of plant in Mℓ/day)	POSITION HELD	VALUE OF WORK	YEAR COMPLETED

ELECTRICAL DESIGN ENGINEER	NAME: QUALIFICATION: NQF LEVEL PROFESSIONAL ACCREDITATION: NO OF YEARS APPLICABLE EXPERIENCE:			
	REQUIREMENTS: Electrical Design Engineer (relevant experience should include as a minimum, wastewater and water treatment projects with an average capacity of 20 Ml/d and/or R 80 million or more (per individual project), escalated to date of tender closure by Employer/ Employer's Agent using an escalation factor of 7.5% per annum). Electrical Design Engineer should include a minimum of two such projects.			
CONTRACT & CLIENT	NATURE OF WORK (Including average capacity of plant in Mℓ/day)	POSITION HELD	VALUE OF WORK	YEAR COMPLETED

CONTROL AND INSTRUMENTATION DESIGN ENGINEER	NAME: QUALIFICATION: NQF LEVEL PROFESSIONAL ACCREDITATION: NO OF YEARS APPLICABLE EXPERIENCE:			
	REQUIREMENTS: C&I Design Engineer (relevant experience should include as a minimum, wastewater and water treatment projects with an average capacity of 20 Ml/d and/or R 40 million or more (per individual project), escalated to date of tender closure by Employer/ Employer's Agent using an escalation factor of 7.5% per annum). C&I Design Engineer should include a minimum of two such projects.			
CONTRACT & CLIENT	NATURE OF WORK (Including average capacity of plant in Mℓ/day)	POSITION HELD	VALUE OF WORK	YEAR COMPLETED

HEALTH AND SAFETY OFFICER	NAME:..... QUALIFICATION:NQF LEVEL..... PROFESSIONAL ACCREDITATION: NO OF YEARS APPLICABLE EXPERIENCE:			
	REQUIREMENTS: Health and Safety Officer to have a minimum of 10 years' experience, (relevant experience should include as a minimum, wastewater treatment projects with an average capacity of 20 Ml/d and/or R 200 million or more (per individual project), escalated to date of tender closure by Employer/ Employer's Agent using an escalation factor of 7.5% per annum).			
CONTRACT & CLIENT	NATURE OF WORK (Including average capacity of plant in Mℓ/day)	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:

CITY OF CAPE TOWN

DIRECTORATE: WATER AND SANITATION

CONTRACT NO. 191Q/2023/24

DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS

SCHEDULE 13: SCHEDULE OF CONSTRUCTION EQUIPMENT

The tenderer shall state below what construction equipment will be available for this Contract. The tenderer shall differentiate, if applicable, between construction equipment immediately available and construction equipment which will become available by virtue of outstanding orders, and indicate what further construction equipment will be acquired or hired for the work should he be awarded the Contract.

CONSTRUCTION EQUIPMENT IMMEDIATELY AVAILABLE

DESCRIPTION, SIZE, CAPACITY	NUMBER

CONSTRUCTION EQUIPMENT ON ORDER

(State details of arrangements made, with delivery dates)

DESCRIPTION, SIZE, CAPACITY	NUMBER

CONSTRUCTION EQUIPMENT THAT WILL BE ACQUIRED OR HIRED

(State details of delivery arrangements)

DESCRIPTION, SIZE, CAPACITY	NUMBER

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

SIGNED ON BEHALF OF TENDERER:

CITY OF CAPE TOWN

DIRECTORATE: WATER AND SANITATION

CONTRACT NO. 191Q/2023/24

DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS

SCHEDULE 14: DETAILS OF TENDERER’S WORKSHOP FACILITIES

The tenderer shall state below what technical support centres and repair facilities for the tenderer and/or manufacturer will be available for this Contract and for post contract support.

Technical Support Centre:
.....
.....

Repair facilities:
.....
.....

Address
.....
.....
.....

Number of Artisans Normally
Employed by Firm
.....

Number of Technically Qualified
Persons Employed

Spares held in stock:
.....
.....
.....
.....
.....
.....

SIGNED ON BEHALF OF TENDERER:

CITY OF CAPE TOWN

DIRECTORATE: WATER AND SANITATION

CONTRACT NO. 191Q/2023/24

DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS

SCHEDULE 15: PRELIMINARY PROGRAMME

The tenderer shall attach a preliminary programme, to this schedule.

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 take into account 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:

CITY OF CAPE TOWN

DIRECTORATE: WATER AND SANITATION

CONTRACT NO. 191Q/2023/24

DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS

SCHEDULE 16: PROPOSED WORK PLAN

The tenderer shall append their proposed work plan to this Schedule.

It should be noted that while a programme may form part of the required work plan, more than a programme is expected in response to this requirement. The work plan must indicate the approach and methodology that the tenderer intends following in order to reach the required outcomes. The work plan must show that the tenderer has appreciated the Scope of Work, and has good insight as to what actions or activities are required in order to comply with the Employer's objectives.

SIGNED ON BEHALF OF TENDERER:

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DIRECTORATE: WATER AND SANITATION

CONTRACT NO. 191Q/2023/24

DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS

SCHEDULE 17: SCHEDULE OF ESTIMATED MONTHLY EXPENDITURE

The tenderer shall state his estimated expenditure indicating the value of work done and materials not yet built into the Permanent Works for each month of the Contract period which he estimates will arise based on his preliminary programme and tendered rates, as set out in the table below. The total of the monthly amounts shall be equal to the tender sum.

MONTH	VALUE
CONTRACT PERIOD (48 MONTHS)	
1.	R
2.	R
3.	R
4.	R
5.	R
6.	R
7.	R
8.	R
9.	R
10.	R
11.	R
12.	R
13.	R
14.	R
15.	R
16.	R
17.	R
18.	R
19.	R
20.	R
21.	R
22.	R

23.	R
24.	R
25.	R
26.	R
27.	R
28.	R
29.	R
30.	R
31.	R
32.	R
33.	R
34.	R
35.	R
36.	R
37.	R
38.	R
39.	R
40.	R
41.	R
42.	R
43.	R
44.	R
45.	R
46.	R
47.	R
48.	R
PROCESS CONTROL: ASSISTANCE, MAINTENANCE AND TRAINING PERIOD (18 MONTHS)	
49.	R
50.	R
51.	R
52.	R
53.	R
54.	R
55.	R

56.	R
57.	R
58.	R
59.	R
60.	R
61.	R
62.	R
63.	R
64.	R
65.	R
66.	R
SUBTOTAL	R
CONTINGENCIES (7.5%)	R
ESCALATION ALLOWANCE	R 300,000,000.00
FOREX ALLOWANCE	R 105,000,000.00
SUBTOTAL	R
VAT (15%)	R
TOTAL	R (INCLUDING VAT @ 15%)

SIGNED ON BEHALF OF TENDERER:

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DIRECTORATE: WATER AND SANITATION

CONTRACT NO. 191Q/2023/24

DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS

SCHEDULE 18: SCHEDULE OF SUBCONTRACTORS

We notify you that it is our intention to employ the following sub-contractors for work (excluding work covered by provisional sums and contingencies) in this contract.

Acceptance of this tender shall not be construed as approval of all or any of the listed sub-contractors. Should any of the sub-contractors not be approved subsequent to acceptance of the tender, this shall in no way invalidate the contract, and the tendered unit rates for the various items making up the work activities shall remain final and binding.

Sub-contractor's name / Address / Contact Person / Phone / Details of Organisation / Firm Experience	Work activities to be undertaken by the Sub-contractor	Estimated value of work (Rand)

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

SIGNED ON BEHALF OF TENDERER:

CITY OF CAPE TOWN

DIRECTORATE: WATER AND SANITATION

CONTRACT NO. 191Q/2023/24

DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF
THE MACASSAR WASTEWATER TREATMENT WORKS

SCHEDULE 19: HEALTH AND SAFETY PLAN

Tenderers are referred to the requirements of Clause C.2.18.4 in Part T1.2 Tender Data and shall append the required draft Health and Safety Plan to this Schedule.

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

SIGNED ON BEHALF OF TENDERER:

CITY OF CAPE TOWN

DIRECTORATE: WATER AND SANITATION

CONTRACT NO. 191Q/2023/24

DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE
MACASSAR WASTEWATER TREATMENT WORKS

SCHEDULE 20: PROPOSED DEVIATIONS AND QUALIFICATIONS BY TENDERER

The Tenderer should record any **proposed** deviations or qualifications he may wish to make to the tender documents in this Returnable Schedule. Alternatively, a tenderer may state such proposed deviations and qualifications in a covering letter attached to his tender and reference such letter in this schedule. Any proposed deviations or qualifications contained in a covering letter which is not referenced in this schedule will not be considered.

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 deviations and qualifications.

If no deviations or qualifications are proposed, the schedule hereunder is to be marked NIL and signed by the Tenderer.

PAGE	CLAUSE OR ITEM	PROPOSED DEVIATION OR QUALIFICATION

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

SIGNED ON BEHALF OF TENDERER:

CITY OF CAPE TOWN

DIRECTORATE: WATER AND SANITATION

CONTRACT NO. 191Q/2023/24

DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS

SCHEDULE 21: FUNCTIONALITY CRITERIA

The Tenderer shall provide information for the functionality criteria listed in this Returnable Schedule.

The Tenderer's attention is drawn to clause C.2.1.4.3 in the Tender Data for a more detailed explanation of the functionality criteria given in the table below and how the score will be calculated (with applicable values).

Description of functionality criteria	Weighting	Points attained
Demonstrated experience of the tendering entity with respect to municipal wastewater and water treatment projects;	50	
Qualifications and demonstrated experience of the key staff in relation to the scope of work	40	
Submission and quality of evidence of planning for the project	10	
Maximum possible score for Functionality	100	

The minimum score for functionality is **70**. Tenderers that fail to achieve the minimum score for functionality will be rejected .

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

SIGNED ON BEHALF OF TENDERER:

CITY OF CAPE TOWN

DIRECTORATE: WATER AND SANITATION

CONTRACT NO. 191Q/2023/24

DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF
THE MACASSAR WASTEWATER TREATMENT WORKS

**SCHEDULE 22: DECLARATION CERTIFICATE FOR LOCAL PRODUCTION AND CONTENT FOR
DESIGNATED SECTORS**

Not applicable to this tender.

SCHEDULE 23: PRICE BASIS FOR RESOURCES

[illegible]

* 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 be 7 calendar days before tender closing.

SIGNED ON BEHALF OF TENDERER:

CITY OF CAPE TOWN

DIRECTORATE: WATER AND SANITATION

CONTRACT NO. 191Q/2023/24

DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS

SCHEDULE 24: RECORD OF ADDENDA TO TENDER DOCUMENTS

We confirm that the following communications received from the Employer before the submission of this tender offer, amending the tender documents, have been taken into account in this tender offer:		
	Date	Title or Details
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		

Attach additional pages if more space is required.

SIGNED ON BEHALF OF TENDERER:

CITY OF CAPE TOWN

DIRECTORATE: WATER AND SANITATION

CONTRACT NO. 191Q/2023/24

DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS

SCHEDULE 25: PREFERENCE SCHEDULE

1. GENERAL CONDITIONS

1.1 The following preference point systems are applicable to invitations to tender:

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

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

(delete whichever is not applicable for this tender).

- a) The applicable preference point system for this tender is the **90/10** preference point system.

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

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

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

The maximum points for this tender are allocated as follows:

	POINTS
PRICE	90
SPECIFIC GOALS	10
Total points for Price and SPECIFIC GOALS	100

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

1.6 The organ of state reserves the right to require of a tenderer, either before a tender is adjudicated or at any time subsequently, to substantiate any claim in regard to preferences, in any manner required by the organ of state.

Definitions

The following definitions shall apply to this schedule:

- (a) "tender" means a written offer in the form determined by an organ of state in response to an invitation to provide goods or services through price quotations, competitive tendering process or any other method envisaged in legislation;
- (b) "price" means an amount of money tendered for goods or services, and includes all applicable taxes less all unconditional discounts;
- (c) "rand value" means the total estimated value of a contract in Rand, calculated at the time of bid invitation, and includes all applicable taxes;

- (d) “tender for income-generating contracts” means a written offer in the form determined by an organ of state in response to an invitation for the origination of income-generating contracts through any method envisaged in legislation that will result in a legal agreement between the organ of state and a third party that produces revenue for the organ of state, and includes, but is not limited to, leasing and disposal of assets and concession contracts, excluding direct sales and disposal of assets through public auctions; and
- (e) “the Act” means the Preferential Procurement Policy Framework Act, 2000 (Act No. 5 of 2000).

FORMULAE FOR PROCUREMENT OF GOODS AND SERVICES

3.1. POINTS AWARDED FOR PRICE

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

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

80/20	or	90/10
$P_s = 80 \left(1 - \frac{P_t - P_{min}}{P_{min}} \right)$	or	$P_s = 90 \left(1 - \frac{P_t - P_{min}}{P_{min}} \right)$

Where

Ps = Points scored for price of tender under consideration
 Pt = Price of tender under consideration
 Pmin = Price of lowest acceptable tender

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

3.2.1. POINTS AWARDED FOR PRICE

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

80/20	or	90/10
$P_s = 80 \left(1 + \frac{P_t - P_{max}}{P_{max}} \right)$	or	$P_s = 90 \left(1 + \frac{P_t - P_{max}}{P_{max}} \right)$

Where

Ps = Points scored for price of tender under consideration
 Pt = Price of tender under consideration
 Pmax = Price of highest acceptable tender

4. POINTS AWARDED FOR SPECIFIC GOALS

- 4.1. In terms of Regulation 4(2); 5(2); 6(2) and 7(2) of the Preferential Procurement Regulations, preference points must be awarded for specific goals stated in the tender. For the purposes of this tender the tenderer will be allocated points based on the goals stated in table 1 below as may be supported by proof/ documentation stated in the conditions of this tender:
- 4.2. In cases where organs of state intend to use Regulation 3(2) of the Regulations, which states that, if it is unclear whether the 80/20 or 90/10 preference point system applies, an organ of state must, in the tender documents, stipulate in the case of—
- (a) an invitation for tender for income-generating contracts, that either the 80/20 or 90/10 preference point system will apply and that the highest acceptable tender will be used to determine the applicable preference point system; or

(b) any other invitation for tender, that either the 80/20 or 90/10 preference point system will apply and that the lowest acceptable tender will be used to determine the applicable preference point system, then the organ of state must indicate the points allocated for specific goals for both the 90/10 and 80/20 preference point system.

Table 1: Specific goals for the tender and points claimed are indicated per the table below.

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

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

The specific goals allocated points in terms of this tender	Number of points allocated (90/10 system) (To be completed by the organ of state)	Number of points claimed (90/10 system) (To be completed by the tenderer)
Gender	3	
Race	3	
Disability	1	
Promotion of Micro and Small Enterprises	3	

DECLARATION WITH REGARD TO COMPANY/FIRM

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

4.4. Company registration number:

4.5. TYPE OF COMPANY/ FIRM

- ☐ Partnership/Joint Venture / Consortium
 - ☐ One-person business/sole propriety
 - ☐ Close corporation
 - ☐ Public Company
 - ☐ Personal Liability Company
 - ☐ (Pty) Limited
 - ☐ Non-Profit Company
 - ☐ State Owned Company
- [Tick applicable box]

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

- i) The information furnished is true and correct;
- ii) The preference points claimed are in accordance with the General Conditions as indicated in paragraph 1 of this form;
- iii) In the event of a contract being awarded as a result of points claimed as shown in paragraphs 4.1 and 4.2, the contractor may be required to furnish documentary proof to the satisfaction of the organ of state that the claims are correct;
- iv) If the specific goals have been claimed or obtained on a fraudulent basis or any of the conditions of contract have not been fulfilled, the organ of state may, in addition to any other remedy it may have –

- (a) disqualify the person from the tendering process;

- (b) recover costs, losses or damages it has incurred or suffered as a result of that person's conduct;
- (c) cancel the contract and claim any damages which it has suffered as a result of having to make less favourable arrangements due to such cancellation;
- (d) recommend that the tenderer or contractor, its shareholders and directors, or only the shareholders and directors who acted on a fraudulent basis, be restricted from obtaining business from any organ of state for a period not exceeding 10 years, after the audi alteram partem (hear the other side) rule has been applied; and
- (e) forward the matter for criminal prosecution, if deemed necessary.

..... SIGNATURE(S) OF TENDERER(S)	
SURNAME AND NAME:	
DATE:	
ADDRESS:	
	
	
	

CITY OF CAPE TOWN

DIRECTORATE: WATER AND SANITATION

CONTRACT NO. 191Q/2023/24

**DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE
MACASSAR WASTEWATER TREATMENT WORKS**

SCHEDULE 26: SCHEDULE OF PRE-QUALIFICATION CRITERIA FOR SUB-CONTRACTORS

Not applicable to this tender.

CITY OF CAPE TOWN

DIRECTORATE: WATER AND SANITATION

CONTRACT NO. 191Q/2023/24

**DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE
MACASSAR WASTEWATER TREATMENT WORKS**

SCHEDULE 27: INFORMATION TO BE PROVIDED WITH THE TENDER

The following information shall be provided with the Tender:

- a) The various technical details and data required by the Technical Data Sheets and information required in the Returnable Schedules (Schedule 28).
- b) Drawings and Samples (Not applicable to this tender).

Drawings and samples that may be required to be furnished by it and the drawings and samples shall be duly marked so as to connect them with the tender to the satisfaction of the Employer's Agents. Particulars of the drawings to be furnished with the tender are given in the Specification and the Schedules.

If the tender is accepted, the drawings shall be re submitted for approval and after being approved will form part of the contract.

- c) The Schedule of Type Tests completed (Not applicable to this tender).
- d) Maintenance manual of equipment offered (Not applicable to this tender).
- e) Quality assurance plan.

SIGNED ON BEHALF OF TENDERER:

CITY OF CAPE TOWN

DIRECTORATE: WATER AND SANITATION

CONTRACT NO. 191Q/2023/24

DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE
MACASSAR WASTEWATER TREATMENT WORKS

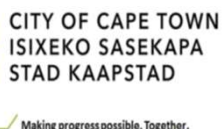
SCHEDULE 28: TECHNICAL DATA SHEETS

SIGNED ON BEHALF OF TENDERER:

 CITY OF CAPE TOWN ISIXEKO SASEKAPA STAD KAAPSTAD <i>Making progress possible. Together.</i>		DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS 191Q/2023/24	
MECHANICAL SUMMARY SHEET		CLIENT N°.	PAGE
		ZUTARI N°.	REV. T0
Title: Client: Project No: Client ref. No.: Zutari ref. No.:	DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS City of Cape Town 191Q/2023/24		
Procurement Package Process Area/Unit	W1.2 Entire Treatment Plant		
ITEM NO.	EQUIPMENT	DATASHEET NR	
1	First Lift Pump Station: Archimedean Screw Pumps	TD01	
2	Mechanical Front Rake Screens	TD02	
3	Perforated Plate Belt Screens	TD03	
4	Second Lift Pump Station: Archimedean Screw Pumps	TD04	
5	Hand Rake Screens: Coarse screens	TD05	
6	Hand Rake Screens: Fine screens	TD06	
7	Wash Compactor: Inlet Works	TD07	
8	Vortex Degritter Equipment	TD08	
9	Grit Classifier (with integrated washing)	TD09	
10	Skip Dolly	TD10	
11	Odour Control Equipment - Inlet Works	TD11	
12	Odour Control Equipment - Gravity thickener and Main Sludge Pump Station	TD12	
13	Vertical Shaft Mixers: Biological Reactor	TD13	
14	Vertical Shaft Mixers: Emergency Tank	TD14	
15	Vertical Shaft Mixers: Main Sludge Pump Station	TD15	
16	A-Recycle Pump	TD16	
17	R-Recycle Pump	TD17	
18	Primary Settling Tank	TD18	
19	Secondary Settling Tank	TD19	
20	Ultraviolet (UV) Disinfection Equipment	TD20	
21	Mechanical Screens at UV Facility	TD21	
22	Odour Control Equipment - Dewatering	TD22	
23	Fine Bubble Diffused Aeration Equipment	TD23	
24	RAS Pump Station - Submersible Axial Column Pump	TD24	
25	Primary Sludge Hydro Cyclone	TD25	
26	WAS Hydro Cyclone	TD26	
27	Primary Sludge Holding Tank Mixing Pumps	TD27	
28	WAS Holding Tank Mixing Pumps	TD28	
29	Digester Mixing Pumps	TD29	
30	Digested Sludge Recirculation Pumps	TD30	
31	Scum Pumps	TD31	
32	Digester Feed Pumps	TD32	
33	WAS Transfer Pumps	TD33	
34	Belt Press Feed Pumps	TD34	
35	Linear Screen Feed Pumps	TD35	
36	Poly Dosing Pumps	TD36	
37	Primary Sludge Cake Pumps	TD37	
38	WAS Cake Pumps	TD38	
39	Primary Sludge Belt Presses	TD39	
40	WAS Linear Screens	TD40	
41	WAS Belt Presses	TD41	
42	Primary Sludge Horizontal Screw Conveyor	TD42	

	EQUIPMENT	DATASHEET NR
43	WAS Horizontal Screw Conveyor	TD43
44	Live Bottom Screw Conveyor (Primary Sludge Silos)	TD44
45	Live Bottom Screw Conveyor (WAS Silos)	TD45
46	Return Flow Pump Station - Submersible Centrifugal Pump	TD46
47	Service Water Pumps - End Suction Centrifugal Pump	TD47
48	TSE Pump Station - Horizontal Multistage Centrifugal Pumps	TD48
49	Poly Solution Preparation Unit	TD49
50	Ventilation for Main Sludge Pump Station	TD50
51	Ventilation for Dewatering Building	TD51
52	Ventilation for Poly Storage Room (dehumidifier)	TD52
53	Ventilation for TSE Pump Station	TD53
54	Ventilation for Service Water Pump Station	TD54
55	Ventilation for Blower House	TD55
56	Ventilation for Chlorine Building	TD56
57	Lifting Equipment for Lower Screw Pump Station	TD57
58	Lifting Equipment for Front Raked Screens and Perforated Plate Screens	TD58
59	Lifting Equipment for Upper Screw Pump Station	TD59
60	Lifting Equipment for Main Sludge Pump Station	TD60
61	Lifting Equipment for A and R Recycle Pump Station	TD61
62	Lifting Equipment for RAS Pump Station	TD62
63	Lifting Equipment for Blower House	TD63
64	Lifting Equipment for UV Disinfection	TD64
65	Lifting Equipment for TSE Pump Station	TD65
66	Lifting Equipment for Service Water Pump Station	TD66
67	Lifting Equipment for Chlorine Building	TD67
68	Lifting Equipment for Dewatering Building	TD68
69	Lifting Equipment for Polyelectrolyte and Feeding Area	TD69
70	Chlorination Equipment	TD70
71	Dry Chlorine Scrubber	TD71
72	Boilers	TD72
73	Heat Exchangers	TD73
74	Combined Heat and Power Plant	TD74

 CITY OF CAPE TOWN ISIXEKO SASEKAPA STAD KAAPSTAD Making progress possible. Together.				DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS 191Q/2023/24			
TD03: Perforated Plate Belt Screens				CLIENT N°.		PAGE	
				ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD03: Perforated Plate Belt Screens	AH	MD	NH		MARCH 2024
Supplier:			Quantity:				
Item		Unit	Offered				
1	GENERAL						
1.1	Number of screw pumps	No.					
1.2	Make	text					
1.3	Model	text					
1.3	Country of manufacture	text					
1.4	Spares supplier and address	text					
2	PERFORMANCE REQUIREMENTS						
2.1	Flow range	m3/s					
2.2	Maximum design lift	m					
2.3	Angle of inclination	Deg. (°)					
2.4	Shaft power required	kW					
2.5	Efficiency at maximum design flow	%					
3	CONSTRUCTION AND DESIGN						
3.1	Number of flights	text					
3.2	Maximum tensile stress in tube	MPa					
3.3	Maximum deflection under self-load and in operation	mm					
3.4	Central tube wall thickness	mm					
3.5	Scroll flight thickness	mm					
3.6	Make and model of shaft coupling	text					
3.7	Power rating of shaft coupling	kW					
3.8	Speed rating of shaft coupling	rpm					
3.9	Torque rating of shaft coupling	text					
4	MATERIALS AND COATINGS						
4.1	Material of tube	text					
4.2	Material of scroll flights	text					
4.3	Material for tips of scroll flight	text					
4.4	Corrosion protection of screw	text					



DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS

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TD03: Perforated Plate Belt Screens

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T0	D	TD03: Perforated Plate Belt Screens	AH	MD	NH		MARCH 2024

Supplier:

Quantity:

[illegible]



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DESIGN BUILD OF MECHANICAL
AND ELECTRICAL WORKS FOR THE
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THE MACASSAR WASTEWATER
TREATMENT WORKS

191Q/2023/24

TD03: Perforated Plate Belt Screens

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Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD03: Perforated Plate Belt Screens	AH	MD	NH		MARCH 2024

Supplier:

Quantity:

Item		Unit	Offered
7	WEIGHT AND DIMENSIONS		
7.1	Weight of screw	kg	
7.2	Scroll diameter	mm	
7.3	Tube diameter	mm	

Regardless of any information provided in this technical detail sheet, the equipment to be provided will comply with the specified requirements.

Name (Print): _____

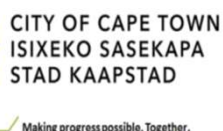
Signature: _____

 CITY OF CAPE TOWN ISIXEKO SASEKAPA STAD KAAPSTAD Making progress possible. Together.				DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS 191Q/2023/24					
TD02: Mechanical Front Rake Screens						CLIENT N°.		PAGE	
						ZUTARI N°.		REV. T0	
Rev.	T1	Description	By	Ckd	APP.	Aut.	Date		
0	D	TD02: Mechanical Front Rake Screens	AH	MD	NH		MARCH 2024		
Supplier:			Quantity:						
Item		Unit	Offered						
1	GENERAL								
1.1	Number of screens	No.							
1.2	Make	text							
1.3	Model	text							
1.3	Country of manufacture	text							
1.4	Spares supplier and address	text							
2	PERFORMANCE REQUIREMENTS								
2.1	Operating range of unit, water flow	m3/s							
2.2	Operating range of unit, screenings	kg/hr							
2.3	Maximum head loss at peak flow	mm							
3	OPERATION AND CONTROL								
3.1	Description of overload protection system	text							
4	CONSTRUCTION AND DESIGN								
4.1	Angle of inclination	Deg. (°)							
4.2	Bar spacing	text							
4.3	Operating speed of rake mechanism	m/s							
4.4	Method of replacing screen field	text							
4.5	Screen bar dimensions	mm x mm							
4.6	Method of replacing rake comb	text							
4.8	Details of bottom bearing or turnaround	text							
4.9	Method of lubrication for bottom bearing	text							

 CITY OF CAPE TOWN ISIXEKO SASEKAPA STAD KAAPSTAD Making progress possible. Together.				DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS 191Q/2023/24					
TD02: Mechanical Front Rake Screens						CLIENT N°.		PAGE	
						ZUTARI N°.		REV. T0	
Rev.	T1	Description	By	Ckd	APP.	Aut.	Date		
0	D	TD02: Mechanical Front Rake Screens	AH	MD	NH		MARCH 2024		
Supplier:			Quantity:						
Item		Unit	Offered						
5	MATERIALS AND COATINGS								
5.1	Material of frame	text							
5.2	Material of screen field	text							
5.3	Material of rake assembly	text							
5.4	Material of rake comb	text							
5.5	Material of chain	text							
5.6	Material of chain guides	text							
5.7	Material of sprockets	text							
5.9	Material of wiper assembly	text							
5.10	Material of wiper blade	text							
6	MOTORS								
6.1	Make	text							
6.2	Model	text							
6.3	Nameplate power	kW							
6.4	Voltage	V							
6.5	Rated load current	Amps							
6.6	Frequency	Hz							
6.7	Phase	Ph.							
6.8	Ingress Protection	IP							
6.9	Weight	kg							
7	GEARBOXES								
7.1	Make	text							
7.2	Model	text							
7.3	Gearbox type	text							
7.4	Gearbox service factor	text							
7.5	Power	kW							
7.6	Torque	Nm							
7.7	Input speed (N ₁)	rpm							

 CITY OF CAPE TOWN ISIXEKO SASEKAPA STAD KAAPSTAD Making progress possible. Together.		DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS					
		191Q/2023/24					
TD02: Mechanical Front Rake Screens		CLIENT N°.					
		PAGE					
		ZUTARI N°.					
		REV. T0					
Rev.	T1	Description	By	Ckd	APP.	Aut.	Date
0	D	TD02: Mechanical Front Rake Screens	AH	MD	NH		MARCH 2024
Supplier:			Quantity:				
Item		Unit	Offered				
7	GEARBOXES (CONTINUED)						
7.8	Output speed (N ₁)	rpm					
7.9	Ratio	-					
7.10	Weight	kg					
8	WEIGHT AND DIMENSIONS						
8.1	Overall weight of unit	kg					
8.2	Width of screen field	mm					
8.3	Height of screen field	mm					
8.4	Width of frame (external)	mm					
8.5	Screen discharge height (above top of channel)	mm					
8.5	Screen height (above top of channel)	mm					
8.7	Overall length (from top of floor)	mm					
Regardless of any information provided in this technical detail sheet, the equipment to be provided will comply with the specified requirements.							
Name (Print): _____ Signature: _____							

 CITY OF CAPE TOWN ISIXEKO SASEKAPA STAD KAAPSTAD Making progress possible. Together.				DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS 191Q/2023/24			
TD03: Perforated Plate Belt Screens				CLIENT N°.		PAGE	
				ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD03: Perforated Plate Belt Screens	AH	MD	NH		MARCH 2024
Supplier:			Quantity:				
Item			Unit	Offered			
1	GENERAL						
1.1	Number of screens		No.				
1.2	Make		text				
1.3	Model		text				
1.3	Country of manufacture		text				
1.4	Spares supplier and address		text				
2	PERFORMANCE REQUIREMENTS						
2.1	Operating range of unit, water flow		m3/s				
2.2	Operating range of unit, screenings		kg/hr				
2.3	Maximum headloss at 50% blinded		text				
2.4	Screenings Capture Ratio		-				
3	OPERATION AND CONTROL						
3.1	Description of overload protection system		text				
4	CONSTRUCTION AND DESIGN						
4.1	Angle of inclination		Deg. (°)				
4.2	Screen aperture		mm				
4.3	Wash water requirement		l/s				
4.4	Wash water supply pressure		bar				
4.5	Wash water connection		NB				
5	MATERIALS AND COATINGS						
5.1	Material of frame		text				
5.2	Material of screen field (perforated plate)		text				
5.3	Material of rotating brush roller		text				
5.4	Material of chain		text				
5.5	Material of chain guides		text				
5.6	Material of sprockets		text				



DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS

191Q/2023/24

TD03: Perforated Plate Belt Screens

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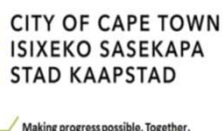
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Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD03: Perforated Plate Belt Screens	AH	MD	NH		MARCH 2024

Supplier:

Quantity:

[illegible]



DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS

191Q/2023/24

TD03: Perforated Plate Belt Screens

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Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD03: Perforated Plate Belt Screens	AH	MD	NH		MARCH 2024

Supplier:

Quantity:

[illegible]



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Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD03: Perforated Plate Belt Screens	AH	MD	NH		MARCH 2024

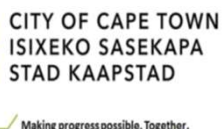
Supplier:		Quantity:	
Item		Unit	Offered
8	WEIGHT AND DIMENSIONS		
8.1	Overall weight of unit	kg	
8.2	Width of screen seive	mm	
8.4	Overall width of screen (external)	mm	
8.5	Screen discharge height (above top of channel)	mm	
8.5	Screen height (above top of channel)	mm	
8.7	Overall screen height (from top of floor)	mm	

Regardless of any information provided in this technical detail sheet, the equipment to be provided will comply with the specified requirements.

Name (Print): _____

Signature: _____

 CITY OF CAPE TOWN ISIXEKO SASEKAPA STAD KAAPSTAD Making progress possible. Together.				DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS 191Q/2023/24					
TD04: Second Lift Pump Station: Archimedean Screw Pumps						CLIENT N°.		PAGE	
						ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date		
T0	D	TD04: Second Lift Pump Station: Archimedean Screw Pumps	AH	MD	NH		MARCH 2024		
Supplier:			Quantity:						
Item			Unit	Offered					
1	GENERAL								
1.1	Number of screw pumps		No.						
1.2	Make		text						
1.3	Model		text						
1.3	Country of manufacture		text						
1.4	Spares supplier and address		text						
2	PERFORMANCE REQUIREMENTS								
2.1	Flow range		m3/s						
2.2	Maximum design lift		m						
2.3	Angle of inclination		Deg. (°)						
2.4	Shaft power required		kW						
2.5	Efficiency at maximum design flow		%						
3	CONSTRUCTION AND DESIGN								
3.1	Number of flights		text						
3.2	Maximum tensile stress in tube		MPa						
3.3	Maximum deflection under self-load and in operation		mm						
3.4	Central tube wall thickness		mm						
3.5	Scroll flight thickness		mm						
3.6	Make and model of shaft coupling		text						
3.7	Power rating of shaft coupling		kW						
3.8	Speed rating of shaft coupling		rpm						
3.9	Torque rating of shaft coupling		text						
4	MATERIALS AND COATINGS								
4.1	Material of tube		text						
4.2	Material of scroll flights		text						
4.3	Material for tips of scroll flight		text						
4.4	Corrosion protection of screw		text						



DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS

191Q/2023/24

TD04: Second Lift Pump Station: Archimedean Screw Pumps

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Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD04: Second Lift Pump Station: Archimedean Screw Pumps	AH	MD	NH		MARCH 2024

Supplier:

Quantity:

[illegible]



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DESIGN BUILD OF MECHANICAL
AND ELECTRICAL WORKS FOR THE
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TD04: Second Lift Pump Station: Archimedean
Screw Pumps

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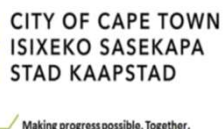
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD04: Second Lift Pump Station: Archimedean Screw Pumps	AH	MD	NH		MARCH 2024

Supplier:		Quantity:	
Item		Unit	Offered
7	WEIGHT AND DIMENSIONS		
7.1	Weight of screw	kg	
7.2	Scroll diameter	mm	
7.3	Tube diameter	mm	

Regardless of any information provided in this technical detail sheet, the equipment to be provided will comply with the specified requirements.

Name (Print): _____

Signature: _____



DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS

191Q/2023/24

TD05: Hand Rake Screens: Coarse screens

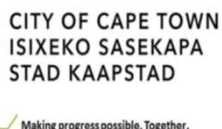
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DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS

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TD06: Hand Rake Screens: Fine screens

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Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD06: Hand Rake Screens: Fine screens	AH	MD	NH		MARCH 2024

Supplier:

Quantity:

Item		Unit	Offered
1	CONSTRUCTION AND DESIGN		
1.1	Angle of inclination	Deg. (°)	
1.2	Method of fixing	text	
1.3	Number of screen segments	No.	
1.4	Bar spacing	mm	
1.5	Bar cross section dimensions	mm x mm	
2	MATERIALS AND COATINGS		
2.1	Material of construction (screen)	text	
2.2	Material of construction (hand rake)	text	
3	WEIGHT AND DIMENSIONS		
3.1	Weight of rake	kg	
3.2	Weight of single screen segment	kg	
3.3	Width of screen segment	mm	
3.4	Total screen width	mm	

Regardless of any information provided in this technical detail sheet, the equipment to be provided will comply with the specified requirements.

Name (Print): _____

Signature: _____

 CITY OF CAPE TOWN ISIXEKO SASEKAPA STAD KAAPSTAD Making progress possible. Together.				DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS 191Q/2023/24			
TD07: Wash Compactor: Inlet Works				CLIENT N°.		PAGE	
				ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD07: Wash Compactor: Inlet Works	AH	MD	NH		MARCH 2024
Supplier:			Quantity:				
Item			Unit	Offered			
1	GENERAL						
1.1	Number of units		No.				
1.2	Make		text				
1.3	Model		text				
1.4	Country of manufacture		text				
1.5	Spares supplier and address		text				
2	PERFORMANCE REQUIREMENTS						
2.1	Operating capacity		kg/hr				
2.2	Guaranteed dry solids percentage		%				
2.3	Degree of washing (percentage organics removal)		%				
3	OPERATION AND CONTROL						
3.1	Method of operation		text				
3.2	Level measuring instrumentation		text				
3.3	Over torque protection for screw conveyor		text				
4	CONSTRUCTION AND DESIGN						
4.1	Volume of feed hopper		m ³				
4.2	Description of agitator		text				
4.3	Description of actuated drain valve		text				
4.4	Drain valve type, size and material		text				
4.5	Rated motor power of actuated drain valve		kW				
4.6	Drain line size		DN				
4.7	Overflow line size		DN				
4.8	Details of wearing surfaces and liners		text				
4.9	Wash water flowrate		l/s				
4.10	Wash water supply pressure		bar				
4.11	Wash water line size connection		DN				

 CITY OF CAPE TOWN ISIXEKO SASEKAPA STAD KAAPSTAD Making progress possible. Together.				DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS 191Q/2023/24					
TD07: Wash Compactor: Inlet Works						CLIENT N°.		PAGE	
						ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date		
T0	D	TD07: Wash Compactor: Inlet Works	AH	MD	NH		MARCH 2024		
Supplier:			Quantity:						
Item			Unit	Offered					
5	MATERIALS AND COATINGS								
5.1	Material of frame		text						
5.2	Material of supports		text						
5.3	Material of Screw / Spiral		text						
5.4	Material of Shaft		text						
5.5	Material of lining		text						
5.6	Material of agitator		text						
6	MOTORS								
6.1	Agitator								
6.1.1	Make		text						
6.1.2	Model		text						
6.1.3	Nameplate power		kW						
6.1.4	Voltage		V						
6.1.5	Rated load current		Amps						
6.1.6	Frequency		Hz						
6.1.7	Phase		Ph.						
6.1.8	Ingress Protection		IP						
6.1.9	Weight		kg						
6.2	Screw Conveyor								
6.2.1	Make		text						
6.2.2	Model		text						
6.2.3	Nameplate power		kW						
6.2.4	Voltage		V						
6.2.5	Rated load current		Amps						
6.2.6	Frequency		Hz						

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TD07: Wash Compactor: Inlet Works				CLIENT N°.		PAGE	
				ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD07: Wash Compactor: Inlet Works	AH	MD	NH		MARCH 2024
Supplier:			Quantity:				
Item			Unit	Offered			
6	MOTORS (CONTINUED)						
6.2	Screw Conveyor						
6.2.7	Phase		Ph.				
6.2.8	Ingress Protection		IP				
6.2.9	Weight		kg				
7	GEARBOXES						
7.1	Agitator						
7.1.1	Make		text				
7.1.2	Model		text				
7.1.3	Gearbox type		text				
7.1.4	Gearbox service factor		text				
7.1.5	Power		kW				
7.1.6	Torque		Nm				
7.1.7	Input speed (N ₁)		rpm				
7.1.8	Output speed (N ₁)		rpm				
7.1.9	Ratio		-				
7.1.10	Weight		kg				
7.2	Screw Conveyor						
7.2.1	Make		text				
7.2.2	Model		text				
7.2.3	Gearbox type		text				
7.2.4	Gearbox service factor		text				
7.2.5	Power		kW				
7.2.6	Torque		Nm				
7.2.7	Input speed (N ₁)		rpm				
7.2.8	Output speed (N ₁)		rpm				
7.2.9	Ratio		-				
7.2.10	Weight		kg				



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DESIGN BUILD OF MECHANICAL
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THE MACASSAR WASTEWATER
TREATMENT WORKS

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TD07: Wash Compactor: Inlet Works

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Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD07: Wash Compactor: Inlet Works	AH	MD	NH		MARCH 2024

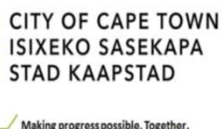
Supplier:		Quantity:	
Item		Unit	Offered
8	WEIGHT AND DIMENSIONS		
8.1	Overall dimensions	mm x mm x mm	
8.2	Mass when full	kg	

Regardless of any information provided in this technical detail sheet, the equipment to be provided will comply with the specified requirements.

Name (Print): _____

Signature: _____

 CITY OF CAPE TOWN ISIXEKO SASEKAPA STAD KAAPSTAD Making progress possible. Together.				DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS 191Q/2023/24			
TD08: Vortex Degritter Equipment				CLIENT N°.		PAGE	
				ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD08: Vortex Degritter Equipment	AH	MD	NH		MARCH 2024
Supplier:			Quantity:				
Item			Unit	Offered			
1	GENERAL						
1.1	Make & model		text				
1.2	Type & description		text				
1.3	County of manufacture		text				
1.4	Spares supplier and address		text				
1.5	Method of operation		text				
2	PERFORMANCE REQUIREMENTS						
2.1	Guaranteed grit separation efficiency		% > SES micron				
2.2	Maximum grit removal		kg/hr				
3	OPERATION AND CONTROL						
3.1	Description of method of optimising grit concentration conditions over range of flows		text				
4	CONSTRUCTION AND DESIGN						
4.1	Description of paddle system		text				
4.2	Number of paddle blades		No.				
4.3	Method of grit extraction		text				
4.4	Grit sparging water requirements		kPa, l/s				
4.5	Grit sparging air requirements		kPa, m ³ /hr				
4.6	Grit sparging (air and water) manifold (No. of nozzles and pipe diameter)		text				
5	MATERIALS AND COATINGS						
5.1	Material of paddle drive shaft		text				
5.2	Material of blades		text				
5.3	Material of grit sparging (air and water) pipework and manifold		text				
5.4	Material of grit extraction pipework		text				



DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS

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TREATMENT WORKS

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TD08: Vortex Degritter Equipment

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Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD08: Vortex Degritter Equipment	AH	MD	NH		MARCH 2024

Supplier:		Quantity:	
Item		Unit	Offered
8	WEIGHT AND DIMENSIONS		
8.1	Total Mass	kg	
8.2	Nominal diameter of blades	text	
8.3	Diameter of opening in concrete platform	text	
8.4	Diameter of paddle drive shaft	mm	
8.5	Diameter of paddle blades	mm	
8.6	Thickness of paddle blades	mm	
8.7	Grit extraction pipework diameter	DN	

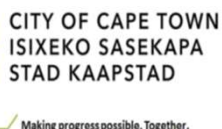
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Name (Print): _____

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 CITY OF CAPE TOWN ISIXEKO SASEKAPA STAD KAAPSTAD Making progress possible. Together.				DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS 191Q/2023/24			
TD09: Grit Classifier (with integrated washing)				CLIENT N°.		PAGE	
				ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD09: Grit Classifier (with integrated washing)	AH	MD	NH		MARCH 2024
Supplier:		Quantity:					
Item	Unit		Offered				
1	GENERAL						
1.1.	Number of units		text				
1.2	Make & model		text				
1.3	Type & description		text				
1.4	County of manufacture		text				
1.5	Spares supplier and address		text				
2	PERFORMANCE REQUIREMENTS						
2.1	Maximum possible feed rate		l/s				
2.2	Maximum possible solids loading rate		kg/h				
2.3	Separation Capability		% > size mm				
2.4	Maximum moisture content of discharged grit		%				
3	OPERATION AND CONTROL						
3.1	Description of overload protection system for agitator		text				
3.2	Description of overload protection system for screw conveyor		text				
4	CONSTRUCTION AND DESIGN						
4.1	Integrated grit washing (Yes/No)		text				
4.2	Description of agitator (type, method of cooling)		text				
4.3	Operating speed of agitator		rpm				
4.4	Method of agitator gearbox lubrication		text				

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TD09: Grit Classifier (with integrated washing)				CLIENT N°.		PAGE	
				ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD09: Grit Classifier (with integrated washing)	AH	MD	NH		MARCH 2024
Supplier:			Quantity:				
Item			Unit	Offered			
5	MATERIALS AND COATINGS						
5.1	Material of frame		text				
5.2	Material of supports		text				
5.3	Material of Screw / Spiral		text				
5.4	Material of Shaft		text				
5.5	Material of discharge trough lining		text				
5.6	Material of agitator		text				
6	MOTORS						
6.1	Agitator						
6.1.1	Make		text				
6.1.2	Model		text				
6.1.3	Nameplate power		kW				
6.1.4	Voltage		V				
6.1.5	Rated load current		Amps				
6.1.6	Frequency		Hz				
6.1.7	Phase		Ph.				
6.1.8	Ingress Protection		IP				
6.1.9	Weight		kg				
6.2	Screw Conveyor						
6.2.1	Make		text				
6.2.2	Model		text				
6.2.3	Nameplate power		kW				
6.2.4	Voltage		V				
6.2.5	Rated load current		Amps				
6.2.6	Frequency		Hz				
6.2.7	Phase		Ph.				
6.2.8	Ingress Protection		IP				
6.2.9	Weight		kg				



DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS

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TD09: Grit Classifier (with integrated washing)

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T0	D	TD09: Grit Classifier (with integrated washing)	AH	MD	NH		MARCH 2024

Supplier:

Quantity:

[illegible]



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DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS

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TD09: Grit Classifier (with integrated washing)

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Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD09: Grit Classifier (with integrated washing)	AH	MD	NH		MARCH 2024

Supplier:		Quantity:	
Item		Unit	Offered
8	WEIGHT AND DIMENSIONS		
8.1	Overall height	mm	
8.2	Overall length / diameter of grit classifier	mm	
8.3	Grit discharge height	mm	
8.4	Inlet connection (grit inlet)	DN	
8.5	Drain outlet connection	DN	

Regardless of any information provided in this technical detail sheet, the equipment to be provided will comply with the specified requirements.

Name (Print): _____

Signature: _____

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TD10: Skip Dolly				CLIENT N°.		PAGE	
				ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD10: Skip Dolly	AH	MD	NH		MARCH 2024
Supplier:			Quantity:				
Item			Unit	Offered			
1	GENERAL						
1.1.	Number of units		No.				
1.2	Spares supplier and address		text				
2	PERFORMANCE REQUIREMENTS						
2.1	Carrying capacity (No. of skips)		No.				
2.2	Operating speed of dolly		m/min				
3	OPERATION AND CONTROL						
3.1	Overrun protection		text				
4	CONSTRUCTION AND DESIGN						
4.1	Wheel bearing load rating		kg				
4.2	Rail bearing load rating		kg				
4.3	Details of cable reel system		text				
5	MATERIALS AND COATINGS						
5.1	Material of construction for frame		text				
5.2	Material of wheels		text				
5.3	Material of shafts		text				
5.4	Corrosion protection system for frame		text				
5.5	Corrosion protection system for wheels		text				
5.6	Corrosion protection system for shafts		text				
6	MOTORS						
6.1	Make		text				
6.2	Model		text				
6.3	Nameplate power		kW				
6.4	Voltage		V				
6.5	Rated load current		Amps				
6.6	Frequency		Hz				



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TD10: Skip Dolly

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Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD10: Skip Dolly	AH	MD	NH		MARCH 2024

Supplier:		Quantity:	
Item		Unit	Offered
6	MOTORS (CONTINUED)		
6.7	Phase	Ph.	
6.8	Ingress Protection	IP	
6.9	Weight	kg	
8	WEIGHT AND DIMENSIONS		
8.1	Total Mass	kg	
8.2	Length (dolly only, no skip)	mm	
8.3	Width (dolly only, no skip)	mm	

Regardless of any information provided in this technical detail sheet, the equipment to be provided will comply with the specified requirements.

Name (Print): _____

Signature: _____

 CITY OF CAPE TOWN ISIXEKO SASEKAPA STAD KAAPSTAD Making progress possible. Together.				DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS 191Q/2023/24			
TD11: Odour Control Equipment - Inlet Works				CLIENT N°.		PAGE	
				ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD11: Odour Control Equipment - Inlet Works	AH	MD	NH		MARCH 2024
Supplier:			Quantity:				
Item		Unit	Offered				
1	BIO TRICKLING SCRUBBER						
1.1	Make and Model	text					
1.2	Type and design	text					
1.3	Treatment flow capacity	m3/h					
1.4	Volume of scrubber	text					
1.5	Overall dimensions	mm X mm X mm					
1.6	Footprint	mm X mm					
1.7	Materials of tank and construction details, including wall thicknesses	text					
1.8	Details of synthetic media	text					
1.9	Media volume	ℓ					
1.10	Details of nutrient and nutrient addition system	text					
1.11	Recirculation rate	ℓ/s					
1.12	Recirculation pressure	m					
1.13	Description of nozzles and number	text					
1.14	Empty bed residence time	seconds					
1.15	Service life of media at average H2S load as calculated	years					
1.16	Daily water requirement	litres					
1.17	Detail of lifting eyes	text					
1.18	Pump type	text					
1.19	Pump materials	text					
1.20	Pump motor power rating	kW					
1.21	Dry mass	kg					
1.22	Operational mass	kg					
1.23	Country of manufacture	text					
1.24	Spares supplier and address	text					
1.25	Performance Guarantee	text					

 CITY OF CAPE TOWN ISIXEKO SASEKAPA STAD KAAPSTAD Making progress possible. Together.				DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS 191Q/2023/24			
TD11: Odour Control Equipment - Inlet Works				CLIENT N°.		PAGE	
				ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD11: Odour Control Equipment - Inlet Works	AH	MD	NH		MARCH 2024
Supplier:			Quantity:				
Item		Unit	Offered				
2	ODOUR CONTROL FAN						
2.1	Make and model	text					
2.2	Type and design	text					
2.3	Configuration of motor/drive/fan	text					
2.4	Pressure and flow at duty point	Pa @ l/s [FAD]					
2.5	Maximum allowable continuous operating pressure	Pa					
2.6	Fan power required at duty point	kW					
2.7	Rated motor power	kW					
2.8	Operating speed	rpm					
2.9	Operating range of unit	m3/s – m3/s					
2.10	Operating range of unit	Pa - Pa					
2.11	Design flow	m3/s					
2.12	Design pressure	Pa					
2.1	Description of coupling/drive	text					
2.14	Inlet diameter	mm					
2.15	Outlet dimensions	mm X mm					
2.16	Material of casing	text					
2.17	Material of fan	text					
2.18	Fan impeller diameter	mm					
2.19	Speed	rpm					
2.20	Critical speed	rpm					
2.21	Description of corrosion protection systems used	text					
2.22	Mass	kg					
2.23	Country of manufacture	text					
2.24	Spares supplier and address	text					

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				191Q/2023/24				
TD12: Odour Control Equipment - Gravity thickener and Main Sludge Pump Station						CLIENT N°.		PAGE
						ZUTARI N°.		REV. T0
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date	
T0	D	TD12: Odour Control Equipment - Gravity thickener and Main Sludge Pump Station	AH	MD	NH		MARCH 2024	
Supplier:			Quantity:					
Item		Unit	Offered					
1	BIO TRICKLING SCRUBBER							
1.1	Make and Model	text						
1.2	Type and design	text						
1.3	Treatment flow capacity	m3/h						
1.4	Volume of scrubber	text						
1.5	Overall dimensions	mm X mm X mm						
1.6	Footprint	mm X mm						
1.7	Materials of tank and construction details, including wall thicknesses	text						
1.8	Details of synthetic media	text						
1.9	Media volume	ℓ						
1.10	Details of nutrient and nutrient addition system	text						
1.11	Recirculation rate	ℓ/s						
1.12	Recirculation pressure	m						
1.13	Description of nozzles and number	text						
1.14	Empty bed residence time	seconds						
1.15	Service life of media at average H2S load as calculated	years						
1.16	Daily water requirement	litres						
1.17	Detail of lifting eyes	text						
1.18	Pump type	text						
1.19	Pump materials	text						
1.20	Pump motor power rating	kW						
1.21	Dry mass	kg						
1.22	Operational mass	kg						
1.23	Country of manufacture	text						
1.24	Spares supplier and address	text						
1.25	Performance Guarantee	text						

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TD12: Odour Control Equipment - Gravity thickener and Main Sludge Pump Station						CLIENT N°.		PAGE	
						ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date		
T0	D	TD12: Odour Control Equipment - Gravity thickener and Main Sludge Pump Station	AH	MD	NH		MARCH 2024		
Supplier:			Quantity:						
Item		Unit	Offered						
2	ODOUR CONTROL FAN								
2.1	Make and model	text							
2.2	Type and design	text							
2.3	Configuration of motor/drive/fan	text							
2.4	Pressure and flow at duty point	Pa @ l/s [FAD]							
2.5	Maximum allowable continuous operating pressure	Pa							
2.6	Fan power required at duty point	kW							
2.7	Rated motor power	kW							
2.8	Operating speed	rpm							
2.9	Operating range of unit	m3/s – m3/s							
2.10	Operating range of unit	Pa - Pa							
2.11	Design flow	m3/s							
2.12	Design pressure	Pa							
2.1	Description of coupling/drive	text							
2.14	Inlet diameter	mm							
2.15	Outlet dimensions	mm X mm							
2.16	Material of casing	text							
2.17	Material of fan	text							
2.18	Fan impeller diameter	mm							
2.19	Speed	rpm							
2.20	Critical speed	rpm							
2.21	Description of corrosion protection systems used	text							
2.22	Mass	kg							
2.23	Country of manufacture	text							
2.24	Spares supplier and address	text							

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TD13: Vertical Shaft Mixers: Biological Reactor				CLIENT N°.		PAGE	
				ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD13: Vertical Shaft Mixers: Biological Reactor	AH	MD	NH		MARCH 2024
Supplier:		Quantity:					
Item	Unit		Offered				
1	GENERAL						
1.1	No. of units	text					
1.2	Make and model	text					
1.3	Country of manufacture	text					
1.4	Spares address	text					
2	PERFORMANCE REQUIREMENTS						
2.1	Mixing performance details	text					
2.2	Maximum solids consistency capability	%					
2.3	Power demand at maximum duty point	kW					
2.4	Mixing thrust produced	N					
3	CONSTRUCTION AND DESIGN						
3.1	Impeller type and design	text					
3.2	Operating speed range	rpm					
4	MATERIALS AND COATINGS						
4.1	Material of impeller	text					
4.2	Material of shaft	text					
5	MOTORS						
5.1	Make	text					
5.2	Model	text					
5.3	Nameplate power	kW					
5.4	Voltage	V					
5.5	Rated load current	Amps					
5.6	Frequency	Hz					
5.7	Phase	Ph.					
5.8	Ingress Protection	IP					
5.9	Weight	kg					



ZUTARI

DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS

191Q/2023/24

TD13: Vertical Shaft Mixers: Biological Reactor

CLIENT N°.

PAGE

ZUTARI N°.

REV.

T0

Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD13: Vertical Shaft Mixers: Biological Reactor	AH	MD	NH		MARCH 2024

Supplier:		Quantity:	
Item		Unit	Offered
6	GEARBOXES		
6.1	Make	text	
6.2	Model	text	
6.3	Gearbox type	text	
6.4	Gearbox service factor	text	
6.5	Power	kW	
6.6	Torque	Nm	
6.7	Input speed (N _i)	rpm	
6.8	Output speed (N _i)	rpm	
6.9	Ratio	-	
6.10	Weight	kg	
7	WEIGHT AND DIMENSIONS		
7.1	Impeller diameter	mm	
7.2	Minimum Impeller / column clearance	mm	
7.3	Minimum impeller submergence required	mm	

Regardless of any information provided in this technical detail sheet, the equipment to be provided will comply with the specified requirements.

Name (Print): _____

Signature: _____

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TD14: Vertical Shaft Mixers: Emergency Tank				CLIENT N°.		PAGE	
				ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD14: Vertical Shaft Mixers: Emergency Tank	AH	MD	NH		MARCH 2024
Supplier:			Quantity:				
Item			Unit	Offered			
1	GENERAL						
1.1	No. of units		text				
1.2	Make and model		text				
1.3	Country of manufacture		text				
1.4	Spares address		text				
2	PERFORMANCE REQUIREMENTS						
2.1	Mixing performance details		text				
2.2	Maximum solids consistency capability		%				
2.3	Power demand at maximum duty point		kW				
2.4	Mixing thrust produced		N				
3	CONSTRUCTION AND DESIGN						
3.1	Impeller type and design		text				
3.2	Operating speed range		rpm				
4	MATERIALS AND COATINGS						
4.1	Material of impeller		text				
4.2	Material of shaft		text				
5	MOTORS						
5.1	Make		text				
5.2	Model		text				
5.3	Nameplate power		kW				
5.4	Voltage		V				
5.5	Rated load current		Amps				
5.6	Frequency		Hz				
5.7	Phase		Ph.				
5.8	Ingress Protection		IP				
5.9	Weight		kg				



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DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS

191Q/2023/24

TD14: Vertical Shaft Mixers: Emergency Tank

CLIENT N°.

PAGE

ZUTARI N°.

REV.

T0

Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD14: Vertical Shaft Mixers: Emergency Tank	AH	MD	NH		MARCH 2024

Supplier:		Quantity:	
Item		Unit	Offered
6	GEARBOXES		
6.1	Make	text	
6.2	Model	text	
6.3	Gearbox type	text	
6.4	Gearbox service factor	text	
6.5	Power	kW	
6.6	Torque	Nm	
6.7	Input speed (N _i)	rpm	
6.8	Output speed (N _i)	rpm	
6.9	Ratio	-	
6.10	Weight	kg	
7	WEIGHT AND DIMENSIONS		
7.1	Impeller diameter	mm	
7.2	Minimum Impeller / column clearance	mm	
7.3	Minimum impeller submergence required	mm	

Regardless of any information provided in this technical detail sheet, the equipment to be provided will comply with the specified requirements.

Name (Print): _____

Signature: _____

 CITY OF CAPE TOWN ISIXEKO SASEKAPA STAD KAAPSTAD Making progress possible. Together.				DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS 191Q/2023/24					
TD15: Vertical Shaft Mixers: Main Sludge Pump Station						CLIENT N°.		PAGE	
						ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date		
T0	D	TD15: Vertical Shaft Mixers: Main Sludge Pump Station	AH	MD	NH		MARCH 2024		
Supplier:			Quantity:						
Item	Unit		Offered						
1	GENERAL								
1.1	No. of units		text						
1.2	Make and model		text						
1.3	Country of manufacture		text						
1.4	Spares address		text						
2	PERFORMANCE REQUIREMENTS								
2.1	Mixing performance details		text						
2.2	Maximum solids consistency capability		%						
2.3	Power demand at maximum duty point		kW						
2.4	Mixing thrust produced		N						
3	CONSTRUCTION AND DESIGN								
3.1	Impeller type and design		text						
3.2	Operating speed range		rpm						
4	MATERIALS AND COATINGS								
4.1	Material of impeller		text						
4.2	Material of shaft		text						
5	MOTORS								
5.1	Make		text						
5.2	Model		text						
5.3	Nameplate power		kW						
5.4	Voltage		V						
5.5	Rated load current		Amps						
5.6	Frequency		Hz						
5.7	Phase		Ph.						
5.8	Ingress Protection		IP						
5.9	Weight		kg						



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DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS

191Q/2023/24

TD15: Vertical Shaft Mixers: Main Sludge Pump Station

CLIENT N°.

PAGE

ZUTARI N°.

REV.

T0

Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD15: Vertical Shaft Mixers: Main Sludge Pump Station	AH	MD	NH		MARCH 2024

Supplier:		Quantity:	
Item		Unit	Offered
6	GEARBOXES		
6.1	Make	text	
6.2	Model	text	
6.3	Gearbox type	text	
6.4	Gearbox service factor	text	
6.5	Power	kW	
6.6	Torque	Nm	
6.7	Input speed (N _i)	rpm	
6.8	Output speed (N _o)	rpm	
6.9	Ratio	-	
6.10	Weight	kg	
7	WEIGHT AND DIMENSIONS		
7.1	Impeller diameter	mm	
7.2	Minimum Impeller / column clearance	mm	
7.3	Minimum impeller submergence required	mm	

Regardless of any information provided in this technical detail sheet, the equipment to be provided will comply with the specified requirements.

Name (Print): _____

Signature: _____

 CITY OF CAPE TOWN ISIXEKO SASEKAPA STAD KAAPSTAD Making progress possible. Together.				DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS 191Q/2023/24			
TD16: A-Recycle Pump				CLIENT N°.		PAGE	
				ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD16: A-Recycle Pump	AH	MD	NH		MARCH 2024
Supplier:			Quantity:				
Item			Unit	Offered			
1	GENERAL						
1.1	No. of units		No.				
1.1	Make and model		text				
1.2	Country of manufacture		text				
1.4	Spares address		text				
2	PERFORMANCE REQUIREMENTS						
2.1	Duty point (flowrate, head)		ℓ /s @ m				
2.2	Efficiency at duty point		%				
2.3	Maximum head capability		m				
2.4	Flow at maximum head capability		ℓ /s				
3	CONSTRUCTION AND DESIGN						
3.1	Pump type		text				
3.2	Maximum submergence required for range of duties specified		text				
4	MATERIALS AND COATINGS						
4.1	Corrosion protection		text				
4.2	Description of coats and thickness		text				
5	MOTORS						
5.1	Make		text				
5.2	Model		text				
5.3	Nameplate power		kW				
5.4	Voltage		V				
5.5	Rated load current		Amps				
5.6	Frequency		Hz				
5.7	Phase		Ph.				
5.8	Ingress Protection		IP				
5.9	Weight		kg				



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THE MACASSAR WASTEWATER
TREATMENT WORKS

191Q/2023/24

TD16: A-Recycle Pump

CLIENT N°.

PAGE

ZUTARI N°.

REV.

T0

Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD16: A-Recycle Pump	AH	MD	NH		MARCH 2024

Supplier:		Quantity:	
Item		Unit	Offered
6	WEIGHT AND DIMENSIONS		
6.1	Weight	kg	
6.2	Impeller diameter	mm	

Regardless of any information provided in this technical detail sheet, the equipment to be provided will comply with the specified requirements.

Name (Print): _____

Signature: _____

 CITY OF CAPE TOWN ISIXEKO SASEKAPA STAD KAAPSTAD Making progress possible. Together.				DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS 191Q/2023/24			
TD17: R-Recycle Pump				CLIENT N°.		PAGE	
				ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD17: R-Recycle Pump	AH	MD	NH		MARCH 2024
Supplier:			Quantity:				
Item			Unit	Offered			
1	GENERAL						
1.1	No. of units		No.				
1.1	Make and model		text				
1.2	Country of manufacture		text				
1.4	Spares address		text				
2	PERFORMANCE REQUIREMENTS						
2.1	Duty point (flowrate, head)		ℓ /s @ m				
2.2	Efficiency at duty point		%				
2.3	Maximum head capability		m				
2.4	Flow at maximum head capability		ℓ /s				
3	CONSTRUCTION AND DESIGN						
3.1	Pump type		text				
3.2	Maximum submergence required for range of duties specified		text				
4	MATERIALS AND COATINGS						
4.1	Corrosion protection		text				
4.2	Description of coats and thickness		text				
5	MOTORS						
5.1	Make		text				
5.2	Model		text				
5.3	Nameplate power		kW				
5.4	Voltage		V				
5.5	Rated load current		Amps				
5.6	Frequency		Hz				
5.7	Phase		Ph.				
5.8	Ingress Protection		IP				
5.9	Weight		kg				



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191Q/2023/24

TD17: R-Recycle Pump

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PAGE

ZUTARI N°.

REV.

T0

Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD17: R-Recycle Pump	AH	MD	NH		MARCH 2024

Supplier:		Quantity:	
Item		Unit	Offered
6	WEIGHT AND DIMENSIONS		
6.1	Weight	kg	
6.2	Impeller diameter	mm	

Regardless of any information provided in this technical detail sheet, the equipment to be provided will comply with the specified requirements.

Name (Print): _____

Signature: _____

 CITY OF CAPE TOWN ISIXEKO SASEKAPA STAD KAAPSTAD Making progress possible. Together.				DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS 191Q/2023/24			
TD18: Primary Settling Tank				CLIENT N°.		PAGE	
				ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD18: Primary Settling Tank	AH	MD	NH		MARCH 2024
Supplier:		Quantity:					
Item	Unit		Offered				
1	GENERAL						
2	CONSTRUCTION AND DESIGN						
2.1	Bridge						
2.1.1	Description of bridge structure		text				
2.1.2	Description of scraper mechanism		text				
2.1.3	Bridge width		mm				
2.2	Bridge bearing						
2.2.1	Make of slewing bearing		text				
2.2.3	Diameter of slewing bearing		mm				
2.2.3	Sealing arrangement for slewing bearing		text				
2.2.4	Spares supplier and address		text				
2.3	Wheels						
2.3.1	Make of wheels		text				
2.3.2	Wheel spacing		mm				
2.3.3	Wheel diameter		mm				
2.3.4	Wheel width		mm				
2.3.5	Wheel load rating		kg				
2.3.6	Wheel design load		N				
2.3.7	Spares supplier and address		text				
2.4	Slip ring assembly						
2.4.1	Make and model		text				
2.4.2	Design details		text				
2.4.3	IP rating		IP				
2.4.4	Spares supplier and address		text				

 CITY OF CAPE TOWN ISIXEKO SASEKAPA STAD KAAPSTAD Making progress possible. Together.				DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS 191Q/2023/24			
TD18: Primary Settling Tank				CLIENT N°.		PAGE	
				ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD18: Primary Settling Tank	AH	MD	NH		MARCH 2024
Supplier:			Quantity:				
Item			Unit	Offered			
2.5	Stilling chamber						
2.5.1	Design details		text				
2.5.2	Diameter		mm				
2.5.3	Height		mm				
2.6	Weir plates						
2.6.1	Plate width x plate thickness		mm x mm				
3	MATERIALS AND COATINGS						
3.1	Materials and coatings for bridge (above water)		text				
3.2	Materials and coatings for scraper (underwater)		text				
3.3	Materials and coatings for stilling chamber		text				
3.4	Materials and coatings for v-notch weirs		text				
3.5	Materials of wheel		text				
3.6	Materials and coatings for hand railing		text				
3.7	Materials and coatings for walkway grating		text				
4	MOTORS						
4.1	Make		text				
4.2	Model		text				
4.3	Nameplate power		kW				
4.4	Voltage		V				
4.5	Rated load current		Amps				
4.6	Frequency		Hz				
4.7	Phase		Ph.				
4.8	Ingress Protection		IP				
4.9	Weight		kg				



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191Q/2023/24

TD18: Primary Settling Tank

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ZUTARI N°.

REV.

T0

Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD18: Primary Settling Tank	AH	MD	NH		MARCH 2024

Supplier:		Quantity:	
Item		Unit	Offered
5	GEARBOXES		
5.1	Make	text	
5.2	Model	text	
5.3	Gearbox type	text	
5.4	Gearbox service factor	text	
5.5	Power	kW	
5.6	Torque	Nm	
5.7	Input speed (N ₁)	rpm	
5.8	Output speed (N ₁)	rpm	
5.9	Ratio	-	
5.10	Weight	kg	
6	WEIGHT AND DIMENSIONS		

Regardless of any information provided in this technical detail sheet, the equipment to be provided will comply with the specified requirements.

Name (Print): _____

Signature: _____

 CITY OF CAPE TOWN ISIXEKO SASEKAPA STAD KAAPSTAD Making progress possible. Together.				DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS 191Q/2023/24			
TD19: Secondary Settling Tank				CLIENT N°.		PAGE	
				ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD19: Secondary Settling Tank	AH	MD	NH		MARCH 2024
Supplier:		Quantity:					
Item	Unit		Offered				
1	GENERAL						
2	CONSTRUCTION AND DESIGN						
2.1	Bridge						
2.1.1	Description of bridge structure		text				
2.1.2	Description of scraper mechanism		text				
2.1.3	Bridge width		mm				
2.2	Bridge bearing						
2.2.1	Make of slewing bearing		text				
2.2.2	Diameter of slewing bearing		mm				
2.2.3	Sealing arrangement for slewing bearing		text				
2.2.4	Spares supplier and address		text				
2.3	Wheels						
2.3.1	Make of wheels		text				
2.3.2	Wheel spacing		mm				
2.3.3	Wheel diameter		mm				
2.3.4	Wheel width		mm				
2.3.5	Wheel load rating		kg				
2.3.6	Wheel design load		N				
2.3.7	Spares supplier and address		text				
2.4	Slip ring assembly						
2.4.1	Make and model		text				
2.4.2	Design details		text				
2.4.3	IP rating		IP				
2.4.4	Spares supplier and address		text				

 CITY OF CAPE TOWN ISIXEKO SASEKAPA STAD KAAPSTAD Making progress possible. Together.				DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS 191Q/2023/24			
TD19: Secondary Settling Tank				CLIENT N°.		PAGE	
				ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD19: Secondary Settling Tank	AH	MD	NH		MARCH 2024
Supplier:		Quantity:					
2.5		Stilling chamber					
2.5.1	Design details		text				
2.5.2	Diameter		mm				
2.5.3	Height		mm				
2.6		Weir plates					
2.6.1	Plate width x plate thickness		mm x mm				
2.7		Scum removal equipment					
2.7.1	System description		text				
2.8		Telescopic valve					
2.8.1	Size		DN				
2.8.2	Overall length		mm				
2.8.3	Details of linkages		text				
2.8.4	Spares supplier and address		text				
3		MATERIALS AND COATINGS					
3.1	Materials and coatings for bridge (above water)		text				
3.2	Materials and coatings for scraper (underwater)		text				
3.3	Materials and coatings for stilling chamber		text				
3.4	Materials and coatings for v-notch weirs		text				
3.5	Materials of wheel		text				
3.6	Materials of hand railing		text				
3.7	Materials of walkway grating		text				
3.8	Materials and Coatings for telescopic valves		text				
3.9	Material of seal (telescopic valves)		text				
3.10	Material of fasteners (telescopic valves)		text				
3.11	Material of scum removal system		text				

 CITY OF CAPE TOWN ISIXEKO SASEKAPA STAD KAAPSTAD Making progress possible. Together.		DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS 191Q/2023/24																								
TD19: Secondary Settling Tank		<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 70%; padding: 5px;">CLIENT N°.</td> <td style="width: 30%; padding: 5px;">PAGE</td> </tr> <tr> <td style="padding: 5px;">ZUTARI N°.</td> <td style="padding: 5px;">REV.</td> </tr> <tr> <td style="padding: 5px;"></td> <td style="text-align: center; padding: 5px;">T0</td> </tr> </table>	CLIENT N°.	PAGE	ZUTARI N°.	REV.		T0																		
CLIENT N°.	PAGE																									
ZUTARI N°.	REV.																									
	T0																									
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 5%;">Rev.</th> <th style="width: 5%;">TI</th> <th style="width: 55%;">Description</th> <th style="width: 10%;">By</th> <th style="width: 10%;">Ckd</th> <th style="width: 10%;">APP.</th> <th style="width: 10%;">Aut.</th> <th style="width: 15%;">Date</th> </tr> <tr> <td style="text-align: center;">T0</td> <td style="text-align: center;">D</td> <td>TD19: Secondary Settling Tank</td> <td style="text-align: center;">AH</td> <td style="text-align: center;">MD</td> <td style="text-align: center;">NH</td> <td></td> <td style="text-align: center;">MARCH 2024</td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </table>	Rev.	TI	Description	By	Ckd	APP.	Aut.	Date	T0	D	TD19: Secondary Settling Tank	AH	MD	NH		MARCH 2024										
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date																			
T0	D	TD19: Secondary Settling Tank	AH	MD	NH		MARCH 2024																			
Supplier:		Quantity:																								
4	MOTORS																									
4.1	Make	text																								
4.2	Model	text																								
4.3	Nameplate power	kW																								
4.4	Voltage	V																								
4.5	Rated load current	Amps																								
4.6	Frequency	Hz																								
4.7	Phase	Ph.																								
4.8	Ingress Protection	IP																								
4.9	Weight	kg																								
5	GEARBOXES																									
5.1	Make	text																								
5.2	Model	text																								
5.3	Gearbox type	text																								
5.4	Gearbox service factor	text																								
5.5	Power	kW																								
5.6	Torque	Nm																								
5.7	Input speed (N ₁)	rpm																								
5.8	Output speed (N ₁)	rpm																								
5.9	Ratio	-																								
5.10	Weight	kg																								
		kg																								
6	WEIGHT AND DIMENSIONS																									
<i>Regardless of any information provided in this technical detail sheet, the equipment to be provided will comply with the specified requirements.</i> Name (Print): _____ Signature: _____																										

 CITY OF CAPE TOWN ISIXEKO SASEKAPA STAD KAAPSTAD Making progress possible. Together.				DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS 191Q/2023/24					
TD20: Ultraviolet (UV) Disinfection Equipment						CLIENT N°.		PAGE	
						ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date		
T0	D	TD20: Ultraviolet (UV) Disinfection Equipment	AH	MD	NH		MARCH 2024		
Supplier:			Quantity:						
Item	Unit		Offered						
1	GENERAL								
1.1	Make and model		text						
1.2	Country of manufacture		text						
1.3	Details of South African Agent		text						
1.4	Spares address		text						
2	PERFORMANCE REQUIREMENTS								
2.1	Inactivation								
2.1.1	Fecal coliform (at guarantee dose)		counts/100ml						
2.1.2	Design Dose		mJ						
2.1.3	Design UVT range (1 cm)		% - %						
2.1.4	Design TSS range		mg/l - mg/l						
2.2	Flow rate								
2.2.1	Design flowrate		l/s						
2.2.2	Flowrate (min. / max.)		l/s - l/s						
2.2.3	Headloss (at min. and max. flowrate)		m - m						
2.3	Performance testing								
2.3.1	Performance validation (3 rd party validation type)		text						
3	OPERATION AND CONTROL								
3.1	Method of water level control		text						
3.2	Method of raising lamps above water level (manual / automatic)		text						
3.3	Description of control system		text						
3.4	UV monitoring		text						

 CITY OF CAPE TOWN ISIXEKO SASEKAPA STAD KAAPSTAD Making progress possible. Together.				DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS 191Q/2023/24			
TD20: Ultraviolet (UV) Disinfection Equipment				CLIENT N°.			PAGE
				ZUTARI N°.			REV. T0
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD20: Ultraviolet (UV) Disinfection Equipment	AH	MD	NH		MARCH 2024
Supplier:			Quantity:				
Item		Unit	Offered				
4	CONSTRUCTION AND DESIGN						
4.1	Lamps						
4.1.1	Type (open channel / closed vessel)	text					
4.1.2	Installation location (indoors / outdoors / both)	text					
4.1.3	Lamp orientation (horizontal / vertical / inclined)	text					
4.1.4	Lamp pressure (low pressure / medium pressure / adjustable)	text					
4.1.5	Wiper mechanism (manual / automatic)	text					
4.1.6	Number of lamps (per bank)	No.					
4.1.7	Number of banks (per channel)	No.					
4.2	Hydraulic design						
4.2.1	No. of duty channels at ADWF	No.					
4.2.2	No. of duty channels at PDWF	No.					
4.2.3	No. of duty channels at PWWF	No.					
4.3	UVT sensor						
4.3.1	Type	text					
4.3.2	Model	text					
4.4	Design life						
4.4.1	Guaranteed lamp life	hours					
4.4.2	Guaranteed ballast life	hours					
4.4.3	Guaranteed quartz sleeve life	hours					
5	MATERIALS AND COATINGS						
5.1	Electrical panels / cabinets						



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DESIGN BUILD OF MECHANICAL
AND ELECTRICAL WORKS FOR THE
UPGRADING AND EXPANSION OF
THE MACASSAR WASTEWATER
TREATMENT WORKS

191Q/2023/24

TD20: Ultraviolet (UV) Disinfection Equipment

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Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD20: Ultraviolet (UV) Disinfection Equipment	AH	MD	NH		MARCH 2024

Supplier:		Quantity:	
Item		Unit	Offered
6	ELECTRICAL REQUIREMENTS		
6.1	Max. output power per lamp	Watts	
6.2	Lamp output power variation (min. - max.)	% - %	
6.3	Voltage	V	
6.4	Frequency	Hz	
6.5	Phase	Ph	
6.6	Control cabinet ingress protection rating	IP	
7	WEIGHT AND DIMENSIONS		
7.1	Weight per banks (with lamps)	kg	
7.2	Channel width	mm	
7.3	Channel depth	mm	
7.4	Min. / max. water depth	mm / mm	

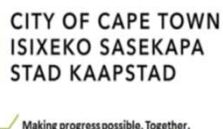
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TD21: Mechanical Screens at UV Facility				CLIENT N°.		PAGE	
				ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD21: Mechanical Screens at UV Facility	AH	MD	NH		MARCH 2024
Supplier:		Quantity:					
Item	Unit		Offered				
1	GENERAL						
1.1	No. of units		No.				
1.2	Make and model		text				
1.3	Country of manufacture		text				
1.4	Spares address		text				
2	PERFORMANCE REQUIREMENTS						
2.1	Operating range of unit, water flow		m3/s				
2.2	Maximum headloss at 50% blinded		text				
2.3	Screenings Capture Ratio		-				
2.4	Operating range of unit, screenings		kg/hr				
3	OPERATION AND CONTROL						
3.1	Method of over torque protection (screen)		text				
3.2	Method of over torque protection (screw conveyor)		text				
4	CONSTRUCTION AND DESIGN						
4.1	Aperture		text				
4.2	Discharge level (above top of channel)		mm				
4.3	Method of dislodging screenings from screen field		text				
5	MATERIALS AND COATINGS						
5.1	Mechanical Screens						
5.1.1	Material of frame		text				
5.1.2	Material of screen field		text				
5.1.3	Material of chain		text				
5.1.4	Material of chain guides		text				
5.1.5	Material of sprockets		text				

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				191Q/2023/24			
TD21: Mechanical Screens at UV Facility				CLIENT N°.		PAGE	
				ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD21: Mechanical Screens at UV Facility	AH	MD	NH		MARCH 2024
Supplier:			Quantity:				
Item			Unit	Offered			
5.2	Screw Conveyor						
5.2.1	Material of trough		text				
5.2.2	Material of trough liner		text				
5.2.2	Material of screw		text				
6	MOTORS						
6.1	Mechanical Screens						
6.1.1	Make		text				
6.1.2	Model		text				
6.1.3	Nameplate power		kW				
6.1.4	Voltage		V				
6.1.5	Rated load current		Amps				
6.1.6	Frequency		Hz				
6.1.7	Phase		Ph.				
6.1.8	Ingress Protection		Ph.				
6.1.9	Weight		kg				
6.2	Screw Conveyor						
6.2.1	Make		text				
6.2.2	Model		text				
6.2.3	Nameplate power		kW				
6.2.4	Voltage		V				
6.2.5	Rated load current		Amps				
6.2.6	Frequency		Hz				
6.2.7	Phase		Ph.				
6.2.8	Ingress Protection		IP				
6.2.9	Weight		kg				



DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS

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TD21: Mechanical Screens at UV Facility

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T0	D	TD21: Mechanical Screens at UV Facility	AH	MD	NH		MARCH 2024

Supplier:

Quantity:

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TD21: Mechanical Screens at UV Facility

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T0	D	TD21: Mechanical Screens at UV Facility	AH	MD	NH		MARCH 2024

Supplier:		Quantity:	
Item		Unit	Offered
8	WEIGHT AND DIMENSIONS		
8.1	Overall mass of unit	kg	
8.2	Operating width of screen field	mm	
8.3	Operating height of screen field	mm	
8.4	Overall width of frame at level of screen field	mm	
8.5	Overall height (above top of channel)	mm	
8.6	Overall length	mm	

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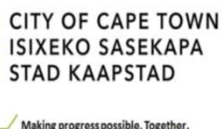
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TD22: Odour Control Equipment - Dewatering						CLIENT N°.		PAGE	
						ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date		
T0	D	TD22: Odour Control Equipment - Dewatering	AH	MD	NH		MARCH 2024		
Supplier:			Quantity:						
Item		Unit	Offered						
1	BIO FILTER								
1.1	Make and model	text							
1.2	Type and design	text							
1.3	Treatment flow capacity	m3/h							
1.4	Vessel volume	m3							
1.5	Overall dimensions	mm X mm X mm							
1.6	Footprint	mm X mm							
1.7	Materials of tank and construction details, including wall thicknesses	text							
1.8	Details of media	text							
1.9	Media volume	ℓ							
1.10	Service life of media at average H2S load as calculated	years							
1.11	Details of nutrient, if applicable	text							
1.12	Details of pre-conditioning step (if applicable)	text							
1.13	Empty bed residence time	seconds							
1.14	Humidifier type	text							
1.15	Power requirement	kW							
1.16	Humidifier water demand	ℓ/s							
1.17	Operating temperature range	°C - °C							
1.18	Daily water requirement, if applicable	litres							
1.19	Condenser type	text							
1.20	Operating temperature range	°C - °C							
1.21	Condensate rate	ℓ/hr							
1.22	Detail of lifting eyes	text							
1.23	Dry mass	kg							
1.24	Operating mass	kg							
1.25	Country of manufacture	text							
1.26	Spares supplier and address	text							
1.27	Performance Guarantee	text							

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TD22: Odour Control Equipment - Dewatering						CLIENT N°.		PAGE	
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T0	D	TD22: Odour Control Equipment - Dewatering	AH	MD	NH		MARCH 2024		
Supplier:			Quantity:						
Item		Unit	Offered						
2	BIO TRICKLING SCRUBBER								
2.1	Make and Model	text							
2.2	Type and design	text							
2.3	Treatment flow capacity	m3/h							
2.4	Volume of scrubber	text							
2.5	Overall dimensions	mm X mm X mm							
2.6	Footprint	mm X mm							
2.7	Materials of tank and construction details, including wall thicknesses	text							
2.8	Details of synthetic media	text							
2.9	Media volume	ℓ							
2.10	Details of nutrient and nutrient addition system	text							
2.11	Recirculation rate	ℓ/s							
2.12	Recirculation pressure	m							
2.13	Description of nozzles and number	text							
2.14	Empty bed residence time	seconds							
2.15	Service life of media at average H2S load as calculated	years							
2.16	Daily water requirement	litres							
2.17	Detail of lifting eyes	text							
2.18	Pump type	text							
2.19	Pump materials	text							
2.20	Pump motor power rating	kW							
2.21	Dry mass	kg							
2.22	Operational mass	kg							
2.23	Country of manufacture	text							
2.24	Spares supplier and address	text							
2.25	Performance Guarantee	text							

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T0	D	TD22: Odour Control Equipment - Dewatering	AH	MD	NH		MARCH 2024		
Supplier:			Quantity:						
Item		Unit	Offered						
3	ODOUR CONTROL FAN								
3.1	Make and model	text							
3.2	Type and design	text							
3.3	Configuration of motor/drive/fan	text							
3.4	Pressure and flow at duty point	Pa @ l/s [FAD]							
3.5	Maximum allowable continuous operating pressure	Pa							
3.6	Fan power required at duty point	kW							
3.7	Rated motor power	kW							
3.8	Operating speed	rpm							
3.9	Operating range of unit	m3/s – m3/s							
3.10	Operating range of unit	Pa - Pa							
3.11	Design flow	m3/s							
3.12	Design pressure	Pa							
3.13	Description of coupling/drive	text							
3.14	Inlet diameter	mm							
3.15	Outlet dimensions	mm X mm							
3.16	Material of casing	text							
3.17	Material of fan	text							
3.18	Fan impeller diameter	mm							
3.19	Speed	rpm							
3.20	Critical speed	rpm							
3.21	Description of corrosion protection systems used	text							
3.22	Mass	kg							
3.23	Country of manufacture	text							
3.24	Spares supplier and address	text							



DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS

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TD22: Odour Control Equipment - Dewatering

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T0	D	TD22: Odour Control Equipment - Dewatering	AH	MD	NH		MARCH 2024

Supplier:

Quantity:

Item		Unit	Offered
4	CHANNEL COVERS		
4.1	Details of construction (thickness of materials, material type etc)	text	
4.2	Details of supporting structure	text	
4.3	Maximum load for walk on covers	text	
4.4	Details of UV protection	text	
4.5	Details of anti-slip coating	text	
4.6	Colour Options	text	
5	DUCTING AND VALVES		
5.1	Material and class of ducting	text	
5.2	Material of valves	text	
5.3	Material of supports and corrosion protection	text	
5.4	Material of fasteners	text	
5.5	Diameters of ducting	text	
5.6	Details of condensate removal devices	text	
5.7	Details and description of skip covering hoods	text	

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Name (Print): _____

Signature: _____

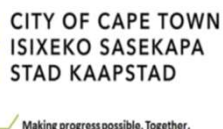
 CITY OF CAPE TOWN ISIXEKO SASEKAPA STAD KAAPSTAD Making progress possible. Together.				DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS 191Q/2023/24			
TD23: Fine Bubble Diffused Aeration Equipment				CLIENT N°.		PAGE	
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T0	D	TD23: Fine Bubble Diffused Aeration Equipment	AH	MD	NH		MARCH 2024
Supplier:			Quantity:				
Item			Unit	Offered			
1	GENERAL						
1.1	Blowers						
1.1.1	Number of blowers		No.				
1.1.2	Make and model		text				
1.1.3	Country of manufacture		text				
1.1.4	Details of South African Agent		text				
1.1.5	Spares address		text				
2	DESIGN PARAMETERS						
2.1	Reactor operating DO concentration		mgO/l				
2.2	Oxygen transfer correction factor (α)		text				
2.3	"Effect of impurities and salinity – Surface tension" correction factor (β)		text				
2.4	Arrhenius constant (θ)		text				
2.5	SOTE/m depth submergence		%/m				
2.6	Standard oxygen transfer rate (oxygenation rate) of system as specified by manufacturer		kgO/kW.hr				
2.7	Standard oxygen transfer rate (oxygenation rate) of aerators provided by manufacturer (20°C and 1 atm.)		kgO/kW.hr				
3	PERFORMANCE REQUIREMENTS						
3.1	Site design conditions						
3.1.1	Inlet pressure		kPa				
3.1.2	Inlet temperature		°C				
3.1.3	Relative humidity		kW				
3.2	Blowers - design duty point						
3.2.1	Discharge Pressure		kPa (g)				
3.2.2	Blower air flow (per blower)		m3/h				
3.2.3	Power absorbed at coupling		kW				
3.2.4	Efficiency		%				

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TD23: Fine Bubble Diffused Aeration Equipment				CLIENT N°.		PAGE	
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T0	D	TD23: Fine Bubble Diffused Aeration Equipment	AH	MD	NH		MARCH 2024
Supplier:			Quantity:				
Item			Unit	Offered			
3.3 Blowers - duty point 2							
3.3.1	Discharge Pressure		kPa (g)				
3.3.2	Blower air flow (per blower)		m3/h				
3.3.3	Power absorbed at coupling		kW				
3.3.4	Efficiency		%				
3.4 Blowers - duty point 3							
3.4.1	Discharge Pressure		kPa (g)				
3.4.2	Blower air flow (per blower)		m3/h				
3.4.3	Power absorbed at coupling		kW				
3.4.4	Efficiency		%				
4 AERATION SYSTEM PERFORMANCE PER BASIN							
4.1	SOTR (Min/Average/Peak)		kgO2/h				
4.2	Total air flow (Min/Average/Peak)		Nm3/h				
4.3	Air Flow per diffuser (Min/Average/Peak)		Nm3/h				
4.4	SOTE (Min/Average/Peak)		%				
4.5	Flux Ratio at 0°C, 101.3 kPa (Min/Average/Peak)		Nm3/m2/hr				
5 OPERATION AND CONTROL							
5.1	No. of duty blowers		No.				
5.2	No. of standby blowers		No.				
5.3	Method of inlet air differential pressure measurement		text				
5.4	Method of actuating IGV (inlet guide vanes)		text				
5.5	Method of actuating VVD (variable vane diffusers)		text				
5.6	Method of actuating blow-off valve		text				
5.7	Method of outlet air differential pressure measurement		text				
5.8	Details of bearing temperature measurement		text				
5.9	Details of gearbox vibration measurement		text				

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TD23: Fine Bubble Diffused Aeration Equipment				CLIENT N°.		PAGE	
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Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD23: Fine Bubble Diffused Aeration Equipment	AH	MD	NH		MARCH 2024
Supplier:			Quantity:				
Item			Unit	Offered			
5	OPERATION AND CONTROL (CONTINUED)						
5.10	Details of gearbox oil temperature measurement		text				
5.11	Method of oil pressure differential measurement		text				
5.12	Method of outlet air temperature measurement		text				
5.13	Method of outlet air pressure measurement		text				
5.14	Method of accoustic enclosure air temperature measurement		text				
5.15	Details of motor winding temperature elements		text				
6	CONSTRUCTION AND DESIGN						
6.1	Blowers						
6.1.1	Inlet diameter (DN)		mm				
6.1.2	Outlet diameter (DN)		mm				
6.2	Blower Enclosure						
6.2.1	Type of enclosure		text				
6.2.2	Class of insulation		text				
6.3	Layout of the proposed system per basin (four aerobic basins in total)						
6.3.1	No of Laterals per Zone		text				
6.3.2	No of Diffusers per Lateral		text				
6.3.3	No of Diffusers per Zone		text				
6.3.4	Active Membrane area per zone		m2				
6.3.5	Diffuser Density		text				
6.3.6	Details of Mountings		text				
7	MATERIALS AND COATINGS						
7.1	Blowers						
7.1.1	Materials and coatings of volute casing		text				
7.1.2	Materials and coatings of Impeller		text				

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TD23: Fine Bubble Diffused Aeration Equipment				CLIENT N°.		PAGE	
				ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD23: Fine Bubble Diffused Aeration Equipment	AH	MD	NH		MARCH 2024
Supplier:			Quantity:				
Item			Unit	Offered			
7	MATERIALS AND COATINGS (CONTINUED)						
7.1	Blowers						
7.1.3	Materials and coatings of baseplate		text				
7.1.4	Materials and coatings of IGV (inlet guide vanes)		text				
7.1.5	Materials of shaft seals		text				
7.2	Diffusers						
7.2.1	Materials of diffuser discs and membranes		text				
7.3	Pipework						
7.3.1	Materials and coatings of main air header		text				
7.3.2	Materials and coatings of down pipes		text				
7.3.3	Materials and coatings of lateral pipes		text				
7.4	Blower Enclosure						
7.4.1	Main body		text				
8	MOTORS						
8.1	Blowers						
8.1.1	Make		text				
8.1.2	Model		text				
8.1.3	Nameplate power		kW				
8.1.4	Voltage		V				
8.1.5	Rated load current		Amps				
8.1.6	Frequency		Hz				
8.1.7	Phase		Ph.				
8.1.8	Ingress Protection		IP				
8.1.9	Weight		kg				

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TD23: Fine Bubble Diffused Aeration Equipment		CLIENT N°.	PAGE				
		ZUTARI N°.	REV. T0				
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD23: Fine Bubble Diffused Aeration Equipment	AH	MD	NH		MARCH 2024
Supplier:			Quantity:				
Item		Unit	Offered				
9	GEARBOXES						
9.1	Blowers						
9.1.1	Make	text					
9.1.2	Model	text					
9.1.3	Gearbox type	text					
9.1.4	Gearbox service factor	text					
9.1.5	Power	kW					
9.1.6	Torque	Nm					
9.1.7	Input speed (N _i)	rpm					
9.1.8	Output speed (N _i)	rpm					
9.1.9	Ratio	-					
9.1.10	Weight	kg					
10	WEIGHT AND DIMENSIONS						
10.1	Blowers						
10.1.1	Blower (incl. motor & gearbox)	kg					
10.2	Blower Enclosure						
10.2.1	Length	mm					
10.2.2	Width	mm					
10.2.3	Height	mm					
10.2.4	Weight (without blower)	kg					
Regardless of any information provided in this technical detail sheet, the equipment to be provided will comply with the specified requirements. Name (Print): _____ Signature: _____							



DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS

191Q/2023/24

TD24: RAS Pump Station - Submersible Axial Column Pump

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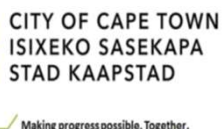
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Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD24: RAS Pump Station - Submersible Axial Column Pump	AH	MD	NH		MARCH 2024

Supplier:

Quantity:

[illegible]



DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS

191Q/2023/24

TD24: RAS Pump Station - Submersible Axial Column Pump

CLIENT N°.	
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TO

Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD24: RAS Pump Station - Submersible Axial Column Pump	AH	MD	NH		MARCH 2024

Supplier:

Quantity:

[illegible]

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TD24: RAS Pump Station - Submersible Axial Column Pump		CLIENT N°.	PAGE				
		ZUTARI N°.	REV.				
		T0					
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD24: RAS Pump Station - Submersible Axial Column Pump	AH	MD	NH		MARCH 2024
Supplier:			Quantity:				
Item			Unit	Offered			
6	MOTORS						
6.1	Nameplate power		kW				
6.2	Voltage		V				
6.3	Rated load current		Amps				
6.4	Frequency		Hz				
6.5	Phase		Ph.				
6.6	Insulation class		text				
6.7	No. of starts per hour		No.				
6.8	Description of ingress protection for motor (cable end)		text				
6.9	Cable length		m				
7	WEIGHT AND DIMENSIONS						
7.1	Pump wieght		kg				
7.2	Inlet (suction) diameter		mm				
7.3	Outlet (discharge) diameter		mm				
7.4	Pump height		mm				
<i>Regardless of any information provided in this technical detail sheet, the equipment to be provided will comply with the specified requirements.</i>							
Name (Print): _____ Signature: _____							

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				191Q/2023/24			
TD25: Primary Sludge Hydro Cyclone				CLIENT N°.		PAGE	
				ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD25: Primary Sludge Hydro Cyclone	AH	MD	NH		MARCH 2024
Supplier:			Quantity:				
Item			Unit	Offered			
1	GENERAL						
1.1	No. of units		No.				
1.1	Make and model		text				
1.2	Country of manufacture		text				
1.4	Spares address		text				
2	PERFORMANCE REQUIREMENTS						
2.1	Particle cut size (D ₅₀)		micron				
2.2	Minimum inlet pressure		kPa				
2.3	Operating pressure		kPa				
2.4	Maximum inlet pressure		kPa				
2.5	Pressure drop over cyclone		kPa				
2.6	Minimum / maximum flow		ℓ /s - ℓ /s				
2.7	Feed concentration (by volume)		%				
3	CONSTRUCTION AND DESIGN						
3.1	Installation (vertical / horizontal)		text				
3.2	Feed type (tangential or involuted)		text				
3.3	Flange drilling		text				
4	MATERIALS AND COATINGS						
4.1	Shell		text				
4.2	Liner		text				
4.3	Overflow pipe		text				
5	WEIGHT AND DIMENSIONS						
5.1	Mass of complete unit		kg				
5.2	Inlet diameter		DN				
5.3	Overflow elbow diameter		DN				
5.4	Vortex finder diameter		mm				
5.5	Vortex finder height		mm				



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DESIGN BUILD OF MECHANICAL
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UPGRADING AND EXPANSION OF
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TREATMENT WORKS

191Q/2023/24

TD25: Primary Sludge Hydro Cyclone

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Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD25: Primary Sludge Hydro Cyclone	AH	MD	NH		MARCH 2024

Supplier:		Quantity:	
Item		Unit	Offered
5	WEIGHT AND DIMENSIONS (CONTINUED)		
5.6	Outlet spigot (apex) diameter	mm	
5.7	Cylindrical chamber / barrel diameter	mm	
5.8	Height of cylinder chamber / barrel	mm	
5.9	Lower cone angle	mm	
5.10	Upper cone angle	mm	
5.11	Lower cone height	mm	
5.12	Upper cone height	mm	
5.13	Overall height (including overflow elbow and spigot)	mm	

Regardless of any information provided in this technical detail sheet, the equipment to be provided will comply with the specified requirements.

Name (Print): _____

Signature: _____

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				191Q/2023/24			
TD26: WAS Hydro Cyclone				CLIENT N°.		PAGE	
				ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD26: WAS Hydro Cyclone	AH	MD	NH		MARCH 2024
Supplier:			Quantity:				
Item		Unit	Offered				
1	GENERAL						
1.1	No. of units	No.					
1.1	Make and model	text					
1.2	Country of manufacture	text					
1.4	Spares address	text					
2	PERFORMANCE REQUIREMENTS						
2.1	Particle cut size (D ₅₀)	micron					
2.2	Minimum inlet pressure	kPa					
2.3	Operating pressure	kPa					
2.4	Maximum inlet pressure	kPa					
2.5	Pressure drop over cyclone	kPa					
2.6	Minimum / maximum flow	ℓ /s - ℓ /s					
2.7	Feed concentration (by volume)	%					
3	CONSTRUCTION AND DESIGN						
3.1	Installation (vertical / horizontal)	text					
3.2	Feed type (tangential or involuted)	text					
3.3	Flange drilling	text					
4	MATERIALS AND COATINGS						
4.1	Shell	text					
4.2	Liner	text					
4.3	Overflow pipe	text					
5	WEIGHT AND DIMENSIONS						
5.1	Mass of complete unit	kg					
5.2	Inlet diameter	DN					
5.3	Overflow elbow diameter	DN					
5.4	Vortex finder diameter	mm					
5.5	Vortex finder height	mm					



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TREATMENT WORKS

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TD26: WAS Hydro Cyclone

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Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD26: WAS Hydro Cyclone	AH	MD	NH		MARCH 2024

Supplier:		Quantity:	
Item		Unit	Offered
5	WEIGHT AND DIMENSIONS (CONTINUED)		
5.6	Outlet spigot (apex) diameter	mm	
5.7	Cylindrical chamber / barrel diameter	mm	
5.8	Height of cylinder chamber / barrel	mm	
5.9	Lower cone angle	mm	
5.10	Upper cone angle	mm	
5.11	Lower cone height	mm	
5.12	Upper cone height	mm	
5.13	Overall height (including overflow elbow and spigot)	mm	

Regardless of any information provided in this technical detail sheet, the equipment to be provided will comply with the specified requirements.

Name (Print): _____

Signature: _____

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TD27: Primary Sludge Holding Tank Mixing Pumps						CLIENT N°.		PAGE	
						ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date		
T0	D	TD27: Primary Sludge Holding Tank Mixing Pumps	AH	MD	NH		MARCH 2024		
Supplier:			Quantity:						
Item	Unit		Offered						
1	GENERAL								
1.1	Number of pumps		No.						
1.2	Make		text						
1.3	Model		text						
1.4	Country of manufacture		text						
1.5	Spares supplier and address		text						
2	PERFORMANCE REQUIREMENTS								
2.1	Shut-off head		m						
2.2	Flowrate at duty point (for water)		ℓ / s						
2.3	Head at duty point (for water)		m						
2.4	Flow range (min - max)		ℓ / s to ℓ / s						
2.5	Efficiency at duty point		%						
2.6	Best efficiency point		%						
2.7	NPSHrequired at duty point (absolute pressure)		m						
3	CONSTRUCTION AND DESIGN								
3.1	Pump type and description		text						
3.2	Maximum diameter of solid object that can be pumped		mm						
3.3	Pump seal type and description		text						
3.4	Description of impeller		text						
3.5	Design includes cutter for stringy materials		Yes / no						
3.6	Description of cutter (if applicable)		text						
3.7	Flange drilling		text						
3.8	Description of couplings		text						
4	MATERIALS AND COATINGS								
4.1	Pump casing		text						
4.2	Impeller		text						
4.3	Cutter		text						

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TD27: Primary Sludge Holding Tank Mixing Pumps		CLIENT N°.	PAGE				
		ZUTARI N°.	REV. T0				
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD27: Primary Sludge Holding Tank Mixing Pumps	AH	MD	NH		MARCH 2024
Supplier:			Quantity:				
Item		Unit	Offered				
4	MATERIALS AND COATINGS (CONTINUED)						
4.4	Shaft	text					
4.5	Wear ring (or equivalent)	text					
4.6	Seal Material	text					
4.7	Base frame	text					
4.8	Exterior coating	text					
5	MOTORS						
5.1	Make	text					
5.2	Model	text					
5.3	Nameplate power	kW					
5.4	Voltage	V					
5.5	Rated load current	Amps					
5.6	Frequency	Hz					
5.7	Phase	Ph.					
5.8	Ingress Protection	IP					
5.9	Weight	kg					
6	WEIGHT AND DIMENSIONS						
6.1	Mass (empty pump)	kg					
6.2	Impeller diameter	mm					
6.3	Inlet diameter	DN					
6.4	Outlet diameter	DN					
Regardless of any information provided in this technical detail sheet, the equipment to be provided will comply with the specified requirements. Name (Print): _____ Signature: _____							

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TD28: WAS Holding Tank Mixing Pumps				CLIENT N°.		PAGE	
				ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD28: WAS Holding Tank Mixing Pumps	AH	MD	NH		MARCH 2024
Supplier:			Quantity:				
Item			Unit	Offered			
1	GENERAL						
1.1	Number of pumps		No.				
1.2	Make		text				
1.3	Model		text				
1.4	Country of manufacture		text				
1.5	Spares supplier and address		text				
2	PERFORMANCE REQUIREMENTS						
2.1	Shut-off head		m				
2.2	Flowrate at duty point (for water)		ℓ /s				
2.3	Head at duty point (for water)		m				
2.4	Flow range (min - max)		ℓ /s to ℓ /s				
2.5	Efficiency at duty point		%				
2.6	Best efficiency point		%				
2.7	NPSHrequired at duty point (absolute pressure)		m				
3	CONSTRUCTION AND DESIGN						
3.1	Pump type and description		text				
3.2	Maximum diameter of solid object that can be pumped		mm				
3.3	Pump seal type and description		text				
3.4	Description of impeller		text				
3.5	Design includes cutter for stringy materials		Yes / no				
3.6	Description of cutter (if applicable)		text				
3.7	Flange drilling		text				
3.8	Description of couplings		text				
4	MATERIALS AND COATINGS						
4.1	Pump casing		text				
4.2	Impeller		text				
4.3	Cutter		text				



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UPGRADING AND EXPANSION OF
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TREATMENT WORKS**

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TD28: WAS Holding Tank Mixing Pumps

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Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD28: WAS Holding Tank Mixing Pumps	AH	MD	NH		MARCH 2024

Supplier:		Quantity:	
Item		Unit	Offered
4	MATERIALS AND COATINGS (CONTINUED)		
4.4	Shaft	text	
4.5	Wear ring (or equivalent)	text	
4.6	Seal Material	text	
4.7	Base frame	text	
4.8	Exterior coating	text	
5	MOTORS		
5.1	Make	text	
5.2	Model	text	
5.3	Nameplate power	kW	
5.4	Voltage	V	
5.5	Rated load current	Amps	
5.6	Frequency	Hz	
5.7	Phase	Ph.	
5.8	Ingress Protection	IP	
5.9	Weight	kg	
6	WEIGHT AND DIMENSIONS		
6.1	Mass (empty pump)	kg	
6.2	Impeller diameter	mm	
6.3	Inlet diameter	DN	
6.4	Outlet diameter	DN	

Regardless of any information provided in this technical detail sheet, the equipment to be provided will comply with the specified requirements.

Name (Print): _____

Signature: _____

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				191Q/2023/24			
TD29: Digester Mixing Pumps				CLIENT N°.		PAGE	
				ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD29: Digester Mixing Pumps	AH	MD	NH		MARCH 2024
Supplier:			Quantity:				
Item		Unit	Offered				
1	GENERAL						
1.1	Number of pumps	No.					
1.2	Make	text					
1.3	Model	text					
1.4	Country of manufacture	text					
1.5	Spares supplier and address	text					
2	PERFORMANCE REQUIREMENTS						
2.1	Shut-off head	m					
2.2	Flowrate at duty point (for water)	ℓ /s					
2.3	Head at duty point (for water)	m					
2.4	Flow range (min - max)	ℓ /s to ℓ /s					
2.5	Efficiency at duty point	%					
2.6	Best efficiency point	%					
2.7	NPSHrequired at duty point (absolute pressure)	m					
3	CONSTRUCTION AND DESIGN						
3.1	Pump type and description	text					
3.2	Maximum diameter of solid object that can be pumped	mm					
3.3	Pump seal type and description	text					
3.4	Description of impeller	text					
3.5	Design includes cutter for stringy materials	Yes / no					
3.6	Description of cutter (if applicable)	text					
3.7	Flange drilling	text					
3.8	Description of couplings	text					
4	MATERIALS AND COATINGS						
4.1	Pump casing	text					
4.2	Impeller	text					
4.3	Cutter	text					

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		191Q/2023/24					
TD29: Digester Mixing Pumps		CLIENT N°. PAGE ZUTARI N°. REV. T0					
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD29: Digester Mixing Pumps	AH	MD	NH		MARCH 2024
Supplier:			Quantity:				
Item		Unit	Offered				
4	MATERIALS AND COATINGS (CONTINUED)						
4.4	Shaft	text					
4.5	Wear ring (or equivalent)	text					
4.6	Seal Material	text					
4.7	Base frame	text					
4.8	Exterior coating	text					
5	MOTORS						
5.1	Make	text					
5.2	Model	text					
5.3	Nameplate power	kW					
5.4	Voltage	V					
5.5	Rated load current	Amps					
5.6	Frequency	Hz					
5.7	Phase	Ph.					
5.8	Ingress Protection	IP					
5.9	Weight	kg					
6	WEIGHT AND DIMENSIONS						
6.1	Mass (empty pump)	kg					
6.2	Impeller diameter	mm					
6.3	Inlet diameter	DN					
6.4	Outlet diameter	DN					
<i>Regardless of any information provided in this technical detail sheet, the equipment to be provided will comply with the specified requirements.</i>							
Name (Print): _____ Signature: _____							

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				191Q/2023/24			
TD30: Digested Sludge Recirculation Pumps				CLIENT N°.		PAGE	
				ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD30: Digested Sludge Recirculation Pumps	AH	MD	NH		MARCH 2024
Supplier:			Quantity:				
Item			Unit	Offered			
1	GENERAL						
1.1	Number of pumps		No.				
1.2	Make		text				
1.3	Model		text				
1.4	Country of manufacture		text				
1.5	Spares supplier and address		text				
2	PERFORMANCE REQUIREMENTS						
2.1	Shut-off head		m				
2.2	Flowrate at duty point (for water)		ℓ /s				
2.3	Head at duty point (for water)		m				
2.4	Flow range (min - max)		ℓ /s to ℓ /s				
2.5	Efficiency at duty point		%				
2.6	Best efficiency point		%				
2.7	NPSHrequired at duty point (absolute pressure)		m				
3	CONSTRUCTION AND DESIGN						
3.1	Pump type and description		text				
3.2	Maximum diameter of solid object that can be pumped		mm				
3.3	Pump seal type and description		text				
3.4	Description of impeller		text				
3.5	Design includes cutter for stringy materials		Yes / no				
3.6	Description of cutter (if applicable)		text				
3.7	Flange drilling		text				
3.8	Description of couplings		text				
4	MATERIALS AND COATINGS						
4.1	Pump casing		text				
4.2	Impeller		text				
4.3	Cutter		text				

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TD30: Digested Sludge Recirculation Pumps		CLIENT N°.	PAGE				
		ZUTARI N°.	REV. T0				
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD30: Digested Sludge Recirculation Pumps	AH	MD	NH		MARCH 2024
Supplier:			Quantity:				
Item		Unit	Offered				
4	MATERIALS AND COATINGS (CONTINUED)						
4.4	Shaft	text					
4.5	Wear ring (or equivalent)	text					
4.6	Seal Material	text					
4.7	Base frame	text					
4.8	Exterior coating	text					
5	MOTORS						
5.1	Make	text					
5.2	Model	text					
5.3	Nameplate power	kW					
5.4	Voltage	V					
5.5	Rated load current	Amps					
5.6	Frequency	Hz					
5.7	Phase	Ph.					
5.8	Ingress Protection	IP					
5.9	Weight	kg					
6	WEIGHT AND DIMENSIONS						
6.1	Mass (empty pump)	kg					
6.2	Impeller diameter	mm					
6.3	Inlet diameter	DN					
6.4	Outlet diameter	DN					
Regardless of any information provided in this technical detail sheet, the equipment to be provided will comply with the specified requirements. Name (Print): _____ Signature: _____							

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TD31: Scum Pumps				CLIENT N°.		PAGE	
				ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD31: Scum Pumps	AH	MD	NH		MARCH 2024
Supplier:			Quantity:				
Item			Unit	Offered			
1	GENERAL						
1.1	Number of pumps		No.				
1.2	Make		text				
1.3	Model		text				
1.4	Country of manufacture		text				
1.5	Spares supplier and address		text				
2	PERFORMANCE REQUIREMENTS						
2.1	Flow range		ℓ /s - ℓ /s				
2.2	Pressure range		bar - bar				
2.3	Flowrate at duty point		m ³ /h				
2.4	Pressure at duty point		bar				
2.5	Speed at duty point		rpm				
2.6	Solids content range		% DS - % DS				
2.7	Starting torque		Nm				
2.8	Maximum inlet pressure		bar				
2.9	Sliding / rubbing velocity		m/s				
3	OPERATION AND CONTROL						
3.1	Operation mode		Continuous / intermittent				
3.2	Installation orientation		Vertical / horizontal				
3.3	Details of stator temperature measurement		text				
3.4	Details of method to prevent dry running		text				
4	CONSTRUCTION AND DESIGN						
4.1	Mechanical seal make and model		text				
4.2	Flange design		text				

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TD31: Scum Pumps				CLIENT N°.		PAGE	
				ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD31: Scum Pumps	AH	MD	NH		MARCH 2024
Supplier:			Quantity:				
Item			Unit	Offered			
5	MATERIALS AND COATINGS						
5.1	Pump housing		text				
5.2	Base plate		text				
5.3	Rotor		text				
5.4	Stator		text				
5.5	Shaft seals		text				
5.6	Nameplate		text				
5.7	Exterior coating system		text				
6	MOTORS						
6.1	Make		text				
6.2	Model		text				
6.3	Nameplate power		kW				
6.4	Voltage		V				
6.5	Rated load current		Amps				
6.6	Frequency		Hz				
6.7	Phase		Ph.				
6.8	Ingress Protection		IP				
6.9	Weight		kg				
7	GEARBOXES						
7.1	Make		text				
7.2	Model		text				
7.3	Gearbox type		text				
7.4	Gearbox service factor		text				
7.5	Power		kW				
7.6	Torque		Nm				
7.7	Input speed (N _i)		rpm				
7.8	Output speed (N _o)		rpm				
7.9	Ratio		-				
7.10	Weight		kg				



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TD31: Scum Pumps

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Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD31: Scum Pumps	AH	MD	NH		MARCH 2024

Supplier:		Quantity:	
Item		Unit	Offered
8	WEIGHT AND DIMENSIONS		
8.1	Total mass (assembled, pump empty)	kg	
8.2	Inlet flange size	mm	
8.3	Outlet flange size	mm	
8.4	Total length (assembled, pump + motor + gearbox)	mm	
8.5	Installed height (base plate to outlet flange)	mm	
8.6	Space required for disassembly / re-assembly pump	mm	

Regardless of any information provided in this technical detail sheet, the equipment to be provided will comply with the specified requirements.

Name (Print): _____

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TD32: Digester Feed Pumps				CLIENT N°.		PAGE	
				ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD32: Digester Feed Pumps	AH	MD	NH		MARCH 2024
Supplier:			Quantity:				
Item	Unit		Offered				
1	GENERAL						
1.1	Number of pumps		No.				
1.2	Make		text				
1.3	Model		text				
1.4	Country of manufacture		text				
1.5	Spares supplier and address		text				
2	PERFORMANCE REQUIREMENTS						
2.1	Flow range		ℓ /s - ℓ /s				
2.2	Pressure range		bar - bar				
2.3	Flowrate at duty point		m ³ /h				
2.4	Pressure at duty point		bar				
2.5	Speed at duty point		rpm				
2.6	Solids content range		% DS - % DS				
2.7	Starting torque		Nm				
2.8	Maximum inlet pressure		bar				
2.9	Sliding / rubbing velocity		m/s				
3	OPERATION AND CONTROL						
3.1	Operation mode		Continuous / intermittent				
3.2	Installation orientation		Vertical / horizontal				
3.3	Details of stator temperature measurement		text				
3.4	Details of method to prevent dry running		text				
4	CONSTRUCTION AND DESIGN						
4.1	Mechanical seal make and model		text				
4.2	Flange design		text				

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TD32: Digester Feed Pumps				CLIENT N°.		PAGE	
				ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD32: Digester Feed Pumps	AH	MD	NH		MARCH 2024
Supplier:			Quantity:				
Item	Unit		Offered				
5	MATERIALS AND COATINGS						
5.1	Pump housing	text					
5.2	Base plate	text					
5.3	Rotor	text					
5.4	Stator	text					
5.5	Shaft seals	text					
5.6	Nameplate	text					
5.7	Exterior coating system	text					
6	MOTORS						
6.1	Make	text					
6.2	Model	text					
6.3	Nameplate power	kW					
6.4	Voltage	V					
6.5	Rated load current	Amps					
6.6	Frequency	Hz					
6.7	Phase	Ph.					
6.8	Ingress Protection	IP					
6.9	Weight	kg					
7	GEARBOXES						
7.1	Make	text					
7.2	Model	text					
7.3	Gearbox type	text					
7.4	Gearbox service factor	text					
7.5	Power	kW					
7.6	Torque	Nm					
7.7	Input speed (N _i)	rpm					
7.8	Output speed (N _o)	rpm					
7.9	Ratio	-					
7.10	Weight	kg					



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Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD32: Digester Feed Pumps	AH	MD	NH		MARCH 2024

Supplier:		Quantity:	
Item		Unit	Offered
8	WEIGHT AND DIMENSIONS		
8.1	Total mass (assembled, pump empty)	kg	
8.2	Inlet flange size	mm	
8.3	Outlet flange size	mm	
8.4	Total length (assembled, pump + motor + gearbox)	mm	
8.5	Installed height (base plate to outlet flange)	mm	
8.6	Space required for disassembly / re-assembly pump	mm	

Regardless of any information provided in this technical detail sheet, the equipment to be provided will comply with the specified requirements.

Name (Print): _____

Signature: _____

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TD33: WAS Transfer Pumps				CLIENT N°.		PAGE	
				ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD33: WAS Transfer Pumps	AH	MD	NH		MARCH 2024
Supplier:			Quantity:				
Item	Unit		Offered				
1	GENERAL						
1.1	Number of pumps		No.				
1.2	Make		text				
1.3	Model		text				
1.4	Country of manufacture		text				
1.5	Spares supplier and address		text				
2	PERFORMANCE REQUIREMENTS						
2.1	Flow range		ℓ /s - ℓ /s				
2.2	Pressure range		bar - bar				
2.3	Flowrate at duty point		m ³ /h				
2.4	Pressure at duty point		bar				
2.5	Speed at duty point		rpm				
2.6	Solids content range		% DS - % DS				
2.7	Starting torque		Nm				
2.8	Maximum inlet pressure		bar				
2.9	Sliding / rubbing velocity		m/s				
3	OPERATION AND CONTROL						
3.1	Operation mode		Continuous / intermittent				
3.2	Installation orientation		Vertical / horizontal				
3.3	Details of stator temperature measurement		text				
3.4	Details of method to prevent dry running		text				
4	CONSTRUCTION AND DESIGN						
4.1	Mechanical seal make and model		text				
4.2	Flange design		text				

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TD33: WAS Transfer Pumps				CLIENT N°.		PAGE	
				ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD33: WAS Transfer Pumps	AH	MD	NH		MARCH 2024
Supplier:			Quantity:				
Item	Unit		Offered				
5	MATERIALS AND COATINGS						
5.1	Pump housing	text					
5.2	Base plate	text					
5.3	Rotor	text					
5.4	Stator	text					
5.5	Shaft seals	text					
5.6	Nameplate	text					
5.7	Exterior coating system	text					
6	MOTORS						
6.1	Make	text					
6.2	Model	text					
6.3	Nameplate power	kW					
6.4	Voltage	V					
6.5	Rated load current	Amps					
6.6	Frequency	Hz					
6.7	Phase	Ph.					
6.8	Ingress Protection	IP					
6.9	Weight	kg					
7	GEARBOXES						
7.1	Make	text					
7.2	Model	text					
7.3	Gearbox type	text					
7.4	Gearbox service factor	text					
7.5	Power	kW					
7.6	Torque	Nm					
7.7	Input speed (N _i)	rpm					
7.8	Output speed (N _o)	rpm					
7.9	Ratio	-					
7.10	Weight	kg					



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Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD33: WAS Transfer Pumps	AH	MD	NH		MARCH 2024

Supplier:		Quantity:	
Item		Unit	Offered
8	WEIGHT AND DIMENSIONS		
8.1	Total mass (assembled, pump empty)	kg	
8.2	Inlet flange size	mm	
8.3	Outlet flange size	mm	
8.4	Total length (assembled, pump + motor + gearbox)	mm	
8.5	Installed height (base plate to outlet flange)	mm	
8.6	Space required for disassembly / re-assembly pump	mm	

Regardless of any information provided in this technical detail sheet, the equipment to be provided will comply with the specified requirements.

Name (Print): _____

Signature: _____

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TD34: Belt Press Feed Pumps				CLIENT N°.		PAGE	
				ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD34: Belt Press Feed Pumps	AH	MD	NH		MARCH 2024
Supplier:		Quantity:					
Item	Unit		Offered				
1	GENERAL						
1.1	Number of pumps		No.				
1.2	Make		text				
1.3	Model		text				
1.4	Country of manufacture		text				
1.5	Spares supplier and address		text				
2	PERFORMANCE REQUIREMENTS						
2.1	Flow range		ℓ /s - ℓ /s				
2.2	Pressure range		bar - bar				
2.3	Flowrate at duty point		m ³ /h				
2.4	Pressure at duty point		bar				
2.5	Speed at duty point		rpm				
2.6	Solids content range		% DS - % DS				
2.7	Starting torque		Nm				
2.8	Maximum inlet pressure		bar				
2.9	Sliding / rubbing velocity		m/s				
3	OPERATION AND CONTROL						
3.1	Operation mode		Continuous / intermittent				
3.2	Installation orientation		Vertical / horizontal				
3.3	Details of stator temperature measurement		text				
3.4	Details of method to prevent dry running		text				
4	CONSTRUCTION AND DESIGN						
4.1	Mechanical seal make and model		text				
4.2	Flange design		text				

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TD34: Belt Press Feed Pumps				CLIENT N°.		PAGE	
				ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD34: Belt Press Feed Pumps	AH	MD	NH		MARCH 2024
Supplier:			Quantity:				
Item	Unit		Offered				
5	MATERIALS AND COATINGS						
5.1	Pump housing	text					
5.2	Base plate	text					
5.3	Rotor	text					
5.4	Stator	text					
5.5	Shaft seals	text					
5.6	Nameplate	text					
5.7	Exterior coating system	text					
6	MOTORS						
6.1	Make	text					
6.2	Model	text					
6.3	Nameplate power	kW					
6.4	Voltage	V					
6.5	Rated load current	Amps					
6.6	Frequency	Hz					
6.7	Phase	Ph.					
6.8	Ingress Protection	IP					
6.9	Weight	kg					
7	GEARBOXES						
7.1	Make	text					
7.2	Model	text					
7.3	Gearbox type	text					
7.4	Gearbox service factor	text					
7.5	Power	kW					
7.6	Torque	Nm					
7.7	Input speed (N _i)	rpm					
7.8	Output speed (N _o)	rpm					
7.9	Ratio	-					
7.10	Weight	kg					



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Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD34: Belt Press Feed Pumps	AH	MD	NH		MARCH 2024

Supplier:		Quantity:	
Item		Unit	Offered
8	WEIGHT AND DIMENSIONS		
8.1	Total mass (assembled, pump empty)	kg	
8.2	Inlet flange size	mm	
8.3	Outlet flange size	mm	
8.4	Total length (assembled, pump + motor + gearbox)	mm	
8.5	Installed height (base plate to outlet flange)	mm	
8.6	Space required for disassembly / re-assembly pump	mm	

Regardless of any information provided in this technical detail sheet, the equipment to be provided will comply with the specified requirements.

Name (Print): _____

Signature: _____

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TD35: Linear Screen Feed Pumps				CLIENT N°.		PAGE	
				ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD35: Linear Screen Feed Pumps	AH	MD	NH		MARCH 2024
Supplier:			Quantity:				
Item	Unit		Offered				
1	GENERAL						
1.1	Number of pumps		No.				
1.2	Make		text				
1.3	Model		text				
1.4	Country of manufacture		text				
1.5	Spares supplier and address		text				
2	PERFORMANCE REQUIREMENTS						
2.1	Flow range		ℓ /s - ℓ /s				
2.2	Pressure range		bar - bar				
2.3	Flowrate at duty point		m ³ /h				
2.4	Pressure at duty point		bar				
2.5	Speed at duty point		rpm				
2.6	Solids content range		% DS - % DS				
2.7	Starting torque		Nm				
2.8	Maximum inlet pressure		bar				
2.9	Sliding / rubbing velocity		m/s				
3	OPERATION AND CONTROL						
3.1	Operation mode		Continuous / intermittent				
3.2	Installation orientation		Vertical / horizontal				
3.3	Details of stator temperature measurement		text				
3.4	Details of method to prevent dry running		text				
4	CONSTRUCTION AND DESIGN						
4.1	Mechanical seal make and model		text				
4.2	Flange design		text				

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TD35: Linear Screen Feed Pumps				CLIENT N°.		PAGE	
				ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD35: Linear Screen Feed Pumps	AH	MD	NH		MARCH 2024
Supplier:			Quantity:				
Item	Unit		Offered				
5	MATERIALS AND COATINGS						
5.1	Pump housing	text					
5.2	Base plate	text					
5.3	Rotor	text					
5.4	Stator	text					
5.5	Shaft seals	text					
5.6	Nameplate	text					
5.7	Exterior coating system	text					
6	MOTORS						
6.1	Make	text					
6.2	Model	text					
6.3	Nameplate power	kW					
6.4	Voltage	V					
6.5	Rated load current	Amps					
6.6	Frequency	Hz					
6.7	Phase	Ph.					
6.8	Ingress Protection	IP					
6.9	Weight	kg					
7	GEARBOXES						
7.1	Make	text					
7.2	Model	text					
7.3	Gearbox type	text					
7.4	Gearbox service factor	text					
7.5	Power	kW					
7.6	Torque	Nm					
7.7	Input speed (N _i)	rpm					
7.8	Output speed (N _o)	rpm					
7.9	Ratio	-					
7.10	Weight	kg					



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Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD35: Linear Screen Feed Pumps	AH	MD	NH		MARCH 2024

Supplier:		Quantity:	
Item		Unit	Offered
8	WEIGHT AND DIMENSIONS		
8.1	Total mass (assembled, pump empty)	kg	
8.2	Inlet flange size	mm	
8.3	Outlet flange size	mm	
8.4	Total length (assembled, pump + motor + gearbox)	mm	
8.5	Installed height (base plate to outlet flange)	mm	
8.6	Space required for disassembly / re-assembly pump	mm	

Regardless of any information provided in this technical detail sheet, the equipment to be provided will comply with the specified requirements.

Name (Print): _____

Signature: _____

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TD36: Poly Dosing Pumps				CLIENT N°.		PAGE	
				ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD36: Poly Dosing Pumps	AH	MD	NH		MARCH 2024
Supplier:			Quantity:				
Item			Unit	Offered			
1	GENERAL						
1.1	Number of pumps		No.				
1.2	Make		text				
1.3	Model		text				
1.4	Country of manufacture		text				
1.5	Spares supplier and address		text				
2	PERFORMANCE REQUIREMENTS						
2.1	Flow range		ℓ /s - ℓ /s				
2.2	Pressure range		bar - bar				
2.3	Flowrate at duty point		m ³ /h				
2.4	Pressure at duty point		bar				
2.5	Speed at duty point		rpm				
2.6	Solids content range		% DS - % DS				
2.7	Starting torque		Nm				
2.8	Maximum inlet pressure		bar				
2.9	Sliding / rubbing velocity		m/s				
3	OPERATION AND CONTROL						
3.1	Operation mode		Continuous / intermittent				
3.2	Installation orientation		Vertical / horizontal				
3.3	Details of stator temperature measurement		text				
3.4	Details of method to prevent dry running		text				
4	CONSTRUCTION AND DESIGN						
4.1	Mechanical seal make and model		text				
4.2	Flange design		text				

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TD36: Poly Dosing Pumps				CLIENT N°.		PAGE	
				ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD36: Poly Dosing Pumps	AH	MD	NH		MARCH 2024
Supplier:			Quantity:				
Item			Unit	Offered			
5	MATERIALS AND COATINGS						
5.1	Pump housing		text				
5.2	Base plate		text				
5.3	Rotor		text				
5.4	Stator		text				
5.5	Shaft seals		text				
5.6	Nameplate		text				
5.7	Exterior coating system		text				
6	MOTORS						
6.1	Make		text				
6.2	Model		text				
6.3	Nameplate power		kW				
6.4	Voltage		V				
6.5	Rated load current		Amps				
6.6	Frequency		Hz				
6.7	Phase		Ph.				
6.8	Ingress Protection		IP				
6.9	Weight		kg				
7	GEARBOXES						
7.1	Make		text				
7.2	Model		text				
7.3	Gearbox type		text				
7.4	Gearbox service factor		text				
7.5	Power		kW				
7.6	Torque		Nm				
7.7	Input speed (N _i)		rpm				
7.8	Output speed (N _o)		rpm				
7.9	Ratio		-				
7.10	Weight		kg				



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Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD36: Poly Dosing Pumps	AH	MD	NH		MARCH 2024

Supplier:		Quantity:	
Item		Unit	Offered
8	WEIGHT AND DIMENSIONS		
8.1	Total mass (assembled, pump empty)	kg	
8.2	Inlet flange size	mm	
8.3	Outlet flange size	mm	
8.4	Total length (assembled, pump + motor + gearbox)	mm	
8.5	Installed height (base plate to outlet flange)	mm	
8.6	Space required for disassembly / re-assembly pump	mm	

Regardless of any information provided in this technical detail sheet, the equipment to be provided will comply with the specified requirements.

Name (Print): _____

Signature: _____

 CITY OF CAPE TOWN ISIXEKO SASEKAPA STAD KAAPSTAD Making progress possible. Together.				DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS 191Q/2023/24			
TD37: Primary Sludge Cake Pumps				CLIENT N°.		PAGE	
				ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD37: Primary Sludge Cake Pumps	AH	MD	NH		MARCH 2024
Supplier:		Quantity:					
Item	Unit		Offered				
1	GENERAL						
1.1	Number of pumps		No.				
1.2	Make		text				
1.3	Model		text				
1.4	Country of manufacture		text				
1.5	Spares supplier and address		text				
2	PERFORMANCE REQUIREMENTS						
2.1	Flow range		ℓ /s - ℓ /s				
2.2	Pressure range		bar - bar				
2.3	Flowrate at duty point		m ³ /h				
2.4	Pressure at duty point		bar				
2.5	Speed at duty point		rpm				
2.6	Solids content range		% DS - % DS				
2.7	Starting torque		Nm				
2.8	Maximum inlet pressure		bar				
2.9	Sliding / rubbing velocity		m/s				
3	OPERATION AND CONTROL						
3.1	Operation mode		Continuous / intermittent				
3.2	Installation orientation		Vertical / horizontal				
3.3	Details of stator temperature measurement		text				
3.4	Details of method to prevent dry running		text				
4	CONSTRUCTION AND DESIGN						
4.1	Mechanical seal make and model		text				
4.2	Flange design		text				

 CITY OF CAPE TOWN ISIXEKO SASEKAPA STAD KAAPSTAD Making progress possible. Together.				DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS 191Q/2023/24			
TD37: Primary Sludge Cake Pumps				CLIENT N°.		PAGE	
				ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD37: Primary Sludge Cake Pumps	AH	MD	NH		MARCH 2024
Supplier:			Quantity:				
Item	Unit		Offered				
5	MATERIALS AND COATINGS						
5.1	Pump housing	text					
5.2	Base plate	text					
5.3	Rotor	text					
5.4	Stator	text					
5.5	Shaft seals	text					
5.6	Nameplate	text					
5.7	Exterior coating system	text					
6	MOTORS						
6.1	Make	text					
6.2	Model	text					
6.3	Nameplate power	kW					
6.4	Voltage	V					
6.5	Rated load current	Amps					
6.6	Frequency	Hz					
6.7	Phase	Ph.					
6.8	Ingress Protection	IP					
6.9	Weight	kg					
7	GEARBOXES						
7.1	Make	text					
7.2	Model	text					
7.3	Gearbox type	text					
7.4	Gearbox service factor	text					
7.5	Power	kW					
7.6	Torque	Nm					
7.7	Input speed (N _i)	rpm					
7.8	Output speed (N _o)	rpm					
7.9	Ratio	-					
7.10	Weight	kg					



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DESIGN BUILD OF MECHANICAL
AND ELECTRICAL WORKS FOR THE
UPGRADING AND EXPANSION OF
THE MACASSAR WASTEWATER
TREATMENT WORKS

191Q/2023/24

TD37: Primary Sludge Cake Pumps

CLIENT N°.

PAGE

ZUTARI N°.

REV.

T0

Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD37: Primary Sludge Cake Pumps	AH	MD	NH		MARCH 2024

Supplier:		Quantity:	
Item		Unit	Offered
8	WEIGHT AND DIMENSIONS		
8.1	Total mass (assembled, pump empty)	kg	
8.2	Inlet flange size	mm	
8.3	Outlet flange size	mm	
8.4	Total length (assembled, pump + motor + gearbox)	mm	
8.5	Installed height (base plate to outlet flange)	mm	
8.6	Space required for disassembly / re-assembly pump	mm	

Regardless of any information provided in this technical detail sheet, the equipment to be provided will comply with the specified requirements.

Name (Print): _____

Signature: _____

 CITY OF CAPE TOWN ISIXEKO SASEKAPA STAD KAAPSTAD Making progress possible. Together.				DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS 191Q/2023/24			
TD38: WAS Cake Pumps				CLIENT N°.		PAGE	
				ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD38: WAS Cake Pumps	AH	MD	NH		MARCH 2024
Supplier:			Quantity:				
Item	Unit		Offered				
1	GENERAL						
1.1	Number of pumps		No.				
1.2	Make		text				
1.3	Model		text				
1.4	Country of manufacture		text				
1.5	Spares supplier and address		text				
2	PERFORMANCE REQUIREMENTS						
2.1	Flow range		ℓ /s - ℓ /s				
2.2	Pressure range		bar - bar				
2.3	Flowrate at duty point		m ³ /h				
2.4	Pressure at duty point		bar				
2.5	Speed at duty point		rpm				
2.6	Solids content range		% DS - % DS				
2.7	Starting torque		Nm				
2.8	Maximum inlet pressure		bar				
2.9	Sliding / rubbing velocity		m/s				
3	OPERATION AND CONTROL						
3.1	Operation mode		Continuous / intermittent				
3.2	Installation orientation		Vertical / horizontal				
3.3	Details of stator temperature measurement		text				
3.4	Details of method to prevent dry running		text				
4	CONSTRUCTION AND DESIGN						
4.1	Mechanical seal make and model		text				
4.2	Flange design		text				

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TD38: WAS Cake Pumps				CLIENT N°.		PAGE	
				ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD38: WAS Cake Pumps	AH	MD	NH		MARCH 2024
Supplier:			Quantity:				
Item	Unit		Offered				
5	MATERIALS AND COATINGS						
5.1	Pump housing	text					
5.2	Base plate	text					
5.3	Rotor	text					
5.4	Stator	text					
5.5	Shaft seals	text					
5.6	Nameplate	text					
5.7	Exterior coating system	text					
6	MOTORS						
6.1	Make	text					
6.2	Model	text					
6.3	Nameplate power	kW					
6.4	Voltage	V					
6.5	Rated load current	Amps					
6.6	Frequency	Hz					
6.7	Phase	Ph.					
6.8	Ingress Protection	IP					
6.9	Weight	kg					
7	GEARBOXES						
7.1	Make	text					
7.2	Model	text					
7.3	Gearbox type	text					
7.4	Gearbox service factor	text					
7.5	Power	kW					
7.6	Torque	Nm					
7.7	Input speed (N _i)	rpm					
7.8	Output speed (N _o)	rpm					
7.9	Ratio	-					
7.10	Weight	kg					



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THE MACASSAR WASTEWATER
TREATMENT WORKS

191Q/2023/24

TD38: WAS Cake Pumps

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REV.

T0

Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD38: WAS Cake Pumps	AH	MD	NH		MARCH 2024

Supplier:		Quantity:	
Item		Unit	Offered
8	WEIGHT AND DIMENSIONS		
8.1	Total mass (assembled, pump empty)	kg	
8.2	Inlet flange size	mm	
8.3	Outlet flange size	mm	
8.4	Total length (assembled, pump + motor + gearbox)	mm	
8.5	Installed height (base plate to outlet flange)	mm	
8.6	Space required for disassembly / re-assembly pump	mm	

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Name (Print): _____

Signature: _____

 CITY OF CAPE TOWN ISIXEKO SASEKAPA STAD KAAPSTAD Making progress possible. Together.				DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS 191Q/2023/24			
TD39: Primary Sludge Belt Presses				CLIENT N°.		PAGE	
				ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD39: Primary Sludge Belt Presses	AH	MD	NH		MARCH 2024
Supplier:		Quantity:					
Item	Unit		Offered				
1	GENERAL						
1.1	Number of machines		No.				
1.2	Make		text				
1.3	Model		text				
1.4	Country of manufacture		text				
1.5	Spares supplier and address		text				
2	PERFORMANCE REQUIREMENTS						
2.1	Hydraulic capacity (per machine)		m³/h - m³/h				
2.2	Solids capacity (per machine)		kg DS/d - kg DS/d				
2.3	Hydraulic loading / m of belt width		m³/h				
2.4	Solids loading / m of belt width		kg/h				
2.5	Feed solids concentration range		%DS - %DS				
2.6	Discharge solids concentration range		%DS - %DS				
2.7	Wash water requirement (per machine)		m³/h @ bar				
2.8	Approximate flocculant consumption		g / kg DS				
3	OPERATION AND CONTROL						
3.1	Flocculant control system		Yes / No				
3.2	Belt alignment system (left and right)		Yes / No				
3.3	Description of belt tensioners		text				
3.4	Details of overload protection		text				
3.5	Description of belt break detection system		text				
4	CONSTRUCTION AND DESIGN						
4.1	Total belt width		m				
4.2	Effective belt width m		m				
4.3	No. of high pressure zone rollers		No.				
4.4	No. of low pressure zone rollers		No.				
4.5	Operating range (hydraulic)		text				
4.6	Operating range (solids)		text				

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TD39: Primary Sludge Belt Presses				CLIENT N°.		PAGE	
				ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD39: Primary Sludge Belt Presses	AH	MD	NH		MARCH 2024
Supplier:			Quantity:				
Item			Unit	Offered			
4	CONSTRUCTION AND DESIGN (CONTINUED)						
4.7	Requirements for foundation (size and forces)		text				
4.8	Description of belt cleaning system		text				
4.9	Details of centralised lubrication system		text				
5	MATERIALS AND COATINGS						
5.1	Belt press frame		text				
5.2	Seals		text				
5.3	Rollers		text				
5.4	Heavy duty bearing housing		text				
5.5	Hydraulic unit tank		text				
5.6	Hydraulic system piping		text				
5.7	Odour hood covers		text				
6	MOTORS						
6.1	Belt Press Drive 1						
6.1.1	Make		text				
6.1.2	Model		text				
6.1.3	Nameplate power		kW				
6.1.4	Voltage		V				
6.1.5	Rated load current		Amps				
6.1.6	Frequency		Hz				
6.1.7	Phase		Ph.				
6.1.8	Ingress Protection		Ph.				
6.1.9	Weight		kg				
6.2	Belt Press Drive 2						
6.2.1	Make		text				
6.2.2	Model		text				
6.2.3	Nameplate power		kW				
6.2.4	Voltage		V				

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TD39: Primary Sludge Belt Presses				CLIENT N°.		PAGE	
				ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD39: Primary Sludge Belt Presses	AH	MD	NH		MARCH 2024
Supplier:			Quantity:				
Item	Unit		Offered				
6	MOTORS (CONTINUED)						
6.1	Belt Press Drive 1						
6.2.5	Rated load current	Amps					
6.2.6	Frequency	Hz					
6.2.7	Phase	Ph.					
6.2.8	Ingress Protection	Ph.					
6.2.9	Weight	kg					
6.3	Hydraulic Unit						
6.3.1	Make	text					
6.3.2	Model	text					
6.3.3	Nameplate power	kW					
6.3.4	Voltage	V					
6.3.5	Rated load current	Amps					
6.3.6	Frequency	Hz					
6.3.7	Phase	Ph.					
6.3.8	Ingress Protection	IP					
6.3.9	Weight	kg					
7	GEARBOXES						
7.1	Belt Press Drive 1						
7.1.1	Make	text					
7.1.2	Model	text					
7.1.3	Gearbox type	text					
7.1.4	Gearbox service factor	text					
7.1.5	Power	kW					
7.1.6	Torque	Nm					
7.1.7	Input speed (N _i)	rpm					
7.1.8	Output speed (N ₁)	rpm					
7.1.9	Ratio	-					
7.1.10	Weight	kg					

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TD39: Primary Sludge Belt Presses		CLIENT N°.	PAGE				
		ZUTARI N°.	REV.				
		T0					
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD39: Primary Sludge Belt Presses	AH	MD	NH		MARCH 2024
Supplier:			Quantity:				
Item			Unit	Offered			
7	GEARBOXES (CONTINUED)						
7.2	Belt Press Drive 2						
7.2.1	Make		text				
7.2.2	Model		text				
7.2.3	Gearbox type		text				
7.2.4	Gearbox service factor		text				
7.2.5	Power		kW				
7.2.6	Torque		Nm				
7.2.7	Input speed (N ₁)		rpm				
7.2.8	Output speed (N ₁)		rpm				
7.2.9	Ratio		-				
7.2.10	Weight		kg				
8	WEIGHT AND DIMENSIONS						
8.1	Overall mass of unit, dry		kg				
8.2	Overall mass of unit, wet		kg				
8.3	Machine length		mm				
8.4	Machine width (including drive unit)		mm				
8.5	Machine height		mm				
8.6	Width - cake discharge chute		mm				
8.7	Sludge feed line		DN				
8.8	Wash water feed connection		DN				
Regardless of any information provided in this technical detail sheet, the equipment to be provided will comply with the specified requirements.							
Name (Print): _____ Signature: _____							

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TD40: WAS Linear Screens				CLIENT N°.		PAGE	
				ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD40: WAS Linear Screens	AH	MD	NH		MARCH 2024
Supplier:			Quantity:				
Item			Unit	Offered			
1	GENERAL						
1.1	Number of machines		No.				
1.2	Make		text				
1.3	Model		text				
1.4	Country of manufacture		text				
1.5	Spares supplier and address		text				
2	PERFORMANCE REQUIREMENTS						
2.1	Hydraulic capacity (per machine)		m³/h - m³/h				
2.2	Solids capacity (per machine)		kg DS/d - kg DS/d				
2.3	Hydraulic loading / m of belt width		m³/h				
2.4	Solids loading / m of belt width		kg/h				
2.5	Feed solids concentration range		%DS - %DS				
2.6	Discharge solids concentration range		%DS - %DS				
2.7	Wash water requirement (per machine)		m³/h @ bar				
2.8	Approximate flocculant consumption		g / kg DS				
3	OPERATION AND CONTROL						
3.1	Description of flocculant control system		text				
3.2	Description of belt alignment system		text				
3.3	Description of belt tensioning system		text				
3.4	Details of overload protection		text				
3.5	Description of belt break detection system		text				
3.6	Details of sludge level measurement equipment		text				

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				191Q/2023/24			
TD40: WAS Linear Screens				CLIENT N°.		PAGE	
				ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD40: WAS Linear Screens	AH	MD	NH		MARCH 2024
Supplier:			Quantity:				
Item		Unit	Offered				
4	CONSTRUCTION AND DESIGN						
4.1	Total belt width	m					
4.2	Effective belt width m	m					
4.3	Effective filter area	m ²					
4.4	Operating range (hydraulic)	text					
4.5	Operating range (solids)	text					
4.6	Requirements for foundation (size and forces)	text					
4.7	Details of centralised lubrication system	text					
5	MATERIALS AND COATINGS						
5.1	Linear screen frame	text					
5.2	Seals	text					
5.3	Rollers	text					
5.4	Heavy duty bearing housing	text					
5.5	Hydraulic unit tank	text					
5.6	Hydraulic system piping	text					
5.7	Transfer chute (between WAS linear screen and WAS belt press)	text					
5.8	Belt material	text					
6	MOTORS						
6.1	Make	text					
6.2	Model	text					
6.3	Nameplate power	kW					
6.4	Voltage	V					
6.5	Rated load current	Amps					
6.6	Frequency	Hz					
6.7	Phase	Ph.					
6.8	Ingress Protection	Ph.					
6.9	Weight	kg					

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TD40: WAS Linear Screens		CLIENT N°.	PAGE				
		ZUTARI N°.	REV. T0				
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD40: WAS Linear Screens	AH	MD	NH		MARCH 2024
Supplier:			Quantity:				
Item			Unit	Offered			
7	GEARBOXES						
7.1	Make		text				
7.2	Model		text				
7.3	Gearbox type		text				
7.4	Gearbox service factor		text				
7.5	Power		kW				
7.6	Torque		Nm				
7.7	Input speed (N ₁)		rpm				
7.8	Output speed (N ₁)		rpm				
7.9	Ratio		-				
7.10	Weight		kg				
8	WEIGHT AND DIMENSIONS						
8.1	Overall weight of unit, dry		kg				
8.2	Overall weight of unit, wet		kg				
8.3	Weight of heaviest component for maintenance		kg				
8.4	Machine length		mm				
8.5	Machine width (including drive unit)		mm				
8.6	Machine height		mm				
8.7	Width - cake discharge chute		mm				
8.8	Sludge feed line		DN				
8.9	Wash water feed connection		DN				
<i>Regardless of any information provided in this technical detail sheet, the equipment to be provided will comply with the specified requirements.</i> Name (Print): _____ Signature: _____							

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TD41: WAS Belt Presses				CLIENT N°.		PAGE	
				ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD41: WAS Belt Presses	AH	MD	NH		MARCH 2024
Supplier:			Quantity:				
Item			Unit	Offered			
1	GENERAL						
1.1	Number of machines		No.				
1.2	Make		text				
1.3	Model		text				
1.4	Country of manufacture		text				
1.5	Spares supplier and address		text				
2	PERFORMANCE REQUIREMENTS						
2.1	Hydraulic capacity (per machine)		m³/h - m³/h				
2.2	Solids capacity (per machine)		kg DS/d - kg DS/d				
2.3	Hydraulic loading / m of belt width		m³/h				
2.4	Solids loading / m of belt width		kg/h				
2.5	Feed solids concentration range		%DS - %DS				
2.6	Discharge solids concentration range		%DS - %DS				
2.7	Wash water requirement (per machine)		m³/h @ bar				
2.8	Approximate flocculant consumption		g / kg DS				
3	OPERATION AND CONTROL						
3.1	Flocculant control system		Yes / No				
3.2	Belt alignment system (left and right)		Yes / No				
3.3	Description of belt tensioners		text				
3.4	Details of overload protection		text				
3.5	Description of belt break detection system		text				



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TD41: WAS Belt Presses

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Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD41: WAS Belt Presses	AH	MD	NH		MARCH 2024

Supplier:		Quantity:	
Item		Unit	Offered
4	CONSTRUCTION AND DESIGN		
4.1	Total belt width	m	
4.2	Effective belt width m	m	
4.3	No. of high pressure zone rollers	No.	
4.4	No. of low pressure zone rollers	No.	
4.5	Operating range (hydraulic)	text	
4.6	Operating range (solids)	text	
4.7	Requirements for foundation (size and forces)	text	
4.8	Description of belt cleaning system	text	
4.9	Details of centralised lubrication system	text	
5	MATERIALS AND COATINGS		
5.1	Belt press frame	text	
5.2	Seals	text	
5.3	Rollers	text	
5.4	Heavy duty bearing housing	text	
5.5	Hydraulic unit tank	text	
5.6	Hydraulic system piping	text	
5.7	Odour hood covers	text	
6	MOTORS		
6.1	Belt Press Drive 1		
6.1.1	Make	text	
6.1.2	Model	text	
6.1.3	Nameplate power	kW	
6.1.4	Voltage	V	
6.1.5	Rated load current	Amps	
6.1.6	Frequency	Hz	
6.1.7	Phase	Ph.	
6.1.8	Ingress Protection	Ph.	
6.1.9	Weight	kg	



DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS

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TD41: WAS Belt Presses

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 CITY OF CAPE TOWN ISIXEKO SASEKAPA STAD KAAPSTAD Making progress possible. Together.				DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS 191Q/2023/24			
TD41: WAS Belt Presses				CLIENT N°.		PAGE	
				ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD41: WAS Belt Presses	AH	MD	NH		MARCH 2024
Supplier:			Quantity:				
Item			Unit	Offered			
7	GEARBOXES						
7.1	Belt Press Drive 1						
7.1.1	Make	text					
7.1.2	Model	text					
7.1.3	Gearbox type	text					
7.1.4	Gearbox service factor	text					
7.1.5	Power	kW					
7.1.6	Torque	Nm					
7.1.7	Input speed (N _i)	rpm					
7.1.8	Output speed (N _i)	rpm					
7.1.9	Ratio	-					
7.1.10	Weight	kg					
7.2	Belt Press Drive 2						
7.2.1	Make	text					
7.2.2	Model	text					
7.2.3	Gearbox type	text					
7.2.4	Gearbox service factor	text					
7.2.5	Power	kW					
7.2.6	Torque	Nm					
7.2.7	Input speed (N _i)	rpm					
7.2.8	Output speed (N _i)	rpm					
7.2.9	Ratio	-					
7.2.10	Weight	kg					



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THE MACASSAR WASTEWATER
TREATMENT WORKS

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TD41: WAS Belt Presses

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ZUTARI N°.

REV.

T0

Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD41: WAS Belt Presses	AH	MD	NH		MARCH 2024

Supplier:		Quantity:	
Item		Unit	Offered
8	WEIGHT AND DIMENSIONS		
8.1	Overall mass of unit, dry	kg	
8.2	Overall mass of unit, wet	kg	
8.3	Machine length	mm	
8.4	Machine width (including drive unit)	mm	
8.5	Machine height	mm	
8.6	Width - cake discharge chute	mm	
8.7	Sludge feed line	DN	
8.8	Wash water feed connection	DN	

Regardless of any information provided in this technical detail sheet, the equipment to be provided will comply with the specified requirements.

Name (Print): _____

Signature: _____

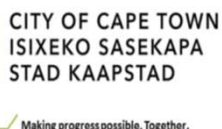
 CITY OF CAPE TOWN ISIXEKO SASEKAPA STAD KAAPSTAD Making progress possible. Together.				DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS 191Q/2023/24			
TD42: Primary Sludge Horizontal Screw Conveyor				CLIENT N°.		PAGE	
				ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD42: Primary Sludge Horizontal Screw Conveyor	AH	MD	NH		MARCH 2024
Supplier:			Quantity:				
Item			Unit	Offered			
1	GENERAL						
1.1	Make		text				
1.2	Model		text				
1.3	Country of manufacture		text				
1.4	Spares supplier and address		text				
2	PERFORMANCE REQUIREMENTS						
2.1	Operating capacity		m³/h				
2.2	Maximum solids concentration		% DS				
3	OPERATION AND CONTROL						
3.1	Details of overtorque protection		text				
3.2	Emergency trip wires on both sides of conveyor		Yes / no				
3.3	Method of joining screw segments		text				
4	CONSTRUCTION AND DESIGN						
4.1	Screw material thickness		mm				
4.2	Trough material thickness		mm				
5	MATERIALS AND COATINGS						
5.1	Screw material		text				
5.2	Trough material		text				
5.3	Material of trough liner		text				
6	MOTORS						
6.1	Make		text				
6.2	Model		text				
6.3	Nameplate power		kW				
6.4	Voltage		V				
6.5	Rated load current		Amps				

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TD42: Primary Sludge Horizontal Screw Conveyor						CLIENT N°.		PAGE	
						ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date		
T0	D	TD42: Primary Sludge Horizontal Screw Conveyor	AH	MD	NH		MARCH 2024		
Supplier:			Quantity:						
Item			Unit	Offered					
6	MOTORS (CONTINUED)								
6.6	Frequency		Hz						
6.7	Phase		Ph.						
6.8	Ingress Protection		IP						
6.9	Weight		kg						
7	GEARBOXES								
7.1	Make		text						
7.2	Model		text						
7.3	Gearbox type		text						
7.4	Gearbox service factor		text						
7.5	Power		kW						
7.6	Torque		Nm						
7.7	Input speed (N ₁)		rpm						
7.8	Output speed (N ₁)		rpm						
7.9	Ratio		-						
7.10	Weight		kg						
8	WEIGHT AND DIMENSIONS								
8.1	Overall mass		kg						
8.2	Length of each screw segment		mm						
8.3	Length of screw		mm						
8.4	Nominal diameter of screw		mm						
8.5	Overall length		mm						
Regardless of any information provided in this technical detail sheet, the equipment to be provided will comply with the specified requirements. Name (Print): _____ Signature: _____									

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TD43: WAS Horizontal Screw Conveyor				CLIENT N°.		PAGE	
				ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD43: WAS Horizontal Screw Conveyor	AH	MD	NH		MARCH 2024
Supplier:			Quantity:				
Item			Unit	Offered			
1	GENERAL						
1.1	Make		text				
1.2	Model		text				
1.3	Country of manufacture		text				
1.4	Spares supplier and address		text				
2	PERFORMANCE REQUIREMENTS						
2.1	Operating capacity		m ³ /h				
2.2	Maximum solids concentration		% DS				
3	OPERATION AND CONTROL						
3.1	Details of overtorque protection		text				
3.2	Emergency trip wires on both sides of conveyor		Yes / no				
3.3	Method of joining screw segments		text				
4	CONSTRUCTION AND DESIGN						
4.1	Screw material thickness		mm				
4.2	Trough material thickness		mm				
5	MATERIALS AND COATINGS						
5.1	Screw material		text				
5.2	Trough material		text				
5.3	Material of trough liner		text				
6	MOTORS						
6.1	Make		text				
6.2	Model		text				
6.3	Nameplate power		kW				
6.4	Voltage		V				
6.5	Rated load current		Amps				

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TD43: WAS Horizontal Screw Conveyor		CLIENT N°.	PAGE				
		ZUTARI N°.	REV. T0				
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD43: WAS Horizontal Screw Conveyor	AH	MD	NH		MARCH 2024
Supplier:			Quantity:				
Item		Unit	Offered				
6	MOTORS (CONTINUED)						
6.6	Frequency	Hz					
6.7	Phase	Ph.					
6.8	Ingress Protection	IP					
6.9	Weight	kg					
7	GEARBOXES						
7.1	Make	text					
7.2	Model	text					
7.3	Gearbox type	text					
7.4	Gearbox service factor	text					
7.5	Power	kW					
7.6	Torque	Nm					
7.7	Input speed (N ₁)	rpm					
7.8	Output speed (N ₁)	rpm					
7.9	Ratio	-					
7.10	Weight	kg					
8	WEIGHT AND DIMENSIONS						
8.1	Overall mass	kg					
8.2	Length of each screw segment	mm					
8.3	Length of screw	mm					
8.4	Nominal diameter of screw	mm					
8.5	Overall length	mm					
Regardless of any information provided in this technical detail sheet, the equipment to be provided will comply with the specified requirements. Name (Print): _____ Signature: _____							

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TD44: Live Bottom Screw Conveyor (Primary Sludge Silos)				CLIENT N°.		PAGE	
				ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD44: Live Bottom Screw Conveyor (Primary Sludge Silos)	AH	MD	NH		MARCH 2024
Supplier:		Quantity:					
Item	Unit		Offered				
1	GENERAL						
1.1	Make	text					
1.2	Model	text					
1.3	Country of manufacture	text					
1.4	Spares supplier and address	text					
2	PERFORMANCE REQUIREMENTS						
2.1	Operating capacity	m³/h - m³/h					
2.2	Sludge dryness range	% DS - % DS					
3	OPERATION AND CONTROL						
3.1	Method of over-torque protection	text					
3.2	Method of sludge control during discharge	text					
4	CONSTRUCTION AND DESIGN						
4.1	Number of screw	No.					
4.2	Screw type (centreless, shafted, other - specify)	text					
4.3	Screw material thickness	mm					
4.4	Trough material thickness	mm					
4.5	Details of bearings	text					
4.6	Details of discharge chute isolation	text					
5	MATERIALS AND COATINGS						
5.1	Screw	text					
5.2	Trough	text					
5.3	Trough liner	text					



DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS

191Q/2023/24

TD44: Live Bottom Screw Conveyor (Primary Sludge Silos)

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DESIGN BUILD OF MECHANICAL
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UPGRADING AND EXPANSION OF
THE MACASSAR WASTEWATER
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TD44: Live Bottom Screw Conveyor (Primary
Sludge Silos)

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T0	D	TD44: Live Bottom Screw Conveyor (Primary Sludge Silos)	AH	MD	NH		MARCH 2024

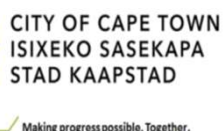
Supplier:		Quantity:	
Item		Unit	Offered
8	WEIGHT AND DIMENSIONS		
8.1	Overall mass (including motors and gearboxes)	kg	
8.2	Length of screws	mm	
8.3	Nominal diameter of screw	mm	
8.4	Overall length	mm	
8.5	Overall width	mm	

Regardless of any information provided in this technical detail sheet, the equipment to be provided will comply with the specified requirements.

Name (Print): _____

Signature: _____

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TD45: Live Bottom Screw Conveyor (WAS Silos)				CLIENT N°.		PAGE	
				ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD45: Live Bottom Screw Conveyor (WAS Silos)	AH	MD	NH		MARCH 2024
Supplier:			Quantity:				
Item			Unit	Offered			
1	GENERAL						
1.1	Make		text				
1.2	Model		text				
1.3	Country of manufacture		text				
1.4	Spares supplier and address		text				
2	PERFORMANCE REQUIREMENTS						
2.1	Operating capacity		m³/h - m³/h				
2.2	Sludge dryness range		% DS - % DS				
3	OPERATION AND CONTROL						
3.1	Method of over-torque protection		text				
3.2	Method of sludge control during discharge		text				
4	CONSTRUCTION AND DESIGN						
4.1	Number of screw		No.				
4.2	Screw type (centreless, shafted, other - specify)		text				
4.3	Screw material thickness		mm				
4.4	Trough material thickness		mm				
4.5	Details of bearings		text				
4.6	Details of discharge chute isolation		text				
5	MATERIALS AND COATINGS						
5.1	Screw		text				
5.2	Trough		text				
5.3	Trough liner		text				



DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS

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TD45: Live Bottom Screw Conveyor (WAS Silos)

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T0	D	TD45: Live Bottom Screw Conveyor (WAS Silos)	AH	MD	NH		MARCH 2024

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art T2: Returnable Documents
eference No. 191O/2023/24



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TD45: Live Bottom Screw Conveyor (WAS Silos)

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Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD45: Live Bottom Screw Conveyor (WAS Silos)	AH	MD	NH		MARCH 2024

Supplier:

Quantity:

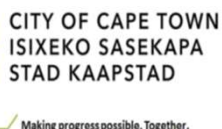
Item		Unit	Offered
8	WEIGHT AND DIMENSIONS		
8.1	Overall mass (including motors and gearboxes)	kg	
8.2	Length of screws	mm	
8.3	Nominal diameter of screw	mm	
8.4	Overall length	mm	
8.5	Overall width	mm	

Regardless of any information provided in this technical detail sheet, the equipment to be provided will comply with the specified requirements.

Name (Print): _____

Signature: _____

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TD46: Return Flow Pump Station - Submersible Centrifugal Pump						CLIENT N°.		PAGE	
						ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date		
T0	D	TD46: Return Flow Pump Station - Submersible Centrifugal Pump	AH	MD	NH		MARCH 2024		
Supplier:			Quantity:						
Item			Unit	Offered					
1	GENERAL								
1.1	Number of pumps		No.						
1.2	Make		text						
1.3	Model		text						
1.4	Country of manufacture		text						
1.5	Spares supplier and address		text						
2	PERFORMANCE REQUIREMENTS								
2.1	Shut-off head		m						
2.2	Flowrate at duty point (for water)		ℓ /s						
2.3	Head at duty point (for water)		m						
2.4	Flow range (min - max)		ℓ /s to ℓ /s						
2.5	Efficiency at duty point		%						
2.6	Best efficiency point		%						
2.7	NPSHrequired at duty point (absolute pressure)		m						
3	OPERATION AND CONTROL								
3.1	Method of temperature monitoring		text						
3.2	Method of moisture ingress monitoring		text						
4	CONSTRUCTION AND DESIGN								
4.1	Pump type and description		text						
4.2	Installation type (wet well / dry well / both)		text						
4.3	Maximum diameter of solid object that can be pumped		mm						
4.4	Pump seal type and description		text						
4.5	Description of ingress protection for motor (shaft end)		text						
4.6	Description of ingress protection for motor (cable end)		text						
4.7	Cable size and length		text						
4.8	Bearing life		L ₁₀						



DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS

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TD46: Return Flow Pump Station - Submersible Centrifugal Pump

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Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD46: Return Flow Pump Station - Submersible Centrifugal Pump	AH	MD	NH		MARCH 2024

Supplier:

Quantity:

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TD46: Return Flow Pump Station - Submersible
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T0	D	TD46: Return Flow Pump Station - Submersible Centrifugal Pump	AH	MD	NH		MARCH 2024

Supplier:

Quantity:

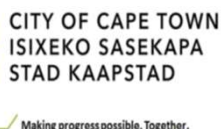
Item		Unit	Offered
7	WEIGHT AND DIMENSIONS		
7.1	Mass (empty pump)	kg	
7.2	Impeller size	mm	
7.3	Inlet diameter	DN	
7.4	Outlet diameter	DN	

Regardless of any information provided in this technical detail sheet, the equipment to be provided will comply with the specified requirements.

Name (Print): _____

Signature: _____

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TD47: Sevice Water Pumps - End Suction Centrifugal Pump						CLIENT N°.		PAGE	
						ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date		
T0	D	TD47: Sevice Water Pumps - End Suction Centrifugal Pump	AH	MD	NH		MARCH 2024		
Supplier:			Quantity:						
Item	Unit		Offered						
1	GENERAL								
1.1	Number of pumps		no.						
1.2	Make		text						
1.3	Model		text						
1.4	Country of manufacture		text						
1.5	Spares supplier and address		text						
2	PERFORMANCE REQUIREMENTS								
2.1	Shut-off head		m						
2.2	Flow range (min - max)		ℓ /s to ℓ /s						
2.3	Flowrate & head at duty point (1 pump running)		ℓ /s, m						
2.4	Flowrate & head at duty point (2 pumps running)		ℓ /s, m						
2.5	Flowrate & head at duty point (3 pump running)		ℓ /s, m						
2.6	Flowrate & head at duty point (4 pump running)		ℓ /s, m						
2.7	Efficiency at duty point		%						
2.8	Best efficiency point		%						
2.9	NPSHrequired at duty point (absolute pressure)		m						
3	OPERATION AND CONTROL								
4	CONSTRUCTION AND DESIGN								
4.1	Pump type and description		text						
4.2	Number of stages		no.						
4.3	Pump seal type and description		text						
4.4	Bearing life		L ₁₀						
4.5	Description and details of couplings		text						



DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS

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TD47: Sevice Water Pumps - End Suction
Centrifugal Pump

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T0	D	TD47: Sevice Water Pumps - End Suction Centrifugal Pump	AH	MD	NH		MARCH 2024

Supplier:		Quantity:	
Item		Unit	Offered
7	WEIGHT AND DIMENSIONS		
7.1	Mass (Inlc. Motor and base frame)	kg	
7.2	Impeller diameter	mm	
7.3	Suction diameter	DN	
7.4	Discharge diameter	DN	
7.5	Overall pump length (including motor)	mm	
7.6	Overall pump width	mm	
7.7	Overall pump height (including base frame)	mm	

Regardless of any information provided in this technical detail sheet, the equipment to be provided will comply with the specified requirements.

Name (Print): _____

Signature: _____

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				191Q/2023/24			
TD48: TSE Pump Station - Horizontal Multistage Centrifugal Pumps				CLIENT N°.		PAGE	
				ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD48: TSE Pump Station - Horizontal Multistage Centrifugal Pumps	AH	MD	NH		MARCH 2024
Supplier:			Quantity:				
Item			Unit	Offered			
1	GENERAL						
1.1	Number of pumps		no.				
1.2	Make		text				
1.3	Model		text				
1.4	Country of manufacture		text				
1.5	Spares supplier and address		text				
2	PERFORMANCE REQUIREMENTS						
2.1	Shut-off head		m				
2.2	Flow range (min - max), for pump type		ℓ /s to ℓ /s				
2.3	Best efficiency point, for pump type		%				
2.4	Flowrate, head & efficiency at duty point (1 pump running)		ℓ /s, m, %				
2.5	Flowrate, head & efficiency at duty point (2 pumps running)		ℓ /s, m, %				
2.6	Flowrate, head & efficiency at duty point (3 pumps running)		ℓ /s, m, %				
2.7	Flowrate, head & efficiency at duty point (4 pumps running)		ℓ /s, m, %				
2.8	Flowrate, head & efficiency at duty point (5 pumps running)		ℓ /s, m, %				
2.9	NPSHrequired at duty point (absolute pressure)		m				
3	OPERATION AND CONTROL						
4	CONSTRUCTION AND DESIGN						
4.1	Pump type (end-suction, horizontal multi-stage, split casing, etc.)		text				
4.2	Number of stages / impellers		no.				
4.3	Shaft seal type and description		text				
4.4	Impeller type and description		text				
4.5	Drive end bearing type and description		text				
4.6	Non-drive end bearing type and description		text				
4.7	Bearing life		L ₁₀				

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TD48: TSE Pump Station - Horizontal Multistage Centrifugal Pumps				CLIENT N°.		PAGE	
				ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD48: TSE Pump Station - Horizontal Multistage Centrifugal Pumps	AH	MD	NH		MARCH 2024
Supplier:			Quantity:				
Item			Unit	Offered			
4	CONSTRUCTION AND DESIGN (CONTINUED)						
4.8	Description and details of shaft seals		text				
4.9	Description and details of coupling		text				
5	MATERIALS AND COATINGS						
5.1	Suction, discharge and stage casing		text				
5.2	Impeller (and diffusers)		text				
5.3	Shaft		text				
5.4	Shaft sleeves		text				
5.5	Shaft seals		text				
5.6	Stationary wear rings		text				
5.7	Wear rings		text				
5.8	Tie bolts / fasteners		text				
5.9	Base frame		text				
5.10	Interior corrosion protection		text				
5.11	Exterior corrosion protection		text				
6	MOTORS						
6.1	Make		text				
6.2	Model		text				
6.3	Nameplate power		kW				
6.4	Voltage		V				
6.5	Rated load current		Amps				
6.6	Frequency		Hz				
6.7	Phase		Ph.				
6.8	Number of poles		No.				
6.9	Speed		rpm				
6.10	Service factor		text				
6.11	Ingress Protection		IP				
6.12	Weight		kg				



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THE MACASSAR WASTEWATER
TREATMENT WORKS

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TD48: TSE Pump Station - Horizontal Multistage
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Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD48: TSE Pump Station - Horizontal Multistage Centrifugal Pumps	AH	MD	NH		MARCH 2024

Supplier:		Quantity:	
Item		Unit	Offered
7	WEIGHT AND DIMENSIONS		
7.1	Mass (including motor and base frame)	kg	
7.2	Impeller diameter	mm	
7.3	Suction (inlet) size	DN	
7.4	Discharge (outlet) size	DN	
7.5	Overall pump length (including motor)	mm	
7.6	Overall pump width	mm	
7.7	Overall pump height (including base frame)	mm	

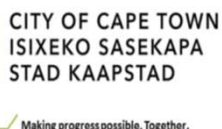
Regardless of any information provided in this technical detail sheet, the equipment to be provided will comply with the specified requirements.

Name (Print): _____

Signature: _____

 CITY OF CAPE TOWN ISIXEKO SASEKAPA STAD KAAPSTAD Making progress possible. Together.				DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS 191Q/2023/24			
TD49: Poly Solution Preparation Unit				CLIENT N°.		PAGE	
				ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD49: Poly Solution Preparation Unit	AH	MD	NH		MARCH 2024
Supplier:			Quantity:				
Item			Unit	Offered			
1	GENERAL						
1.1	Bulk bag unloader						
1.1.1	Number of units		no.				
1.1.2	Make		text				
1.1.3	Model		text				
1.1.4	Country of manufacture		text				
1.1.5	Spares supplier and address		text				
1.2	Automatic poly preparation units						
1.2.1	Number of units		no.				
1.2.2	Make		text				
1.2.3	Model		text				
1.2.4	Country of manufacture		text				
1.2.5	Spares supplier and address		text				
2	PERFORMANCE REQUIREMENTS						
2.1	Bulk bag unloader						
2.1.1	Bag unloader capacity		bags / hour				
2.1.2	Conveyance system feed rate		m ³ /h				
2.1.3	Weight of heaviest bulk bag		kg				
2.1.4	Dimesions of biggest bulk bag equipment can handle		mm x mm x mm				
2.2	Automatic poly preparation units						
2.2.1	Dosing rate		ℓ / h				
2.2.2	Make-up solution concentration (max)		%				
2.2.3	Solution maturation time (max. concentration)		minutes				

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TD49: Poly Solution Preparation Unit				CLIENT N°.		PAGE	
				ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD49: Poly Solution Preparation Unit	AH	MD	NH		MARCH 2024
Supplier:			Quantity:				
Item			Unit	Offered			
3	OPERATION AND CONTROL						
3.1	Bulk bag unloader						
3.1.1	Level monitoring in hopper		text				
3.2	Automatic poly preparation units						
3.2.1	Level monitoring in poly make-up tanks		text				
4	CONSTRUCTION AND DESIGN						
4.1	Bulk bag unloader						
4.1.1	Method of bag opening (Unlacing / bag breaker spike / other (specify)		text				
4.1.2	Description and details of material flow enablers (e.g. vibration pads, etc.)		text				
4.1.3	Description and details of conveying system (e.g. flexible screw conveyors, pneumatic conveying, etc.)		text				
4.1.4	Description and details of flow control and flow choke device (e.g., Iris valve)		text				
4.1.5	Method of dust containment (e.g. enclosed system, unlacing enclosure, dust control system, etc.)		text				
4.1.6	Dust removal rate		m ³ /h				
4.1.7	Electric hoist details		text				
4.2	Automatic poly preparation units						
4.2.1	Number of mixers		no.				
4.2.2	Water requirement (feed rate and pressure)		l/s @ m				



DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS

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TD49: Poly Solution Preparation Unit

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T0	D	TD49: Poly Solution Preparation Unit	AH	MD	NH		MARCH 2024

Supplier:

Quantity:

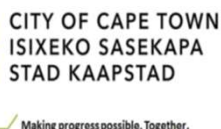
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 CITY OF CAPE TOWN ISIXEKO SASEKAPA STAD KAAPSTAD Making progress possible. Together.				DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS 191Q/2023/24					
TD49: Poly Solution Preparation Unit						CLIENT N°.		PAGE	
						ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date		
T0	D	TD49: Poly Solution Preparation Unit	AH	MD	NH		MARCH 2024		
Supplier:			Quantity:						
Item			Unit	Offered					
6	MOTORS								
6.1	Conveyor screw (option 1)								
6.1.1	No. of motors		no.						
6.1.2	Make		text						
6.1.3	Model		text						
6.1.4	Nameplate power		kW						
6.1.5	Voltage		V						
6.1.6	Rated load current		Amps						
6.1.7	Frequency		Hz						
6.1.8	Phase		Ph.						
6.1.9	Number of poles		No.						
6.1.10	Service factor		text						
6.1.11	Ingress Protection		IP						
6.1.12	Weight		kg						
6.2	Pnuematic conveyance (option 2)								
6.2.1	No. of motors		no.						
6.2.2	Make		text						
6.2.3	Model		text						
6.2.4	Nameplate power		kW						
6.2.5	Voltage		V						
6.2.6	Rated load current		Amps						
6.2.7	Frequency		Hz						
6.2.8	Phase		Ph.						
6.2.9	Number of poles		No.						
6.2.10	Service factor		text						
6.2.11	Ingress Protection		IP						
6.2.12	Weight		kg						

 CITY OF CAPE TOWN ISIXEKO SASEKAPA STAD KAAPSTAD Making progress possible. Together.				DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS 191Q/2023/24					
TD49: Poly Solution Preparation Unit						CLIENT N°.		PAGE	
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Rev.	TI	Description	By	Ckd	APP.	Aut.	Date		
T0	D	TD49: Poly Solution Preparation Unit	AH	MD	NH		MARCH 2024		
Supplier:			Quantity:						
Item			Unit	Offered					
6	MOTORS (CONTINUED)								
6.3	Poly preparation unit - Powder Poly Feeder								
6.3.1	Make		text						
6.3.2	Model		text						
6.3.3	Nameplate power		kW						
6.3.4	Voltage		V						
6.3.5	Rated load current		Amps						
6.3.6	Frequency		Hz						
6.3.7	Phase		Ph.						
6.3.8	Number of poles		No.						
6.3.9	Service factor		text						
6.3.10	Ingress Protection		IP						
6.3.11	Weight		kg						
6.4	Poly preparation unit - Mixer 1								
6.4.1	Make		text						
6.4.2	Model		text						
6.4.3	Nameplate power		kW						
6.4.4	Voltage		V						
6.4.5	Rated load current		Amps						
6.4.6	Frequency		Hz						
6.4.7	Phase		Ph.						
6.4.8	Number of poles		No.						
6.4.9	Service factor		text						
6.4.10	Ingress Protection		IP						
6.4.11	Weight		kg						

 CITY OF CAPE TOWN ISIXEKO SASEKAPA STAD KAAPSTAD Making progress possible. Together.				DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS 191Q/2023/24					
TD49: Poly Solution Preparation Unit						CLIENT N°.		PAGE	
						ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date		
T0	D	TD49: Poly Solution Preparation Unit	AH	MD	NH		MARCH 2024		
Supplier:			Quantity:						
Item		Unit	Offered						
6	MOTORS (CONTINUED)								
6.5	Poly preparation unit - Mixer 2								
6.5.1	Make	text							
6.5.2	Model	text							
6.5.3	Nameplate power	kW							
6.5.4	Voltage	V							
6.5.5	Rated load current	Amps							
6.5.6	Frequency	Hz							
6.5.7	Phase	Ph.							
6.5.8	Number of poles	No.							
6.5.9	Service factor	text							
6.5.10	Ingress Protection	IP							
6.5.11	Weight	kg							
6.6	Poly preparation unit - Mixer 3								
6.6.1	Make	text							
6.6.2	Model	text							
6.6.3	Nameplate power	kW							
6.6.4	Voltage	V							
6.6.5	Rated load current	Amps							
6.6.6	Frequency	Hz							
6.6.7	Phase	Ph.							
6.6.8	Number of poles	No.							
6.6.9	Service factor	text							
6.6.10	Ingress Protection	IP							
6.6.11	Weight	kg							

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TD49: Poly Solution Preparation Unit						CLIENT N°.		PAGE	
						ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date		
T0	D	TD49: Poly Solution Preparation Unit	AH	MD	NH		MARCH 2024		
Supplier:			Quantity:						
Item			Unit	Offered					
7	GEARBOXES (CONTINUED)								
7.3	Poly preparation unit - Mixer 1								
7.3.1	Make	text							
7.3.2	Model	text							
7.3.3	Gearbox type	text							
7.3.4	Gearbox service factor	text							
7.3.5	Power	kW							
7.3.6	Torque	Nm							
7.3.7	Input speed (N ₁)	rpm							
7.3.8	Output speed (N ₁)	rpm							
7.3.9	Ratio	-							
7.3.10	Weight	kg							
7.4	Poly preparation unit - Mixer 2								
7.4.1	Make	text							
7.4.2	Model	text							
7.4.3	Gearbox type	text							
7.4.4	Gearbox service factor	text							
7.4.5	Power	kW							
7.4.6	Torque	Nm							
7.4.7	Input speed (N ₁)	rpm							
7.4.8	Output speed (N ₁)	rpm							
7.4.9	Ratio	-							
7.4.10	Weight	kg							



DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS

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Supplier:

Quantity:

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DESIGN BUILD OF MECHANICAL
AND ELECTRICAL WORKS FOR THE
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THE MACASSAR WASTEWATER
TREATMENT WORKS

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T0	D	TD49: Poly Solution Preparation Unit	AH	MD	NH		MARCH 2024

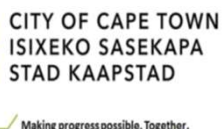
Supplier:		Quantity:	
Item		Unit	Offered
8	WEIGHT AND DIMENSIONS (CONTINUED)		
8.2	Poly preparation unit		
8.2.1	Mass (empty)	kg	
8.2.2	Mass (Full)	kg	
8.2.3	Overall length	mm	
8.2.4	Overall width	mm	
8.2.5	Overall height	mm	
8.2.6	Feed water connection	DN	
8.2.7	Discharge connection	DN	
8.2.8	Overflow connection	DN	
8.2.9	Drain connection	DN	
8.2.10	Day hopper capacity	kg	

Regardless of any information provided in this technical detail sheet, the equipment to be provided will comply with the specified requirements.

Name (Print): _____

Signature: _____

 CITY OF CAPE TOWN ISIXEKO SASEKAPA STAD KAAPSTAD Making progress possible. Together.				DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS 191Q/2023/24					
TD50: Ventilation for Main Sludge Pump Station						CLIENT N°.		PAGE	
						ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date		
T0	D	TD50: Ventilation for Main Sludge Pump Station	AH	MD	NH		MARCH 2024		
Supplier:			Quantity:						
Item			Unit	Offered					
1	GENERAL								
1.1	Spares supplier and address		text						
2	PERFORMANCE REQUIREMENTS								
2.1	Fan airflow (Min. / Max.)		l/s [FAD]						
2.2	Maximum allowable temperature rise		°C						
2.3	Nominal speed of fans		rpm						
2.4	Fan sounds pressure at 1 m		dBA						
2.5	Fan sounds pressure at 3 m		dBA						
3	OPERATION AND CONTROL								
3.1	Method of Ventilation system control		text						
4	CONSTRUCTION AND DESIGN								
4.1	Ventilation Fans								
4.1.1	Number of Fans		No.						
4.1.2	Description of Fans (make & model)		text						
4.1.3	Type of fans (axial flow, centrifugal, tangential flow)		text						
4.1.4	Type of fans drive (direct drive / belt drive / etc.)		text						
4.1.5	Fan diameter		mm						
4.1.6	Materials and coatings of fan casings		text						
4.1.7	Materials and coatings of fan blades		text						
4.1.8	Materials and coatings of base frame (centrifugal fans only)		text						



DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS

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TD50: Ventilation for Main Sludge Pump Station

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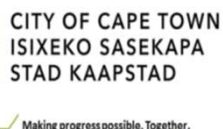
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Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD50: Ventilation for Main Sludge Pump Station	AH	MD	NH		MARCH 2024

Supplier:

Quantity:

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DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS

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TD50: Ventilation for Main Sludge Pump Station

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T0	D	TD50: Ventilation for Main Sludge Pump Station	AH	MD	NH		MARCH 2024

Supplier:

Quantity:

Item		Unit	Offered
5	MOTORS		
5.1	Description of fan motor	text	
5.2	Nameplate power	kW	
5.3	Voltage	V	
5.4	Rated load current	Amps	
5.5	Frequency	Hz	
5.6	Phase	Ph.	
5.7	Number of poles	No.	
5.8	Service factor	text	
5.9	Ingress Protection	IP	
5.10	Weight	kg	

Regardless of any information provided in this technical detail sheet, the equipment to be provided will comply with the specified requirements.

Name (Print): _____

Signature: _____

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TD51: Ventilation for Dewatering Building				CLIENT N°.		PAGE	
				ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD51: Ventilation for Dewatering Building	AH	MD	NH		MARCH 2024
Supplier:			Quantity:				
Item			Unit	Offered			
1	GENERAL						
1.1	Spares supplier and address		text				
2	PERFORMANCE REQUIREMENTS						
2.1	Fan airflow (Min. / Max.)		l/s [FAD]				
2.2	Maximum allowable temperature rise		°C				
2.3	Nominal speed of fans		rpm				
2.4	Fan sounds pressure at 1 m		dBA				
2.5	Fan sounds pressure at 3 m		dBA				
3	OPERATION AND CONTROL						
3.1	Method of Ventilation system control		text				
4	CONSTRUCTION AND DESIGN						
4.1	Ventilation Fans						
4.1.1	Number of Fans		No.				
4.1.2	Description of Fans (make & model)		text				
4.1.3	Type of fans (axial flow, centrifugal, tangential flow)		text				
4.1.4	Type of fans drive (direct drive / belt drive / etc.)		text				
4.1.5	Fan diameter		mm				
4.1.6	Materials and coatings of fan casings		text				
4.1.7	Materials and coatings of fan blades		text				
4.1.8	Materials and coatings of base frame (centrifugal fans only)		text				

 CITY OF CAPE TOWN ISIXEKO SASEKAPA STAD KAAPSTAD Making progress possible. Together.				DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS			
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TD51: Ventilation for Dewatering Building				CLIENT N°.		PAGE	
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T0	D	TD51: Ventilation for Dewatering Building	AH	MD	NH		MARCH 2024
Supplier:			Quantity:				
Item		Unit	Offered				
4.2	Ductwork						
4.2.1	Nominal airflow speed in ducting	m/s					
4.2.2	Materials and coatings of ducting	text					
4.2.3	Materials and coatings of connections	text					
4.2.4	Materials and coatings of ductwork supports	text					
4.2.5	Materials and coatings of dampers	text					
4.3	Inlet Louvres						
4.3.1	No. of inlet louvres	No.					
4.3.2	Type of inlet louvres (accoustic / weather / sand trap louvres / other (specify).	text					
4.3.3	Rated face velocity through (each) inlet louvre	m/s					
4.3.4	Maximum airflow rate through (each) inlet louvre	m³/s					
4.3.5	Differential pressure across louvre (min. - max.)	Pa - Pa					
4.3.6	Materials and coatings of inlet louvres	text					
4.3.7	Weight of inlet louvre (each)	kg					
4.3.8	Dimensions	mm x mm x mm					
4.4	Outlet Louvres						
4.4.1	No. of outlet louvres	No.					
4.4.2	Type of outlet louvres (accoustic / weather / sand trap louvres / other (specify)	text					
4.4.3	Rated face velocity through (each) outlet louvre	m/s					
4.4.4	Maximum airflow rate through (each) outlet louvre	m³/s					
4.4.5	Differential pressure across louvre (min. - max.)	Pa - Pa					
4.4.6	Materials and coatings of outlet louvres	text					
4.4.7	Weight of outlet louvre (each)	kg					
4.4.8	Dimensions	mm x mm x mm					



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DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS

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TD51: Ventilation for Dewatering Building

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T0	D	TD51: Ventilation for Dewatering Building	AH	MD	NH		MARCH 2024

Supplier: _____ **Quantity:** _____

Item	Unit	Offered
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4.5 Sound attenuators

4.5.1	Made & model of sound attenuators	text	
4.5.2	Materials and coatings of sound attenuators	text	
4.5.3	Description of accoustic infill materials	text	
4.5.4	Maximum resistance losses across attenuators	Pa	

5 MOTORS

5.1	Description of fan motor	text	
5.2	Nameplate power	kW	
5.3	Voltage	V	
5.4	Rated load current	Amps	
5.5	Frequency	Hz	
5.6	Phase	Ph.	
5.7	Number of poles	No.	
5.8	Service factor	text	
5.9	Ingress Protection	IP	
5.10	Weight	kg	

Regardless of any information provided in this technical detail sheet, the equipment to be provided will comply with the specified requirements.

Name (Print): _____

Signature: _____

 CITY OF CAPE TOWN ISIXEKO SASEKAPA STAD KAAPSTAD Making progress possible. Together.				DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS 191Q/2023/24					
TD52: Ventilation for Poly Storage Room (dehumidifier)						CLIENT N°.		PAGE	
						ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date		
T0	D	TD52: Ventilation for Poly Storage Room (dehumidifier)	AH	MD	NH		MARCH 2024		
Supplier:			Quantity:						
Item			Unit	Offered					
1	GENERAL								
1.1	Make and model		text						
1.2	Country of manufacture		text						
1.3	Spares supplier and address		text						
2	PERFORMANCE REQUIREMENTS								
2.1	Airflow (min. / nominal / max.)		m³/h						
2.2	Extraction rate (dehumidification capacity)		l/day						
2.3	Operating temperature (min. / max.)		°C - °C						
2.4	Operating range (humidity)		% RH - % RH						
3	OPERATION AND CONTROL								
3.1	Dehumidification control (automatic / manual)		text						
3.2	Description of humidity sensor(s)		text						
3.3	Description of temperature sensor(s)		text						
4	CONSTRUCTION AND DESIGN								
4.1	Dehumidifier type (condensation type / desiccant type / other (specify))		text						
4.2	Installation (wall mounted / portable / other (specify))		text						
4.3	Refrigerant type (if required)		text						
4.4	Drainage (automatic / manual)		text						
4.5	Make and description of filter		text						
4.6	Noise level (1 m away)		dBA						



ZUTARI

DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS

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TD52: Ventilation for Poly Storage Room (dehumidifier)

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Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD52: Ventilation for Poly Storage Room (dehumidifier)	AH	MD	NH		MARCH 2024

Supplier: _____ **Quantity:** _____

Item		Unit	Offered
5	MOTORS		
5.1	Make	text	
5.2	Model	text	
5.3	Nameplate power	kW	
5.4	Voltage	V	
5.5	Rated load current	Amps	
5.6	Frequency	Hz	
5.7	Phase	Ph.	
5.8	Number of poles	No.	
5.9	Speed	rpm	
5.10	Service factor	text	
5.11	Ingress Protection	IP	
6	WEIGHT AND DIMENSIONS		
6.1	Weight (empty)	kg	
6.2	Weight (in operation)	kg	
6.3	Dimensions	mm x mm x mm	

Regardless of any information provided in this technical detail sheet, the equipment to be provided will comply with the specified requirements.

Name (Print): _____

Signature: _____

 CITY OF CAPE TOWN ISIXEKO SASEKAPA STAD KAAPSTAD Making progress possible. Together.				DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS 191Q/2023/24			
TD53: Ventilation for TSE Pump Station				CLIENT N°.		PAGE	
				ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD53: Ventilation for TSE Pump Station	AH	MD	NH		MARCH 2024
Supplier:			Quantity:				
Item			Unit	Offered			
1	GENERAL						
1.1	Spares supplier and address		text				
2	PERFORMANCE REQUIREMENTS						
2.1	Fan airflow (Min. / Max.)		l/s [FAD]				
2.2	Maximum allowable temperature rise		°C				
2.3	Nominal speed of fans		rpm				
2.4	Fan sounds pressure at 1 m		dBA				
2.5	Fan sounds pressure at 3 m		dBA				
3	OPERATION AND CONTROL						
3.1	Method of Ventilation system control		text				
4	CONSTRUCTION AND DESIGN						
4.1	Ventilation Fans						
4.1.1	Number of fans		No.				
4.1.2	Description of fans (make & model)		text				
4.1.3	Type of fans (axial flow, centrifugal, tangential flow)		text				
4.1.4	Type of fans drive (direct drive / belt drive / etc.)		text				
4.1.5	Fan diameter		mm				
4.1.6	Materials and coatings of fan casings		text				
4.1.7	Materials and coatings of fan blades		text				
4.1.8	Materials and coatings of base frame (centrifugal fans only)		text				

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TD53: Ventilation for TSE Pump Station				CLIENT N°.		PAGE	
				ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD53: Ventilation for TSE Pump Station	AH	MD	NH		MARCH 2024
Supplier:			Quantity:				
Item		Unit	Offered				
4.2	Ductwork						
4.2.1	Nominal airflow speed in ducting	m/s					
4.2.2	Materials and coatings of ducting	text					
4.2.3	Materials and coatings of connections	text					
4.2.4	Materials and coatings of ductwork supports	text					
4.2.5	Materials and coatings of Dampers	text					
4.3	Weather (outlet) Louvres						
4.3.1	No. of weather louvres	No.					
4.3.2	Rated face velocity through (each) weather louver	m/s					
4.3.3	Maximum airflow rate through (each) weather louver	m³/s					
4.3.4	Differential pressure across louver (min. - max.)	Pa - Pa					
4.3.5	Materials and coatings of weather louvres	text					
4.3.6	Weight of weather louver (each)	kg					
4.3.7	Dimensions	mm x mm x mm					
4.4	Sound attenuators						
4.4.1	Made & model of sound attenuators	text					
4.4.2	Materials and coatings of sound attenuators	text					
4.4.3	Description of accoustic infill materials	text					
4.4.4	Maximum resistance losses across attenuators	Pa					



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T0	D	TD53: Ventilation for TSE Pump Station	AH	MD	NH		MARCH 2024

Supplier:

Quantity:

Item		Unit	Offered
5	MOTORS		
5.1	Description of fan motor	text	
5.2	Nameplate power	kW	
5.3	Voltage	V	
5.4	Rated load current	Amps	
5.5	Frequency	Hz	
5.6	Phase	Ph.	
5.7	Number of poles	No.	
5.8	Service factor	text	
5.9	Ingress Protection	IP	
5.10	Weight	kg	

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TD54: Ventilation for Service Water Pump Station				CLIENT N°.		PAGE	
				ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD54: Ventilation for Service Water Pump Station	AH	MD	NH		MARCH 2024
Supplier:			Quantity:				
Item			Unit	Offered			
1	GENERAL						
1.1	Spares supplier and address		text				
2	PERFORMANCE REQUIREMENTS						
2.1	Fan airflow (Min. / Max.)		l/s [FAD]				
2.2	Maximum allowable temperature rise		°C				
2.3	Nominal speed of fans		rpm				
2.4	Fan sounds pressure at 1 m		dBA				
2.5	Fan sounds pressure at 3 m		dBA				
3	OPERATION AND CONTROL						
3.1	Method of ventilation system control		text				
4	CONSTRUCTION AND DESIGN						
4.1	Ventilation Fans						
4.1.1	Number of fans		No.				
4.1.2	Description of fans (make & model)		text				
4.1.3	Type of fans (axial flow, centrifugal, tangential flow)		text				
4.1.4	Type of fans drive (direct drive / belt drive / etc.)		text				
4.1.5	Fan diameter		mm				
4.1.6	Materials and coatings of fan casings		text				
4.1.7	Materials and coatings of fan blades		text				
4.1.8	Materials and coatings of base frame (centrifugal fans only)		text				

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TD54: Ventilation for Service Water Pump Station						CLIENT N°.		PAGE	
						ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date		
T0	D	TD54: Ventilation for Service Water Pump Station	AH	MD	NH		MARCH 2024		
Supplier:			Quantity:						
Item		Unit	Offered						
4.2	Ductwork								
4.2.1	Nominal airflow speed in ducting	m/s							
4.2.2	Materials and coatings of ducting	text							
4.2.3	Materials and coatings of connections	text							
4.2.4	Materials and coatings of ductwork supports	text							
4.2.5	Materials and coatings of dampers	text							
4.3	Weather (outlet) Louvres								
4.3.1	No. of weather louvres	No.							
4.3.2	Rated face velocity through (each) weather louver	m/s							
4.3.3	Maximum airflow rate through (each) weather louver	m ³ /s							
4.3.4	Differential pressure across louver (min. - max.)	Pa - Pa							
4.3.5	Materials and coatings of weather louvres	text							
4.3.6	Weight of weather louver (each)	kg							
4.3.7	Dimensions	mm x mm x mm							
4.4	Sound attenuators								
4.4.1	Made & model of sound attenuators	text							
4.4.2	Materials and coatings of sound attenuators	text							
4.4.3	Description of acoustic infill materials	text							
4.4.4	Maximum resistance losses across attenuators	Pa							



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T0	D	TD54: Ventilation for Service Water Pump Station	AH	MD	NH		MARCH 2024

Supplier:

Quantity:

Item		Unit	Offered
5	MOTORS		
5.1	Description of fan motor	text	
5.2	Nameplate power	kW	
5.3	Voltage	V	
5.4	Rated load current	Amps	
5.5	Frequency	Hz	
5.6	Phase	Ph.	
5.7	Number of poles	No.	
5.8	Service factor	text	
5.9	Ingress Protection	IP	
5.10	Weight	kg	

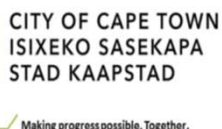
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TD55: Ventilation for Blower House				CLIENT N°.		PAGE	
				ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD55: Ventilation for Blower House	AH	MD	NH		MARCH 2024
Supplier:			Quantity:				
Item			Unit	Offered			
1	GENERAL						
1.1	Spares supplier and address		text				
2	PERFORMANCE REQUIREMENTS						
2.1	Fan airflow (Min. / Max.)		l/s [FAD]				
2.2	Maximum allowable temperature rise		°C				
2.3	Nominal speed of fans		rpm				
2.4	Fan sounds pressure at 1 m		dBA				
2.5	Fan sounds pressure at 3 m		dBA				
3	OPERATION AND CONTROL						
3.1	Method of ventilation system control		text				
4	CONSTRUCTION AND DESIGN						
4.1	Ventilation Fans						
4.1.1	Number of fans		No.				
4.1.2	Description of fans (make & model)		text				
4.1.3	Type of fans (axial flow, centrifugal, tangential flow)		text				
4.1.4	Type of fans drive (direct drive / belt drive / etc.)		text				
4.1.5	Fan diameter		mm				
4.1.6	Materials and coatings of fan casings		text				
4.1.7	Materials and coatings of fan blades		text				
4.1.8	Materials and coatings of base frame (centrifugal fans only)		text				
4.2	Dampers						
4.2.1	Materials and coatings of Dampers		text				

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TD55: Ventilation for Blower House				CLIENT N°.		PAGE	
				ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD55: Ventilation for Blower House	AH	MD	NH		MARCH 2024
Supplier:			Quantity:				
Item			Unit	Offered			
4.3	Ductwork						
4.3.1	Thickness of ductwork		mm				
4.3.2	Nominal airflow speed in ducting		m/s				
4.3.3	Materials and coatings of ducting		text				
4.3.4	Materials and coatings of connections		text				
4.3.5	Materials and coatings of ductwork supports		text				
4.4	Sand Trap Louvres						
4.4.1	No. of sand trap louvres		No.				
4.4.2	Rated face velocity through (each) sand trap louvre		m/s				
4.4.3	Maximum airflow rate through (each) sand trap louvre		m ³ /s				
4.4.4	Differential pressure across louvre (min. - max.)		Pa - Pa				
4.4.5	Materials and coatings of sand trap louvres		text				
4.4.6	Weight of sand trap louvre (each)		kg				
4.4.7	Dimensions		mm x mm x mm				
4.5	Accoustic Louvres						
4.5.1	No. of accoustic louvres		No.				
4.5.2	Rated face velocity through (each) accoustic louvre		m/s				
4.5.3	Maximum airflow rate through (each) accoustic louvre		m ³ /s				
4.5.4	Differential pressure across louvre (min. - max.)		Pa - Pa				
4.5.5	Materials and coatings of accoustic louvres (outer frame)		text				
4.5.6	Materials and coatings of accoustic louvres (infill material)		text				
4.5.7	Weight of accoustic louvre (each)		kg				
4.5.8	Dimensions		mm x mm x mm				



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T0	D	TD55: Ventilation for Blower House	AH	MD	NH		MARCH 2024

Supplier:

Quantity:

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Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD55: Ventilation for Blower House	AH	MD	NH		MARCH 2024

Supplier:

Quantity:

Item		Unit	Offered
5	MOTORS		
5.1	Description of fan motor	text	
5.2	Nameplate power	kW	
5.3	Voltage	V	
5.4	Rated load current	Amps	
5.5	Frequency	Hz	
5.6	Phase	Ph.	
5.7	Number of poles	No.	
5.8	Service factor	text	
5.9	Ingress Protection	IP	
5.10	Weight	kg	

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TD56: Ventilation for Chlorine Building				CLIENT N°.		PAGE	
				ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD56: Ventilation for Chlorine Building	AH	MD	NH		MARCH 2024
Supplier:			Quantity:				
Item			Unit	Offered			
1	GENERAL						
1.1	Spares supplier and address		text				
2	PERFORMANCE REQUIREMENTS						
2.1	Fan airflow (Min. / Max.)		l/s [FAD]				
2.2	Maximum allowable temperature rise		°C				
2.3	Nominal speed of fans		rpm				
2.4	Fan sounds pressure at 1 m		dBA				
2.5	Fan sounds pressure at 3 m		dBA				
3	OPERATION AND CONTROL						
3.1	Method of ventilation system control		text				
4	CONSTRUCTION AND DESIGN						
4.1	Ventilation Fans						
4.1.1	Number of fans		No.				
4.1.2	Description of fans (make & model)		text				
4.1.3	Type of fans (axial flow, centrifugal, tangential flow)		text				
4.1.4	Type of fans drive (direct drive / belt drive / etc.)		text				
4.1.5	Fan diameter		mm				
4.1.6	Materials and coatings of fan casings		text				
4.1.7	Materials and coatings of fan blades		text				
4.1.8	Materials and coatings of base frame (centrifugal fans only)		text				
4.2	Dampers						
4.2.1	Materials and coatings of Dampers		text				

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TD56: Ventilation for Chlorine Building				CLIENT N°.		PAGE	
				ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD56: Ventilation for Chlorine Building	AH	MD	NH		MARCH 2024
Supplier:			Quantity:				
Item		Unit	Offered				
4.3	Ductwork						
4.3.1	Thickness of ductwork	mm					
4.3.2	Nominal airflow speed in ducting	m/s					
4.3.3	Materials and coatings of ducting	text					
4.3.4	Materials and coatings of connections	text					
4.3.5	Materials and coatings of ductwork supports	text					
4.4	Inlet Louvres						
4.4.1	No. of inlet louvres	No.					
4.4.2	Rated face velocity through (each) inlet louvre	m/s					
4.4.3	Maximum airflow rate through (each) inlet louvre	m ³ /s					
4.4.4	Differential pressure across louvre (min. - max.)	Pa - Pa					
4.4.5	Materials and coatings of inlet louvres	text					
4.4.6	Weight of inlet louvre (each)	kg					
4.4.7	Description of weather proofing	text					
4.4.8	Dimensions	mm x mm x mm					
4.5	Sound attenuators						
4.5.1	Made & model of sound attenuators	text					
4.5.2	Materials and coatings of sound attenuators	text					
4.5.3	Description of accoustic infill materials	text					
4.5.4	Maximum resistance losses across attenuators	Pa					



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T0	D	TD56: Ventilation for Chlorine Building	AH	MD	NH		MARCH 2024

Supplier:

Quantity:

Item		Unit	Offered
5	MOTORS		
5.1	Description of fan motor	text	
5.2	Nameplate power	kW	
5.3	Voltage	V	
5.4	Rated load current	Amps	
5.5	Frequency	Hz	
5.6	Phase	Ph.	
5.7	Number of poles	No.	
5.8	Service factor	text	
5.9	Ingress Protection	IP	
5.10	Weight	kg	

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Name (Print): _____

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TD57: Lifting Equipment for Lower Screw Pump Station		CLIENT N°.	PAGE				
		ZUTARI N°.	REV. T0				
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD57: Lifting Equipment for Lower Screw Pump Station	AH	MD	NH		MARCH 2024
Supplier:		Quantity:					
Item		Unit	Offered				
1	STRUCTURE						
1.1	SWL	kg					
1.2	Max Load	text					
1.3	Test Load	text					
1.4	Description of Structure	text					
1.5	Technical design Std	text					
1.6	Grade of Steel	text					
1.7	Corrosion protection System	text					
2	HOIST						
2.1	Hoist make and model	text					
2.2	Overload Protection	text					
2.3	Factor of safety on chain	text					
2.4	Hoist rated power	kW					
2.5	Hoist gearbox service factor	text					
2.6	Crawl trolley make and model	text					
2.7	Crawl trolley rated motor power	kW					
2.8	Crawl trolley gearbox service factor	text					
<i>Regardless of any information provided in this technical detail sheet, the equipment to be provided will comply with the specified requirements.</i> Name (Print): _____ Signature: _____							

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TD58: Lifting Equipment for Front Raked Screens and Perforated Plate Screens				CLIENT N°.		PAGE	
				ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD58: Lifting Equipment for Front Raked Screens and Perforated Plate Screens	AH	MD	NH		MARCH 2024
Supplier:			Quantity:				
Item			Unit	Offered			
1	STRUCTURE						
1.1	SWL		kg				
1.2	Max Load		text				
1.3	Test Load		text				
1.4	Description of Structure		text				
1.5	Technical design Std		text				
1.6	Grade of Steel		text				
1.7	Corrosion protection System		text				
2	HOIST						
2.1	Hoist make and model		text				
2.2	Overload Protection		text				
2.3	Factor of safety on chain		text				
2.4	Hoist rated power		kW				
2.5	Hoist gearbox service factor		text				
2.6	Crawl trolley make and model		text				
2.7	Crawl trolley rated motor power		kW				
2.8	Crawl trolley gearbox service factor		text				
Regardless of any information provided in this technical detail sheet, the equipment to be provided will comply with the specified requirements. Name (Print): _____ Signature: _____							

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		191Q/2023/24					
TD59: Lifting Equipment for Upper Screw Pump Station		CLIENT N°.					
		PAGE					
		ZUTARI N°.					
		REV. T0					
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD59: Lifting Equipment for Upper Screw Pump Station	AH	MD	NH		MARCH 2024
Supplier:			Quantity:				
Item		Unit	Offered				
1	STRUCTURE						
1.1	SWL	kg					
1.2	Max Load	text					
1.3	Test Load	text					
1.4	Description of Structure	text					
1.5	Technical design Std	text					
1.6	Grade of Steel	text					
1.7	Corrosion protection System	text					
2	HOIST						
2.1	Hoist make and model	text					
2.2	Overload Protection	text					
2.3	Factor of safety on chain	text					
2.4	Hoist rated power	kW					
2.5	Hoist gearbox service factor	text					
2.6	Crawl trolley make and model	text					
2.7	Crawl trolley rated motor power	kW					
2.8	Crawl trolley gearbox service factor	text					
<i>Regardless of any information provided in this technical detail sheet, the equipment to be provided will comply with the specified requirements.</i>							
Name (Print): _____ Signature: _____							

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TD60: Lifting Equipment for Main Sludge Pump Station				CLIENT N°.		PAGE	
				ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD60: Lifting Equipment for Main Sludge Pump Station	AH	MD	NH		MARCH 2024
Supplier:			Quantity:				
Item			Unit	Offered			
1	GENERAL						
1.1	Type of Lifting Equipment		text				
1.2	Make and model		text				
1.3	Country of manufacture		text				
1.4	Spares supplier and address		text				
2	PERFORMANCE REQUIREMENTS						
2.1	Load Capacity (Safe Working Load)		ton				
2.2	Test Load		ton				
2.3	Maximum lifting height		mm				
3	OPERATION AND CONTROL						
3.1	Hoist Control (electrical / manual)		text				
4	CONSTRUCTION AND DESIGN						
4.1	Details of hoist (trolley and chain block)		text				
4.2	Details of locking mechanism		text				
5	MOTORS						
6	MATERIALS AND COATINGS						
6.1	Lifting chain		text				
6.2	Hoist		text				
6.3	Trolley		text				
6.4	Hook		text				



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TD60: Lifting Equipment for Main Sludge Pump
Station

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REV.

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Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD60: Lifting Equipment for Main Sludge Pump Station	AH	MD	NH		MARCH 2024

Supplier:		Quantity:	
Item		Unit	Offered
7	WEIGHT AND DIMENSIONS		
7.1	Total equipment weight.	kg	
7.2	Chain length	m	

Regardless of any information provided in this technical detail sheet, the equipment to be provided will comply with the specified requirements.

Name (Print): _____

Signature: _____

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TD61: Lifting Equipment for A and R Recycle Pump Station						CLIENT N°.		PAGE	
						ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date		
T0	D	TD61: Lifting Equipment for A and R Recycle Pump Station	AH	MD	NH		MARCH 2024		
Supplier:			Quantity:						
Item			Unit	Offered					
1	GENERAL								
1.1	Type of Lifting Equipment		text						
1.2	Make and model		text						
1.3	Country of manufacture		text						
1.4	Spares supplier and address		text						
2	PERFORMANCE REQUIREMENTS								
2.1	Load Capacity (Safe Working Load)		ton						
2.2	Test Load		ton						
2.3	Maximum lifting height		mm						
3	OPERATION AND CONTROL								
3.1	Hoist Control (electrical / manual)		text						
4	CONSTRUCTION AND DESIGN								
4.1	Details of hoist (trolley and chain block)		text						
4.2	Details of locking mechanism		text						
5	MOTORS								
6	MATERIALS AND COATINGS								
6.1	Lifting chain		text						
6.2	Hoist		text						
6.3	Trolley		text						
6.4	Hook		text						



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DESIGN BUILD OF MECHANICAL
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TD61: Lifting Equipment for A and R Recycle
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Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD61: Lifting Equipment for A and R Recycle Pump Station	AH	MD	NH		MARCH 2024

Supplier:		Quantity:	
Item		Unit	Offered
7	WEIGHT AND DIMENSIONS		
7.1	Total equipment weight.	kg	
7.2	Chain length	m	

Regardless of any information provided in this technical detail sheet, the equipment to be provided will comply with the specified requirements.

Name (Print): _____

Signature: _____

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TD62: Lifting Equipment for RAS Pump Station				CLIENT N°.		PAGE	
				ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD62: Lifting Equipment for RAS Pump Station	AH	MD	NH		MARCH 2024
Supplier:			Quantity:				
Item			Unit	Offered			
1	GENERAL						
1.1	Type of Lifting Equipment		text				
1.2	Make and model		text				
1.3	Country of manufacture		text				
1.4	Spares supplier and address		text				
2	PERFORMANCE REQUIREMENTS						
2.1	Load Capacity (Safe Working Load)		ton				
2.2	Test Load		ton				
2.3	Maximum lifting height		mm				
3	OPERATION AND CONTROL						
3.1	Hoist Control (electrical / manual)		text				
4	CONSTRUCTION AND DESIGN						
4.1	Details of hoist (trolley and chain block)		text				
4.2	Details of locking mechanism		text				
5	MOTORS						
6	MATERIALS AND COATINGS						
6.1	Lifting chain		text				
6.2	Hoist		text				
6.3	Trolley		text				
6.4	Hook		text				



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TD62: Lifting Equipment for RAS Pump Station

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Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD62: Lifting Equipment for RAS Pump Station	AH	MD	NH		MARCH 2024

Supplier:		Quantity:	
Item		Unit	Offered
7	WEIGHT AND DIMENSIONS		
7.1	Total equipment weight.	kg	
7.2	Chain length	m	

Regardless of any information provided in this technical detail sheet, the equipment to be provided will comply with the specified requirements.

Name (Print): _____

Signature: _____

 CITY OF CAPE TOWN ISIXEKO SASEKAPA STAD KAAPSTAD Making progress possible. Together.				DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS 191Q/2023/24			
TD63: Lifting Equipment for Blower House				CLIENT N°.		PAGE	
				ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD63: Lifting Equipment for Blower House	AH	MD	NH		MARCH 2024
Supplier:			Quantity:				
Item			Unit	Offered			
1	GENERAL						
1.1	Type of Lifting Equipment		text				
1.2	Make and model		text				
1.3	Country of manufacture		text				
1.4	Spares supplier and address		text				
2	PERFORMANCE REQUIREMENTS						
2.1	Load Capacity (Safe Working Load)		ton				
2.2	Test Load		ton				
2.3	Maximum lifting height		mm				
3	OPERATION AND CONTROL						
3.1	Hoist Control (electrical / manual)		text				
3.2	Trolley Travel Control (electrical / manual)		text				
3.3	Long Travel Control (electrical / manual)		text				
3.4	Control Equipment (wired pendant / wireless controller / other (specify))		text				
4	CONSTRUCTION AND DESIGN						
4.1	Hoist type (wire rope / chain / other (specify))		text				
4.2	Crane type (Single-girder / double-girder / other (specify))		text				
5	MOTORS						
5.1	Hoist Lifting Motor						
5.1.1	Number of motors		No.				
5.1.2	Make and model		text				
5.1.3	Hoisting Speed (min. / max.)		m / min				
5.1.4	Nameplate power		kW				
5.1.5	Voltage / current / frequency		V / Amps / Hz				
5.1.6	Phase		Ph.				
5.1.7	Ingress Protection		IP				

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TD63: Lifting Equipment for Blower House						CLIENT N°.		PAGE	
						ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date		
T0	D	TD63: Lifting Equipment for Blower House	AH	MD	NH		MARCH 2024		
Supplier:			Quantity:						
Item		Unit	Offered						
5.2 Trolley Drive Motor (cross travel)									
5.2.1	Number of motors		No.						
5.2.2	Make and model		text						
5.2.3	Hoisting Speed (min. / max.)		m / min						
5.2.4	Nameplate power		kW						
5.2.5	Voltage / current / frequency		V / Amps / Hz						
5.2.6	Phase		Ph.						
5.2.7	Ingress Protection		IP						
5.3 Long Travel Drive Motor									
5.3.1	Number of motors		No.						
5.3.2	Make and model		text						
5.3.3	Travel Speed (min. / max.)		m / min						
5.3.4	Nameplate power		kW						
5.3.5	Voltage / current / frequency		V / Amps / Hz						
5.3.6	Phase		Ph.						
5.3.7	Ingress Protection		IP						
6 MATERIALS AND COATINGS									
6.1	Crane rails		text						
6.2	Main girder(s) / bridge structure(s)		text						
6.3	End carriage		text						
6.4	Wire rope / lifting chain		text						
6.5	Wheels		text						
6.6	Trolley		text						
6.7	Hook		text						



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TD63: Lifting Equipment for Blower House

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T0	D	TD63: Lifting Equipment for Blower House	AH	MD	NH		MARCH 2024

Supplier:		Quantity:	
Item		Unit	Offered
7	WEIGHT AND DIMENSIONS		
7.1	Crane span	mm	
7.2	Length of runway	mm	
7.3	Length of Pendant control cable	mm	
7.4	Total equipment weight (bridge, hoist, trolley, etc).	kg	

Regardless of any information provided in this technical detail sheet, the equipment to be provided will comply with the specified requirements.

Name (Print): _____

Signature: _____

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TD64: Lifting Equipment for UV Disinfection				CLIENT N°.		PAGE	
				ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD64: Lifting Equipment for UV Disinfection	AH	MD	NH		MARCH 2024
Supplier:			Quantity:				
Item		Unit	Offered				
1	GENERAL						
1.1	Type of Lifting Equipment	text					
1.2	Make and model	text					
1.3	Country of manufacture	text					
1.4	Spares supplier and address	text					
2	PERFORMANCE REQUIREMENTS						
2.1	Load Capacity (Safe Working Load)	ton					
2.2	Test Load	ton					
2.3	Maximum lifting height	mm					
3	OPERATION AND CONTROL						
3.1	Hoist Control (electrical / manual)	text					
4	CONSTRUCTION AND DESIGN						
4.1	Details of hoist (trolley and chain block)	text					
4.2	Details of locking mechanism	text					
5	MOTORS						
6	MATERIALS AND COATINGS						
6.1	Lifting chain	text					
6.2	Hoist	text					
6.3	Trolley	text					
6.4	Hook	text					



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DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS

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TD64: Lifting Equipment for UV Disinfection

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Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD64: Lifting Equipment for UV Disinfection	AH	MD	NH		MARCH 2024

Supplier:		Quantity:	
Item		Unit	Offered
7	WEIGHT AND DIMENSIONS		
7.1	Total equipment weight.	kg	
7.2	Chain length	m	

Regardless of any information provided in this technical detail sheet, the equipment to be provided will comply with the specified requirements.

Name (Print): _____

Signature: _____

 CITY OF CAPE TOWN ISIXEKO SASEKAPA STAD KAAPSTAD Making progress possible. Together.				DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS 191Q/2023/24			
TD65: Lifting Equipment for TSE Pump Station				CLIENT N°.		PAGE	
				ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD65: Lifting Equipment for TSE Pump Station	AH	MD	NH		MARCH 2024
Supplier:			Quantity:				
Item			Unit	Offered			
1	GENERAL						
1.1	Type of Lifting Equipment		text				
1.2	Make and model		text				
1.3	Country of manufacture		text				
1.4	Spares supplier and address		text				
2	PERFORMANCE REQUIREMENTS						
2.1	Load Capacity (Safe Working Load)		ton				
2.2	Test Load		ton				
2.3	Maximum lifting height		mm				
3	OPERATION AND CONTROL						
3.1	Hoist Control (electrical / manual)		text				
4	CONSTRUCTION AND DESIGN						
4.1	Details of hoist (trolley and chain block)		text				
4.2	Details of locking mechanism		text				
5	MOTORS						
6	MATERIALS AND COATINGS						
6.1	Lifting chain		text				
6.2	Hoist		text				
6.3	Trolley		text				
6.4	Hook		text				



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TD65: Lifting Equipment for TSE Pump Station

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Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD65: Lifting Equipment for TSE Pump Station	AH	MD	NH		MARCH 2024

Supplier:		Quantity:	
Item		Unit	Offered
7	WEIGHT AND DIMENSIONS		
7.1	Total equipment weight.	kg	
7.2	Chain length	m	

Regardless of any information provided in this technical detail sheet, the equipment to be provided will comply with the specified requirements.

Name (Print): _____

Signature: _____

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TD66: Lifting Equipment for Service Water Pump Station				CLIENT N°.		PAGE	
				ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD66: Lifting Equipment for Service Water Pump Station	AH	MD	NH		MARCH 2024
Supplier:			Quantity:				
Item			Unit	Offered			
1	GENERAL						
1.1	Type of Lifting Equipment		text				
1.2	Make and model		text				
1.3	Country of manufacture		text				
1.4	Spares supplier and address		text				
2	PERFORMANCE REQUIREMENTS						
2.1	Load Capacity (Safe Working Load)		ton				
2.2	Test Load		ton				
2.3	Maximum lifting height		mm				
3	OPERATION AND CONTROL						
3.1	Hoist Control (electrical / manual)		text				
4	CONSTRUCTION AND DESIGN						
4.1	Details of hoist (trolley and chain block)		text				
4.2	Details of locking mechanism		text				
5	MOTORS						
6	MATERIALS AND COATINGS						
6.1	Lifting chain		text				
6.2	Hoist		text				
6.3	Trolley		text				
6.4	Hook		text				



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TD66: Lifting Equipment for Service Water Pump Station

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Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD66: Lifting Equipment for Service Water Pump Station	AH	MD	NH		MARCH 2024

Supplier:		Quantity:	
Item		Unit	Offered
7	WEIGHT AND DIMENSIONS		
7.1	Total equipment weight.	kg	
7.2	Chain length	m	

Regardless of any information provided in this technical detail sheet, the equipment to be provided will comply with the specified requirements.

Name (Print): _____ Signature: _____

 CITY OF CAPE TOWN ISIXEKO SASEKAPA STAD KAAPSTAD Making progress possible. Together.				DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS 191Q/2023/24			
TD67: Lifting Equipment for Chlorine Building				CLIENT N°.		PAGE	
				ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD67: Lifting Equipment for Chlorine Building	AH	MD	NH		MARCH 2024
Supplier:			Quantity:				
Item			Unit	Offered			
1	GENERAL						
1.1	Type of Lifting Equipment		text				
1.2	Make and model		text				
1.3	Country of manufacture		text				
1.4	Spares supplier and address		text				
2	PERFORMANCE REQUIREMENTS						
2.1	Load Capacity (Safe Working Load)		ton				
2.2	Test Load		ton				
2.3	Maximum lifting height		mm				
3	OPERATION AND CONTROL						
3.1	Hoist Control (electrical / manual)		text				
3.2	Trolley Travel Control (electrical / manual)		text				
3.3	Long Travel Control (electrical / manual)		text				
3.4	Control Equipment (wired pendant / wireless controller / other (specify))		text				
4	CONSTRUCTION AND DESIGN						
4.1	Hoist type (wire rope / chain / other (specify))		text				
4.2	Crane type (Single-girder / double-girder / other (specify))		text				
5	MOTORS						
5.1	Hoist Lifting Motor						
5.1.1	Number of motors		No.				
5.1.2	Make and model		text				
5.1.3	Hoisting Speed (min. / max.)		m / min				
5.1.4	Nameplate power		kW				
5.1.5	Voltage / current / frequency		V / Amps / Hz				
5.1.6	Phase		Ph.				
5.1.7	Ingress Protection		IP				

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TD67: Lifting Equipment for Chlorine Building				CLIENT N°.		PAGE	
				ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD67: Lifting Equipment for Chlorine Building	AH	MD	NH		MARCH 2024
Supplier:			Quantity:				
Item			Unit	Offered			
5.2	Trolley Drive Motor (cross travel)						
5.2.1	Number of motors		No.				
5.2.2	Make and model		text				
5.2.3	Hoisting Speed (min. / max.)		m / min				
5.2.4	Nameplate power		kW				
5.2.5	Voltage / current / frequency		V / Amps / Hz				
5.2.6	Phase		Ph.				
5.2.7	Ingress Protection		IP				
5.3	Long Travel Drive Motor						
5.3.1	Number of motors		No.				
5.3.2	Make and model		text				
5.3.3	Travel Speed (min. / max.)		m / min				
5.3.4	Nameplate power		kW				
5.3.5	Voltage / current / frequency		V / Amps / Hz				
5.3.6	Phase		Ph.				
5.3.7	Ingress Protection		IP				
6	MATERIALS AND COATINGS						
6.1	Crane rails		text				
6.2	Main girder(s) / bridge structure(s)		text				
6.3	End carriage		text				
6.4	Wire rope / lifting chain		text				
6.5	Wheels		text				
6.6	Trolley		text				
6.7	Hook		text				



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TD67: Lifting Equipment for Chlorine Building

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T0	D	TD67: Lifting Equipment for Chlorine Building	AH	MD	NH		MARCH 2024

Supplier:		Quantity:	
Item		Unit	Offered
7	WEIGHT AND DIMENSIONS		
7.1	Crane span	mm	
7.2	Length of runway	mm	
7.3	Length of Pendant control cable	mm	
7.4	Total equipment weight (bridge, hoist, trolley, etc).	kg	

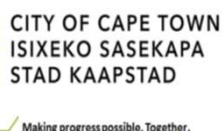
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Name (Print): _____

Signature: _____

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TD68: Lifting Equipment for Dewatering Builing				CLIENT N°.		PAGE	
				ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD68: Lifting Equipment for Dewatering Builing	AH	MD	NH		MARCH 2024
Supplier:			Quantity:				
Item			Unit	Offered			
1	GENERAL						
1.1	Type of Lifting Equipment		text				
1.2	Make and model		text				
1.3	Country of manufacture		text				
1.4	Spares supplier and address		text				
2	PERFORMANCE REQUIREMENTS						
2.1	Load Capacity (Safe Working Load)		ton				
2.2	Test Load		ton				
2.3	Maximum lifting height		mm				
3	OPERATION AND CONTROL						
3.1	Hoist Control (electrical / manual)		text				
3.2	Trolley Travel Control (electrical / manual)		text				
3.3	Long Travel Control (electrical / manual)		text				
3.4	Control Equipment (wired pendant / wireless controller / other (specify))		text				
4	CONSTRUCTION AND DESIGN						
4.1	Hoist type (wire rope / chain / other (specify))		text				
4.2	Crane type (single-girder / double-girder / other (specify))		text				
5	MOTORS						
5.1	Hoist Lifting Motor						
5.1.1	Number of motors		No.				
5.1.2	Make and model		text				
5.1.3	Hoisting speed (min. / max.)		m / min				
5.1.4	Nameplate power		kW				
5.1.5	Voltage / current / frequency		V / Amps / Hz				
5.1.6	Phase		Ph.				
5.1.7	Ingress protection		IP				

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TD68: Lifting Equipment for Dewatering Builing				CLIENT N°.		PAGE	
				ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD68: Lifting Equipment for Dewatering Builing	AH	MD	NH		MARCH 2024
Supplier:			Quantity:				
Item			Unit	Offered			
5.2	Trolley Drive Motor (cross travel)						
5.2.1	Number of motors		No.				
5.2.2	Make and model		text				
5.2.3	Hoisting speed (min. / max.)		m / min				
5.2.4	Nameplate power		kW				
5.2.5	Voltage / current / frequency		V / Amps / Hz				
5.2.6	Phase		Ph.				
5.2.7	Ingress protection		IP				
5.3	Long Travel Drive Motor						
5.3.1	Number of motors		No.				
5.3.2	Make and model		text				
5.3.3	Travel speed (min. / max.)		m / min				
5.3.4	Nameplate power		kW				
5.3.5	Voltage / current / frequency		V / Amps / Hz				
5.3.6	Phase		Ph.				
5.3.7	Ingress protection		IP				
6	MATERIALS AND COATINGS						
6.1	Crane rails		text				
6.2	Main girder(s) / bridge structure(s)		text				
6.3	End carriage		text				
6.4	Wire rope / lifting chain		text				
6.5	Wheels		text				
6.6	Trolley		text				
6.7	Hook		text				



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191Q/2023/24

TD68: Lifting Equipment for Dewatering Building

CLIENT N°.	
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PAGE

ZUTARI N°.

REV.

TO

Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD68: Lifting Equipment for Dewatering Building	AH	MD	NH		MARCH 2024

Supplier:

Quantity:

Item		Unit	Offered
7	WEIGHT AND DIMENSIONS		
7.1	Crane span	mm	
7.2	Length of runway	mm	
7.3	Length of pendant control cable	mm	
7.4	Total equipment weight (bridge, hoist, trolley, etc.)	kg	

Regardless of any information provided in this technical detail sheet, the equipment to be provided will comply with the specified requirements.

Name (Print): _____

Signature: _____

 CITY OF CAPE TOWN ISIXEKO SASEKAPA STAD KAAPSTAD Making progress possible. Together.				DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS 191Q/2023/24					
TD69: Lifting Equipment for Polyelectrolyte and Feeding Area						CLIENT N°.		PAGE	
						ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date		
T0	D	TD69: Lifting Equipment for Polyelectrolyte and Feeding Area	AH	MD	NH		MARCH 2024		
Supplier:			Quantity:						
Item			Unit	Offered					
1	GENERAL								
1.1	Type of Lifting Equipment		text						
1.2	Make and model		text						
1.3	Country of manufacture		text						
1.4	Spares supplier and address		text						
2	PERFORMANCE REQUIREMENTS								
2.1	Load Capacity (Safe Working Load)		ton						
2.2	Test Load		ton						
2.3	Maximum lifting height		mm						
3	OPERATION AND CONTROL								
3.1	Hoist Control (electrical / manual)		text						
3.2	Trolley Travel Control (electrical / manual)		text						
3.3	Long Travel Control (electrical / manual)		text						
3.4	Control Equipment (wired pendant / wireless controller / other (specify))		text						
4	CONSTRUCTION AND DESIGN								
4.1	Hoist type (wire rope / chain / other (specify))		text						
4.2	Crane type (Single-girder / double-girder / other (specify))		text						
5	MOTORS								
5.1	Hoist Lifting Motor								
5.1.1	Number of motors		No.						
5.1.2	Make and model		text						
5.1.3	Hoisting Speed (min. / max.)		m / min						
5.1.4	Nameplate power		kW						
5.1.5	Voltage / current / frequency		V / Amps / Hz						
5.1.6	Phase		Ph.						
5.1.7	Ingress Protection		IP						

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TD69: Lifting Equipment for Polyelectrolyte and Feeding Area				CLIENT N°.		PAGE	
				ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD69: Lifting Equipment for Polyelectrolyte and Feeding Area	AH	MD	NH		MARCH 2024
Supplier:			Quantity:				
Item			Unit	Offered			
5.2	Trolley Drive Motor (cross travel)						
5.2.1	Number of motors		No.				
5.2.2	Make and model		text				
5.2.3	Hoisting Speed (min. / max.)		m / min				
5.2.4	Nameplate power		kW				
5.2.5	Voltage / current / frequency		V / Amps / Hz				
5.2.6	Phase		Ph.				
5.2.7	Ingress Protection		IP				
5.3	Long Travel Drive Motor						
5.3.1	Number of motors		No.				
5.3.2	Make and model		text				
5.3.3	Travel Speed (min. / max.)		m / min				
5.3.4	Nameplate power		kW				
5.3.5	Voltage / current / frequency		V / Amps / Hz				
5.3.6	Phase		Ph.				
5.3.7	Ingress Protection		IP				
6	MATERIALS AND COATINGS						
6.1	Crane rails		text				
6.2	Main girder(s) / bridge structure(s)		text				
6.3	End carriage		text				
6.4	Wire rope / lifting chain		text				
6.5	Wheels		text				
6.6	Trolley		text				
6.7	Hook		text				



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DESIGN BUILD OF MECHANICAL
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UPGRADING AND EXPANSION OF
THE MACASSAR WASTEWATER
TREATMENT WORKS

191Q/2023/24

TD69: Lifting Equipment for Polyelectrolyte and
Feeding Area

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Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD69: Lifting Equipment for Polyelectrolyte and Feeding Area	AH	MD	NH		MARCH 2024

Supplier:		Quantity:	
Item		Unit	Offered
7	WEIGHT AND DIMENSIONS		
7.1	Crane span	mm	
7.2	Length of runway	mm	
7.3	Length of Pendant control cable	mm	
7.4	Total equipment weight (bridge, hoist, trolley, etc.)	kg	

Regardless of any information provided in this technical detail sheet, the equipment to be provided will comply with the specified requirements.

Name (Print): _____

Signature: _____

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TD70: Chlorination Equipment				CLIENT N°.		PAGE	
				ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD70: Chlorination Equipment	AH	MD	NH		MARCH 2024
Supplier:			Quantity:				
Item			Unit	Offered			
1	GENERAL						
1.1	Supplier name		text				
1.2	Address		text				
2	EXTRACT FANS						
2.1	Make and model:		text				
2.2	Country of manufacture:		text				
2.3	Spares supplier and address		text				
3	BREATHING APPARATUS						
3.1	Make and model:		text				
3.2	Country of manufacture:		text				
3.3	Spares supplier and address		text				
4	SAFETY SUIT						
4.1	Make and model:		text				
4.2	Country of manufacture:		text				
4.3	Spares supplier and address:		text				
5	FACE MASK						
5.1	Make and model:		text				
5.2	Country of manufacture:		text				
5.3	Spares supplier and address:		text				
6	AUTOMATIC VACUUM CHANGE-OVER DEVICE						
6.1	Make and model:		text				
6.2	Gas flowrate		kg/h				
6.3	Operating pressure		bar				
6.4	Maximum pressure		bar				



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THE MACASSAR WASTEWATER
TREATMENT WORKS

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TD70: Chlorination Equipment

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T0

Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD70: Chlorination Equipment	AH	MD	NH		MARCH 2024

Supplier:

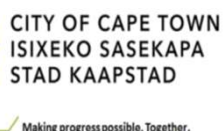
Quantity:

Item		Unit	Offered
7	WEIGHTOMETERS		
7.1	Make and model:	text	

Regardless of any information provided in this technical detail sheet, the equipment to be provided will comply with the specified requirements.

Name (Print): _____

Signature: _____



DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS

191Q/2023/24

TD71: Dry Chlorine Scrubber

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Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD71: Dry Chlorine Scrubber	AH	MD	NH		MARCH 2024

Supplier:

Quantity:

Item		Unit	Offered
1	GENERAL		
1.1	Make & model	text	
1.2	Type and design	text	
1.3	Method of operation	text	
1.4	Overall dimensions	text	
1.5	Mass (kg)	kg	
1.6	Country of manufacture	text	

Regardless of any information provided in this technical detail sheet, the equipment to be provided will comply with the specified requirements.

Name (Print): _____

Signature: _____

 CITY OF CAPE TOWN ISIXEKO SASEKAPA STAD KAAPSTAD Making progress possible. Together.				DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS 191Q/2023/24			
TD72: Boilers				CLIENT N°.		PAGE	
				ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD72: Boilers	AH	MD	NH		MARCH 2024
Supplier:			Quantity:				
Item			Unit	Offered			
1	GENERAL						
1.1	Boiler						
1.1.1	Number of boilers		No.				
1.1.2	Make		text				
1.1.3	Model		text				
1.1.4	Country of manufacture		text				
1.1.5	Spares supplier and address		text				
1.2	Burner						
1.2.1	Number of boilers		No.				
1.2.2	Make		text				
1.2.3	Model		text				
1.2.4	Country of manufacture		text				
1.2.5	Spares supplier and address		text				
2	PERFORMANCE REQUIREMENTS						
2.1	Boiler						
2.1.1	Thermal output		kW				
2.1.2	Operating pressure		bar				
2.1.3	Maximum pressure		bar				
2.1.4	Operating temperature range (min. - max.)		°C to °C				
2.1.5	Boiler efficiency		%				
2.1.6	Water flow through boiler (min. - max.)		m³/h - m³/h				
2.2	Burner						
2.2.1	Gas flowrate (min. - max.)		Nm³/h - Nm³/h				
2.2.2	Gas pressure (min. - max.)		mbar				
2.2.3	Turndown ratio		-				

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TD72: Boilers				CLIENT N°.		PAGE	
				ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD72: Boilers	AH	MD	NH		MARCH 2024
Supplier:			Quantity:				
Item			Unit	Offered			
3	OPERATION AND CONTROL						
3.1	Boiler						
3.1.1	Details of boiler pressure monitoring instrumentation		text				
3.1.2	Details of boiler temperature monitoring instrumentation		text				
3.1.3	Details of boiler water level measurement instrumentation		text				
3.1.4	Details of exhaust gas temperature monitoring instrumentation		text				
3.1.5	Details of return water temperature monitoring instrumentation		text				
3.1.6	Details of feedwater temperature measurement instrumentation		text				
3.1.7	Details of feedwater pressure monitoring instrumentation		text				
3.1.8	Details of feedwater level measurement instrumentation		text				
3	OPERATION AND CONTROL (CONTINUED)						
3.2	Burner						
3.2.1	System supplied with burner management system (yes / no)		text				
3.2.2	Details and description of ignition transformer		text				
3.2.3	Details of air pressure monitoring instrumentation		text				
3.2.4	Details of flame monitoring instrumentation		text				
4	CONSTRUCTION AND DESIGN						
4.1	Boiler						
4.1.1	Design code (e.g ASME, etc.)		text				
4.1.2	Boiler type (e.g. fire tube, water tube, etc.)		text				
4.1.3	Boiler volume		litres				

 CITY OF CAPE TOWN ISIXEKO SASEKAPA STAD KAAPSTAD Making progress possible. Together.				DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS 191Q/2023/24			
TD72: Boilers				CLIENT N°.		PAGE	
				ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD72: Boilers	AH	MD	NH		MARCH 2024
Supplier:			Quantity:				
Item			Unit	Offered			
4.2	Burner						
4.2.1	Installation orientation		text				
4.2.2	Compatible fuel type		text				
4.2.3	Details of gas pressure monitoring instrumentation		text				
5	MATERIALS AND COATINGS						
5.1	Boiler						
5.1.1	Baseframe		text				
5.1.2	Shell		text				
5.1.3	Tubes		text				
5.1.4	Tube sheets		text				
5.1.5	Burner		text				
5.1.6	Reversal chamber(s)		text				
5.1.7	Smokebox		text				
5.2	Burner						
5.2.1	Housing		text				
5.2.1	Gas train piping		text				
6	MOTORS						
6.1	Burner Fan						
6.1.1	Make		text				
6.1.2	Model		text				
6.1.3	Nameplate power		kW				
6.1.4	Voltage		V				
6.1.5	Rated load current		Amps				
6.1.6	Frequency		Hz				
6.1.7	Phase		Ph.				
6.1.8	Number of poles		No.				
6.1.9	Service factor		text				



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191Q/2023/24

TD72: Boilers

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Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD72: Boilers	AH	MD	NH		MARCH 2024

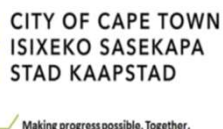
Supplier:		Quantity:	
Item		Unit	Offered
6	MOTORS (CONTINUED)		
6.1	Burner Fan		
6.1.10	Ingress Protection	IP	
6.1.11	Weight	kg	
7	WEIGHT AND DIMENSIONS		
7.1	Boiler weight (empty)	kg	
7.2	Boiler weight (full / operating weigh)	kg	
7.3	Burner	kg	
7.4	Boiler length	mm	
7.5	Boiler diameter (width)	mm	
7.6	Boiler height	mm	
7.7	Flue outlet	mm	
7.8	Boiler inlet connection	DN	
7.9	Boiler outlet connection	DN	
7.9	Boiler return water inlet connection	DN	
7.10	Make-up water inlet	DN	

Regardless of any information provided in this technical detail sheet, the equipment to be provided will comply with the specified requirements.

Name (Print): _____

Signature: _____

 CITY OF CAPE TOWN ISIXEKO SASEKAPA STAD KAAPSTAD Making progress possible. Together.				DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS 191Q/2023/24			
TD73: Heat Exchangers				CLIENT N°.		PAGE	
				ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD73: Heat Exchangers	AH	MD	NH		MARCH 2024
Supplier:			Quantity:				
Item		Unit	Offered				
1	GENERAL						
1.1	Make	text					
1.2	Model	text					
1.3	Number of units	No.					
1.4	Country of manufacture	text					
1.5	Spares supplier and address	text					
2	PERFORMANCE REQUIREMENTS						
2.1	Heat transfer	kW					
2.2	Sludge dryness content	% DS - % DS					
2.3	Water flowrate (min. - max.)	m ³ /h - m ³ /h					
2.4	Water velocity (min. - max.)	m/s - m/s					
2.5	Water temperature (incoming / outgoing)	°C - °C					
2.6	Pressure loss through heat exchanger - water side	bar					
2.7	Sludge flowrate (min. - max.)	m ³ /h - m ³ /h					
2.8	Sludge velocity (min. - max.)	m/s - m/s					
2.9	Sludge temperature (incoming / outgoing)	°C - °C					
2.10	Design pressure	bar					
2.11	Pressure loss through heat exchanger - sludge size	bar					
3	CONSTRUCTION AND DESIGN						
3.1	Details and description of heat exchangers (spiral, tubular, plate, etc.)	text					
3.2	Meets the requirements of PER (Yes / No)	text					
3.3	Heat transfer area	m ²					
3.4	Number of passes	No.					
3.5	Flange details (SANS, ASME, etc.) and pressure rating	text					



DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS

191Q/2023/24

TD73: Heat Exchangers

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T0	D	TD73: Heat Exchangers	AH	MD	NH		MARCH 2024

Supplier:

Quantity:

Item

Unit

Offered

4	MATERIALS AND COATINGS
---	------------------------

4.1	Shell / plate or tube
-----	-----------------------

text

4.2	Gaskets
-----	---------

text

4.3	Insulation
-----	------------

text

5	WEIGHT AND DIMENSIONS
---	-----------------------

5.1	Weight of heat exchanger (empty)
-----	----------------------------------

kg

5.2 Weight of heat exchanger (in operation)

kg

5.3	Overall length
-----	----------------

mm

5.4	Overall width
-----	---------------

mm

5.5	Overall height
-----	----------------

mm

5.6	Water inlet diameter
-----	----------------------

DN

5.7	Water outlet diameter
-----	-----------------------

DN

5.8 | Sludge inlet diameter

DN

5.9	Sludge outlet diameter
-----	------------------------

DN

Regardless of any information provided in this technical detail sheet, the equipment to be provided will comply with the specified requirements.

Name (Print): _____

Signature: _____

 CITY OF CAPE TOWN ISIXEKO SASEKAPA STAD KAAPSTAD Making progress possible. Together.				DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS 191Q/2023/24			
TD74: Combined Heat and Power Plant				CLIENT N°.		PAGE	
				ZUTARI N°.		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD74: Combined Heat and Power Plant	AH	MD	NH		MARCH 2024
Supplier:			Quantity:				
Item			Unit	Offered			
1	GENERAL						
1.1	Gas Engines						
1.1.1	Number of gas engines		No.				
1.1.2	Make		text				
1.1.3	Model		text				
1.1.4	Country of manufacture		text				
1.1.5	Spares supplier and address		text				
1.2	Alternator						
1.2.1	Number of boilers		No.				
1.2.2	Make		text				
1.2.3	Model		text				
1.2.4	Country of manufacture		text				
1.2.5	Spares supplier and address		text				
2	PERFORMANCE REQUIREMENTS						
2.1	Gas Engines						
2.1.1	Electric output		kWe				
2.1.2	Electric efficiency @ 100% load		%				
2.1.3	Electric efficiency @ 75% load		%				
2.1.4	Electric efficiency @ 50% load		%				
2.1.6	Heat output		kWth				
2.1.7	Thermal efficiency		%				
2.1.8	Rated speed		rpm				
2.1.9	Overall efficiency		&				
2.1.10	Gas consumption		m³/h				
2.2	Alternator						
2.2.1	Efficiency		Nm³/h - Nm³/h				

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TD74: Combined Heat and Power Plant				CLIENT N°.		PAGE	
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Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	TD74: Combined Heat and Power Plant	AH	MD	NH		MARCH 2024
Supplier:			Quantity:				
3		OPERATION AND CONTROL					
4		CONSTRUCTION AND DESIGN					
4.1		Gas Engines					
4.1.1		Number of cylinders	no.				
4.1.2		Engine speed	rpm				
4.1.3		Oil consumption (normal - max.)	g/kWh - g/kWh				
4.1.4		Min. methane number	-				
4.1.5		Required gas inlet pressure	mbar				
4.1.6		Max. gas temperature	°C				
4.2		Heat recovery / thermal system					
4.2.1		Heat carrier	text				
4.2.2		Water temperature (input / output)	°C / °C				
4.2.3		Max. working pressure	kPa				
4.2		Other					
4.2.1		Noise level @ 1 m from engine	dB(A)				
5		MATERIALS AND COATINGS					
6		MOTORS					



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THE MACASSAR WASTEWATER
TREATMENT WORKS

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TD74: Combined Heat and Power Plant

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T0	D	TD74: Combined Heat and Power Plant	AH	MD	NH		MARCH 2024

Supplier:

Quantity:

7	WEIGHT AND DIMENSIONS		
7.1	Weight (no fluids)	kg	
7.2	Weight (with fluids)	kg	
7.3	Overall length	mm	
7.4	Overall width	mm	
7.5	Overall height	mm	

Regardless of any information provided in this technical detail sheet, the equipment to be provided will comply with the specified requirements.

Name (Print): _____

Signature: _____

 CITY OF CAPE TOWN ISIXEKO SASEKAPA STAD KAAPSTAD Making progress possible. Together.				DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS 191Q/2023/24	
TITLE ELECTRICAL SUMMARY SHEET			CLIENT N°.		PAGE
			ZUTARI N°.		REV. T0
Title:		DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS			
Client:		City of Cape Town			
Project No:		191Q/2023/24			
Client ref. No.:					
Zutari ref. No.:		1001780			
Procurement Package		W1.2			
Process Area/Unit		Entire Treatment Plant			
ELECTRICAL TECHNICAL DATASHEETS					
	DATASHEET DESCRIPTION		NUMBERING		
TD01	ESKOM INCOMING SWITCHING STATION SWITCHBOARD		DS-EP-0001A		
TD02	INTAKE MAIN INCOMERS		DS-EP-0001B		
TD03	INTAKE SWITCHBOARD		DS-EP-0001C		
TD04	BIOGAS & RENEWABLE GENERATOR SWITCHBOARD		DS-EP-0001D		
TD05	DIESEL GENERATOR SWITCHBOARD		DS-EP-0001E		
TD06	SECONDARY SWITCHGEAR - TRANSFORMER FEEDERS		DS-EP-0002A		
TD07	SECONDARY SWITCHGEAR - EARTHING		DS-EP-0002B		
TD08	BATTERY TRIPPING UNIT - PRIMARY EQUIPMENT		DS-EP-0003A		
TD09	BATTERY TRIPPING UNIT - SECONDARY EQUIPMENT		DS-EP-0003B		
TD10	DISTRIBUTION TRANSFORMERS		DS-EP-0004		
TD11	ISOLATION TRANSFORMER		DS-EP-0005		
TD12	MV CABLES AND CABLE SYSTEMS		DS-EP-0006		
TD13	NECRT EARTHING		DS-EP-0007		
TD14	LV SWITCHGEAR AND CONTROLGEAR ASSEMBLIES - MOTOR CONTROL CENTRES		DS-EE-0010A		
TD15	LV SWITCHGEAR AND CONTROLGEAR ASSEMBLIES - LOCAL CONTROL PANELS		DS-EE-0010B		
TD16	DISTRIBUTION BOARDS AND KIOSKS		DS-EE-0010S		
TD17	LV CABLES		DS-EE-0011		
TD18	CABLE SUPPORTS		DS-EE-0012		
TD19	LIGHTING		DS-EE-0014A		
TD20	LUMINAIRE SCHEDULE		DS-EE-0014B		
TD21	90kW		DS-EE-0023A		
TD22	VARIABLE FREQUENCY CONVERTERS - VSDs LARGER THAN 90kW		DS-EE-0023B		
TD23	LV ELECTRICAL MOTORS - MOTORS < 50kW		DS-EE-0025A		
TD24	LV ELECTRICAL MOTORS - 50 kW < MOTORS < 150 kW		DS-EE-0025B		
TD25	LV ELECTRICAL MOTORS - MOTORS > 150 kW		DS-EE-0025C		
TD26	ELECTRICAL ACTUATORS		DS-EE-0026		
TD27	DIESEL POWERED GENERATOR SETS		DS-EE-0050		
TD28	LV GROUP/CENTRALISED PFC		DS-EE-0022		
TD29	LOW VOLTAGE SOFT STARTERS		DS-EE-0024		

DATA SHEET No. DS-EP-0001A: MEDIUM VOLTAGE SWITCHGEAR - 11kV MACASSAR WWTW ESKOM INCOMING SWITCHING STATION SWITCHBOARD

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Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	DATA SHEET No. DS-EP-0001A: MEDIUM VOLTAGE SWITCHGEAR - 11kV MACASSAR WWTW ESKOM INCOMING SWITCHING STATION SWITCHBOARD	BV	AZ	EB		Mar-24

GENERAL SYSTEM INFORMATION

System Operating Voltage:	11,5	System Frequency:	50 Hz	Phase Rotation:	Anti-Clockwise RWB
Maximum Fault Level:	31,5 kA	System earthing:	NECRT	Earth fault current:	300A
Reference single line diagram - Drawing number	1001780-0000-DRG-EE-0002	Reference protection functional diagram - Drawing number	1001780-0000-DRG-EE-0003		

MAKE AND MODEL

Make	ACTOM AMV12	System Frequency:	50 Hz		
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SWITCHBOARD RATING DATA

Rated Voltage:	12 kV	BIL	95 kV	Rated Short Time Power-Frequency Withstand Voltage:	28 kV
Rated Frequency:	50 Hz	Rated Short-Time Withstand Current:	31.5 kA	Rated Short-Time Current Duration:	3 s
Rated Continuous Main Busbar Current:	1250A	Rated Peak Withstand Current	75 kA	Rated Internal Arc Classification:	AFLR
		Internal Arc Withstand Capability	31.5 kA	Internal Arc Withstand Duration	1 s
Partition Class	PM	Loss of Service Continuity	LSC2B		
Electrical Endurance Class of Circuit Breaker	E2	Mechanical Endurance Class of Circuit Breaker	M1		
Electrical Endurance Class of Switch-Disconnectors	E2	Mechanical Endurance Class of Switch-Disconnectors	M1		
Electrical Endurance Class of Contactors	N/A	Mechanical Endurance Class of Contactors	N/A	Electrical Endurance Class of Earthing Switches	E1

SWITCHBOARD CONSTRUCTION DATA										
Degree of Protection:	IP 4X	Painting:	Powder Coated	Colour:	Grey					
Busbar Arrangement:	Single	Total Number of Switchgear Panels:	11	Number of Voltage Transformers:	2					
Floor Frame	Yes	Gas Exhaust Ducts Required:	Yes	Switchboard air-or gas-insulated	Air					
Type No:	1 (SPECIFIED)	OFFER	2 (SPECIFIED)	OFFER	3 (SPECIFIED)	OFFER	4 (SPECIFIED)	OFFER	5 (SPECIFIED)	OFFER
Panel Function:	Incomer		Bus-Section		Bus-Riser		Feeders		Busbar Earth	
Panel Name:	Incomer		Bus-Section		Bus-Riser		Isolation Transformer Feeder 1 & 2 & Spare		Busbar Earth	
Panel No.:	A2, B3 & C2		A1 & B4		B1 & C1		A3, B2 & C3		A4	
Number of Type Panels:	3		2		2		3		1	
Panel Type:	Incoming/Outgoing Feeder with Vacuum Circuit Breaker		Bus-tie with Vacuum Circuit Breaker		Bus-Riser		Vacuum Circuit Breaker		Earthing Switch	
Rated current:	630 A		1250A		1250A		630 A			
Panel Dimension: W/D/H (mm)										
MV Cable Entry / Bus Duct Entry:	Bottom						Bottom			
MV Cable Size:	As per SLD						As per SLD			
Control Cable Entry:	Bottom				Bottom		Bottom			
Type No:	1 (SPECIFIED)	OFFER	2 (SPECIFIED)	OFFER	3 (SPECIFIED)	OFFER	4 (SPECIFIED)	OFFER	5 (SPECIFIED)	OFFER
SWITCHGEAR DATA										
CB/SD Make:										
CB/SD Model:										
CB Interrupting medium:	Vacuum		Vacuum		N/A		Vacuum			
CB Operating Mechanism	Stored energy		Stored energy		N/A		Stored energy			
Electric Motor Charging	Yes		Yes		N/A		Yes			
Electric Motor Racking	No		No		N/A		No			
Earth Switch Location:	Cable side		Cable Side		Cable side		Cable side		Busbar side	
SWITCHGEAR AUXILIARY EQUIPMENT DATA										
Closing Coil Voltage:	110 V DC		110 V DC		N/A		110 V DC		N/A	
Shunt Trip Coils Voltage:	110 V DC		110 V DC		N/A		110 V DC		N/A	
Additional Shunt Trip Coil Voltage:	N/A		N/A		N/A		N/A		N/A	
Under Voltage Release:	No		No		N/A		No		N/A	
Operation Counter:	Yes		Yes		N/A		Yes		N/A	
Spring Charge Motor Voltage:	110 V DC		110 V DC		N/A		110 V DC		N/A	
Electrical Racking Motor Voltage:	N/A		N/A		N/A		N/A		N/A	
Auxiliary Voltage Supply: (Heater, Light)	230V AC		230V AC		N/A		230V AC		N/A	
Mechanical Trip / Close Pushbutton:	Trip - Yes Close- Blank off		Trip - Yes Close- Blank off		N/A		Trip - Yes Close- Blank off		N/A	

Spring Charged Auxiliary Contacts:	Yes		Yes		N/A		Yes		N/A	
CB/Disconnecter Status Auxiliary Contacts:	Yes		Yes		N/A		Yes		N/A	
CB/Disconnecter Position Auxiliary Contacts:	Yes		Yes		N/A		Yes		N/A	
Earth Switch Status Auxiliary Contacts:	Yes		Yes		N/A		Yes		Yes	
Type No:	1 (SPECIFIED)	OFFER	2 (SPECIFIED)	OFFER	3 (SPECIFIED)	OFFER	4 (SPECIFIED)	OFFER	5 (SPECIFIED)	OFFER
ADDITIONAL EQUIPMENT										
Surge Arrestor/ Suppressor:	Yes		No		No		No			
Surge Arrestor/ Suppressor Make:										
Surge Arrestor Type:	Station class									
Anti Condensation Space Heater:With Thermostat	Yes		Yes		Yes		Yes			
LV Compartment Light:	Yes		Yes		Yes		Yes			
TNC Switch:	Yes		Yes		No		Yes			
Local/ Remote Switch:	Yes		Yes		No		Yes			
Mimic Diagram:	Yes		Yes		Yes		Yes		Yes	
Voltmeter with Selector Switch	Yes		No		No		No		No	
Ammeter	Yes		No		No		Yes		No	
Power meter	Yes									
Selector Switch for Pendant/Remote	Yes		Yes		No		Yes		No	
Pendant Socket with 10m pendant cord with open/close push button	Yes		Yes		No		Yes		No	
Cable live indicators	Yes		Yes		Yes		Yes		Yes	
Key for interlocking	Yes		Yes		Yes		Yes		Yes	
VOLTAGE TRANSFORMERS										
Type (inductive/electronic):	Inductive				Inductive				Inductive	
Connection Location:	Cable side				Cable Side				Cable Side	
Withdrawable / Fixed:	Withdrawable				Withdrawable				Withdrawable	
Residual Voltage Winding Required:	No				No				No	
Rated Output	As per SLD				As per SLD				As per SLD	
Rated Secondary Voltage:										
Rated Voltage Residual Voltage Winding:										
Class:										
Voltage Factor:										
Manufacturer:										

Type No:	1 (SPECIFIED)	OFFER	2 (SPECIFIED)	OFFER	3 (SPECIFIED)	OFFER	4 (SPECIFIED)	OFFER	5 (SPECIFIED)	OFFER
CURRENT TRANSFORMERS										
Purpose:	Metering		Protection				Protection			
Type (inductive/electronic):	Inductive		Inductive				Inductive			
Function:	Power Metering		General Protection IED				General Protection IED			
Accuracy class:	As indicated on SLD		As indicated on SLD				As indicated on SLD			
Rated output:										
Accuracy Limit Factor:										
Security Factor:										
Ratio:										
Purpose:	Protection						Metering			
Type (inductive/electronic):	Inductive						Inductive			
Function:	Differential Line Protection						Ammeter			
Accuracy class:	As indicated on SLD						As indicated on SLD			
Rated output:										
Accuracy Limit Factor:										
Security Factor:										
Ratio:										
Purpose:	Protection									
Type (inductive/electronic):	Inductive									
Function:	General Protection IED									
Accuracy class:	As indicated on SLD									
Rated output:										
Accuracy Limit Factor:										
Security Factor:										
Ratio:										
Manufacturer:										
PROTECTION RELAYS (all panels except SDF)										
Function:	Refer to 1001780-0000-DRG-EE-0003		Refer to 1001780-0000-DRG-EE-0003		Refer to 1001780-0000-DRG-EE-0003		Refer to 1001780-0000-DRG-EE-0003		Refer to 1001780-0000-DRG-EE-0003	
Relay Make:	ABB		ABB				ABB			
Relay Model:	REF615 or equivalent		REF615 or equivalent				REF615 or equivalent			
Function:	Differential Line Protection									
Relay Make:	ABB									
Relay Model:	RED615 or equivalent									
Function:										

Relay Make:										
Relay Model:										
Type No:	1 (SPECIFIED)	OFFER	2 (SPECIFIED)	OFFER	3 (SPECIFIED)	OFFER	4 (SPECIFIED)	OFFER	5 (SPECIFIED)	OFFER
SUPPLEMENTARY INFORMATION										
Front Door & Rear Panel colour:	Grey		Grey		Grey		Grey		Grey	
Digital power meter										
Quality of supply meter										
<i>Regardless of any information provided in this technical detail sheet, the equipment to be provided will comply with the specified requirements</i>										
Name (Print): _____ Signature: _____.										

DATA SHEET No. DS-EP-0001B: MEDIUM VOLTAGE SWITCHGEAR - 11kV MACASSAR WWTW INTAKE MAIN INCOMERS

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Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	DATA SHEET No. DS-EP-0001B: MEDIUM VOLTAGE SWITCHGEAR - 11kV MACASSAR WWTW INTAKE MAIN INCOMERS	BV	AZ	EB		Mar-24

GENERAL SYSTEM INFORMATION

System Operating Voltage:	11,5	System Frequency:	50 Hz	Phase Rotation:	Anti-Clockwise RWB
Maximum Fault Level:	31,5 kA	System earthing:	NECRT	Earth fault current:	300A
Reference single line diagram - Drawing number	1001780-0000-DRG-EE-0002	Reference protection functional diagram - Drawing number	1001780-0000-DRG-EE-0003		

MAKE AND MODEL

Make	ABB Unigear	System Frequency:	50 Hz		
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SWITCHBOARD RATING DATA

Rated Voltage:	12kV	BIL	95 kV	Rated Short Time Power-Frequency Withstand Voltage:	28 kV
Rated Frequency:	50 Hz	Rated Short-Time Withstand Current:	31.5 kA	Rated Short-Time Current Duration:	3 s
Rated Continuous Main Busbar Current:	1,250 A	Rated Peak Withstand Current	75 kA	Rated Internal Arc Classification:	AFLR
		Internal Arc Withstand Capability	31.5 kA	Internal Arc Withstand Duration	1 s
Partition Class	PM	Loss of Service Continuity	LSC2B		
Electrical Endurance Class of Circuit Breaker	E2	Mechanical Endurance Class of Circuit Breaker	M1		
Electrical Endurance Class of Switch-Disconnectors	E2	Mechanical Endurance Class of Switch-Disconnectors	M1		
Electrical Endurance Class of Contactors	N/A	Mechanical Endurance Class of Contactors	N/A	Electrical Endurance Class of Earthing Switches	E1

SWITCHBOARD CONSTRUCTION DATA										
Degree of Protection:	IP 4X	Painting:	Powder Coated	Colour:	Grey					
Busbar Arrangement:	Single	Total Number of Switchgear Panels:	20	Number of Voltage Transformers:	2					
Floor Frame	No	Gas Exhaust Ducts Required:	Yes	Switchboard air-or gas-insulated	Air					
Type No:	1 (SPECIFIED)	OFFER								
Panel Function:	Incomer									
Panel Name:	Incomer									
Panel No.:	A1 & B1									
Number of Type Panels:	2									
Panel Type:	Individual Incoming Circuit Breakers									
Rated current:	630 A									
Panel Dimension: W/D/H (mm)										
MV Cable Entry / Bus Duct Entry:	Bottom									
MV Cable Size:	As per SLD									
Control Cable Entry:	Bottom									
Type No:	1 (SPECIFIED)	OFFER								
SWITCHGEAR DATA										
CB/SD Make:										
CB/SD Model:										
CB Interrupting medium:	Vacuum									
CB Operating Mechanism	Stored energy									
Electric Motor Charging	Yes									
Electric Motor Racking	No									
Earth Switch Location:	Cable side									
SWITCHGEAR AUXILIARY EQUIPMENT DATA										
Closing Coil Voltage:	110 V DC									
Shunt Trip Coils Voltage:	110 V DC									
Additional Shunt Trip Coil Voltage:	N/A									
Under Voltage Release:	No									
Operation Counter:	Yes									
Spring Charge Motor Voltage:	110 V DC									
Electrical Racking Motor Voltage:	N/A									
Auxiliary Voltage Supply: (Heater, Light)	230V AC									

Mechanical Trip / Close Pushbutton:	Trip - Yes Close- Blank off									
Spring Charged Auxiliary Contacts:	Yes									
CB/Disconnecter Status Auxiliary Contacts:	Yes									
CB/Disconnecter Position Auxiliary Contacts:	Yes									
Earth Switch Status Auxiliary Contacts:	Yes									
Type No:	1 (SPECIFIED)	OFFER								
ADDITIONAL EQUIPMENT										
Surge Arrestor/ Suppressor:	Yes									
Surge Arrestor/ Suppressor Make:										
Surge Arrestor Type:	Station class									
Anti Condensation Space Heater:With Thermostat	No									
LV Compartment Light:	Yes									
TNC Switch:	Yes									
Local/ Remote Switch:	Yes									
Mimic Diagram:	Yes									
Voltmeter with Selector Switch	Yes									
Ammeter	Yes									
Power meter	Yes									
Selector Switch for Pendant/Remote	Yes									
Pendant Socket with 10m pendant cord with open/close push button	Yes									
Cable live indicators	Yes									
Key for interlocking	Yes									
VOLTAGE TRANSFORMERS										
Type (inductive/electronic):	Inductive									
Connection Location:	Cable side									
Withdrawable / Fixed:	Withdrawable									
Residual Voltage Winding Required:	No									
Rated Output	As per SLD									
Rated Secondary Voltage:										
Rated Voltage Residual Voltage Winding:										

Class:										
Voltage Factor:										
Manufacturer:										
Type No:	1 (SPECIFIED)	OFFER								
CURRENT TRANSFORMERS										
Purpose:	Metering									
Type (inductive/electronic):	Inductive									
Function:	Power Metering									
Accuracy class:	As indicated on SLD									
Rated output:										
Accuracy Limit Factor:										
Security Factor:										
Ratio:										
Purpose:	Protection									
Type (inductive/electronic):	Inductive									
Function:	Differential Line Protection									
Accuracy class:	As indicated on SLD									
Rated output:										
Accuracy Limit Factor:										
Security Factor:										
Ratio:										
Purpose:	Protection									
Type (inductive/electronic):	Inductive									
Function:	General Protection IED									
Accuracy class:	As indicated on SLD									
Rated output:										
Accuracy Limit Factor:										
Security Factor:										
Ratio:										
Manufacturer:										
PROTECTION RELAYS (all panels except SDF)										
Function:	Refer to 1001780-0000-DRG-EE-0003									
Relay Make:										
Relay Model:	SEL751 or approved equivalent									

Function:	Differential Line Protection									
Relay Make:	ABB									
Relay Model:	RED615 or equivalent									
Function:										
Relay Make:										
Relay Model:										
Type No:	1 (SPECIFIED)	OFFER								
SUPPLEMENTARY INFORMATION										
Front Door & Rear Panel colour:	Grey									
Digital power meter										
Quality of supply meter										
Regardless of any information provided in this technical detail sheet, the equipment to be provided will comply with the specified requirements										
Name (Print): _____ Signature: _____.										

 CITY OF CAPE TOWN ISIXEKO SASEKAPA STAD KAAPSTAD <i>Making progress possible. Together.</i>				DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS 191Q/2023/24			
DATA SHEET No. DS-EP-0001C: MEDIUM VOLTAGE SWITCHGEAR - 11kV MACASSAR WWTW MAIN INTAKE SWITCHBOARD				CLIENT N°:		PAGE	
				ZUTARI N°:		REV. T0	
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	DATA SHEET No. DS-EP-0001C: MEDIUM VOLTAGE SWITCHGEAR - 11kV MACASSAR WWTW MAIN INTAKE SWITCHBOARD	BV	AZ	EB		Mar-24

GENERAL SYSTEM INFORMATION					
System Operating Voltage:	11,5	System Frequency:	50 Hz	Phase Rotation:	Anti-Clockwise RWB
Maximum Fault Level:	31,5 kA	System earthing:	NECRT	Earth fault current:	300A
Reference single line diagram -Drawing number	1001780-0000-DRG-EE-0002	Reference protection functional diagram -Drawing number	1001780-0000-DRG-EE-0003		

MAKE AND MODEL					
Make	ABB Unigear	System Frequency:	50 Hz		

SWITCHBOARD RATING DATA					
Rated Voltage:	12kV	BIL	95 kV	Rated Short Time Power-Frequency Withstand Voltage:	28 kV
Rated Frequency:	50 Hz	Rated Short-Time Withstand Current:	31.5 kA	Rated Short-Time Current Duration:	3 s
Rated Continuous Main Busbar Current:	1,250 A	Rated Peak Withstand Current	75 kA	Rated Internal Arc Classification:	AFLR
		Internal Arc Withstand	31.5 kA	Internal Arc Withstand Duration	1 s
Partition Class	PM	Loss of Service Continuity	LSC2B		
Electrical Endurance Class of Circuit Breaker	E2	Mechanical Endurance Class of Circuit Breaker	M1		
Electrical Endurance Class of Switch-Disconnectors	E2	Mechanical Endurance Class of Switch-Disconnectors	M1		
Electrical Endurance Class of Contactors	N/A	Mechanical Endurance Class of Contactors	N/A	Electrical Endurance Class of Earthing Switches	E1

SWITCHBOARD CONSTRUCTION DATA					
Degree of Protection:	IP 4X	Painting:	Powder Coated	Colour:	Grey
Busbar Arrangement:	Single	Total Number of Switchgear Panels:	20	Number of Voltage Transformers:	2
Floor Frame	Yes	Gas Exhaust Ducts Required:	Yes	Switchboard air-or gas-insulated	Air

Type No:	1 (SPECIFIED)	OFFER	2 (SPECIFIED)	OFFER	3 (SPECIFIED)	OFFER	4 (SPECIFIED)	OFFER	5 (SPECIFIED)	OFFER
Panel Function:	Incomer		Bus-Section		Bus-Riser		Ring Feeders		Busbar Earth	
Panel Name:	Incomer		Bus-Section		Bus-Riser		Feeders + Spares (as per SLD)		Busbar Earth	
Panel No.:	A1, A2, C3, C4, B2 & B3		C1 & C5		C2 & B1		A3, A4, A5, A6, B4, B5, B6, B7 & B8		A7	
Number of Type Panels:	6		2		2		9		1	
Panel Type:	Incoming/Outgoing Feeder with Vacuum Circuit Breaker		Bus-tie with Vacuum Circuit Breaker		Bus-Riser		Vacuum Circuit Breaker		Earthing Switch	
Rated current:	630 A		1,250 A		1,250 A		630 A			
Panel Dimension: W/D/H (mm)										
MV Cable Entry / Bus Duct Entry:	Bottom						Bottom			
MV Cable Size:	As per SLD						As per SLD			
Control Cable Entry:	Bottom				Bottom		Bottom			
Type No:	1 (SPECIFIED)	OFFER	2 (SPECIFIED)	OFFER	3 (SPECIFIED)	OFFER	4 (SPECIFIED)	OFFER	5 (SPECIFIED)	OFFER
SWITCHGEAR DATA										
CB/SD Make:										
CB Operating Mechanism	Stored energy		Stored energy		N/A		Stored energy			
Electric Motor Charging	Yes		Yes		N/A		Yes			
Electric Motor Racking	No		No		N/A		No			
Earth Switch Location:	Cable side		Cable Side		Cable side		Cable side		Busbar side	
SWITCHGEAR AUXILIARY EQUIPMENT DATA										
Closing Coil Voltage:	110 V DC		110 V DC		N/A		110 V DC			
Shunt Trip Coils Voltage:	110 V DC		110 V DC		N/A		110 V DC			
Additional Shunt Trip Coil Voltage:	N/A		N/A		N/A		N/A			
Operation Counter:	Yes		Yes		N/A		Yes			
Spring Charge Motor Voltage:	110 V DC		110 V DC		N/A		110 V DC			
Electrical Racking Motor Voltage:	N/A		N/A		N/A		N/A			
Auxiliary Voltage Supply: (Heater, Light)	230V AC		230V AC		N/A		230V AC			
Mechanical Trip / Close Pushbutton:	Trip - Yes Close- Blank off		Trip - Yes Close- Blank off		N/A		Trip - Yes Close- Blank off			
Spring Charged Auxiliary Contacts:	Yes		Yes		N/A		Yes			
CB/Disconnecter Status Auxiliary Contacts:	Yes		Yes		N/A		Yes			
CB/Disconnecter Position Auxiliary Contacts:	Yes		Yes		N/A		Yes			
Earth Switch Status Auxiliary Contacts:	Yes		Yes		N/A		Yes		Yes	

Type No:	1 (SPECIFIED)	OFFER	2 (SPECIFIED)	OFFER	3 (SPECIFIED)	OFFER	4 (SPECIFIED)	OFFER	5 (SPECIFIED)	OFFER
ADDITIONAL EQUIPMENT										
Surge Arrestor/ Suppressor:	Yes		No		No		No			
Anti Condensation Space Heater:With Thermostat	Yes		Yes		Yes		Yes			
LV Compartment Light:	Yes		Yes		Yes		Yes			
TNC Switch:	Yes		Yes		No		Yes			
Local/ Remote Switch:	Yes		Yes		No		Yes			
Mimic Diagram:	Yes		Yes		Yes		Yes		Yes	
Voltmeter with Selector Switch	Yes		No		No		No		No	
Ammeter	Yes		No		No		Yes		No	
Power meter	Yes									
Selector Switch for Pendant/Remote	Yes		Yes		No		Yes		No	
Pendant Socket with 10m pendant cord with open/close push button	Yes		Yes		No		Yes		No	
Cable live indicators	Yes		Yes		Yes		Yes		Yes	
Key for interlocking	Yes		Yes		Yes		Yes		Yes	
VOLTAGE TRANSFORMERS										
Type (inductive/electronic):	Inductive				Inductive				Inductive	
Connection Location:	Cable side				Cable Side				Cable Side	
Withdrawable / Fixed:	Withdrawable				Withdrawable				Withdrawable	
Rated Output	As per SLD				As per SLD				As per SLD	
Rated Secondary Voltage:										
Rated Voltage Residual Voltage Winding:										
Class:										
Type No:	1 (SPECIFIED)	OFFER	2 (SPECIFIED)	OFFER	3 (SPECIFIED)	OFFER	4 (SPECIFIED)	OFFER	5 (SPECIFIED)	OFFER
CURRENT TRANSFORMERS										
Purpose:	Metering		Protection				Protection			
Type (inductive/electronic):	Inductive		Inductive				Inductive			
Function:	Power Metering		General Protection IED				General Protection IED			
Accuracy class:	As indicated on SLD		As indicated on SLD				As indicated on SLD			
Rated output:										
Accuracy Limit Factor:										
Security Factor:										
Ratio:										
Purpose:	Protection						Metering			

Type (inductive/electronic):	Inductive						Inductive			
Function:	Differential Line Protection						Ammeter			
Accuracy class:	As indicated on SLD						As indicated on SLD			
Rated output:										
Accuracy Limit Factor:										
Security Factor:										
Ratio:										
Purpose:	Protection									
Type (inductive/electronic):	Inductive									
Function:	General Protection IED									
Accuracy class:	As indicated on SLD									
Rated output:										
Accuracy Limit Factor:										
Security Factor:										
Ratio:										
Manufacturer:										
PROTECTION RELAYS (all panels except SDF)										
Function:	Refer to 1001780-0000-DRG-EE-0003		Refer to 1001780-0000-DRG-EE-0003		Refer to 1001780-0000-DRG-EE-0003		Refer to 1001780-0000-DRG-EE-0003		Refer to 1001780-0000-DRG-EE-0003	
Relay Make:										
Relay Model:	SEL751 or equivalent		SEL751 or equivalent				SEL751A or equivalent			
Function:										
Relay Make:										
Relay Model:										
Function:										
Relay Make:										
Relay Model:										
Type No:	1 (SPECIFIED)	OFFER	2 (SPECIFIED)	OFFER	3 (SPECIFIED)	OFFER	4 (SPECIFIED)	OFFER	5 (SPECIFIED)	OFFER
SUPPLEMENTARY INFORMATION										
Front Door & Rear Panel colour:	Panels C3&C4: Maroon Panels A2&B2: Purple All other panels: Grey		Grey		Grey		Panels A3&B4: Green All other panels: Grey		Grey	
Digital power meter										
Quality of supply meter										
Regardless of any information provided in this technical detail sheet, the equipment to be provided will comply with the specified requirements										
Name (Print): _____Signature: _____										

DATA SHEET No. DS-EP-0001D: MEDIUM VOLTAGE SWITCHGEAR - 11kV MACASSAR WWTW BIOGAS & RENEWABLE GENERATOR SWITCHBOARD

CLIENT N°:

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ZUTARI N°:

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Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	DATA SHEET No. DS-EP-0001D: MEDIUM VOLTAGE SWITCHGEAR - 11kV MACASSAR WWTW BIOGAS & RENEWABLE GENERATOR SWITCHBOARD	BV	AZ	EB		Mar-24

GENERAL SYSTEM INFORMATION

System Operating Voltage:	11,5	System Frequency:	50 Hz	Phase Rotation:	Anti-Clockwise RWB
Maximum Fault Level:	31,5 kA	System earthing:	NECRT	Earth fault current:	300A
Reference single line diagram - Drawing number	1001780-0000-DRG-EE-0002	Reference protection functional diagram - Drawing number	1001780-0000-DRG-EE-0003		

MAKE AND MODEL

Make	ABB Unigear	System Frequency:	50 Hz		
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SWITCHBOARD RATING DATA

Rated Voltage:	12kV	BIL	95 kV	Rated Short Time Power-Frequency Withstand	28 kV
Rated Frequency:	50 Hz	Rated Short-Time Withstand Current:	31.5 kA	Rated Short-Time Current Duration:	3 s
Rated Continuous Main Busbar Current:	1,250 A	Rated Peak Withstand Current	75 kA	Rated Internal Arc Classification:	AFLR
		Internal Arc Withstand Capability	31.5 kA	Internal Arc Withstand Duration	1 s

Partition Class	PM	Loss of Service Continuity	LSC2B		
Electrical Endurance Class of Switch-Disconnectors	E2	Mechanical Endurance Class of Switch-Disconnectors	M1		
Electrical Endurance Class of Contactors	N/A	Mechanical Endurance Class of Contactors	N/A	Electrical Endurance Class of Earthing Switches	E1

SWITCHBOARD CONSTRUCTION DATA										
Degree of Protection:	IP 4X	Painting:	Powder Coated	Colour:	Grey					
Busbar Arrangement:	Single	Total Number of Switchgear Panels:	10	Number of Voltage Transformers:	2					
Floor Frame	Yes	Gas Exhaust Ducts Required:	Yes	Switchboard air-or gas-insulated	Air					

Type No:	1 (SPECIFIED)	OFFER	2 (SPECIFIED)	OFFER	3 (SPECIFIED)	OFFER	4 (SPECIFIED)	OFFER	5 (SPECIFIED)	OFFER
Panel Function:	Incomer		Incomer		Renewables Feeder		Bus-Section		Bus-Riser	
Panel Name:	Renew Incomer		Generator Incomer		Renewables Feeder 1 & 2		Bus-Section		Bus-Riser	
Panel No.:	A1		B2, B3, B4, B5 & B6		A3 & B7		A2		A1	
Number of Type Panels:	1		5		2		1		1	
Panel Type:	incoming/outgoing feeder with Vacuum Circuit Breaker		incoming/outgoing feeder with Vacuum Circuit Breaker		Vacuum Circuit Breaker		Bus-tie with Vacuum Circuit Breaker		Bus-Riser	
Rated current:	630 A		630 A		630 A		1,250 A		1,250 A	
Panel Dimension: W/D/H (mm)										
MV Cable Entry / Bus Duct Entry:	Bottom		Bottom		Bottom					
MV Cable Size:	As per SLD		As per SLD		As per SLD					
Control Cable Entry:	Bottom		Bottom		Bottom				Bottom	
Type No:	1 (SPECIFIED)	OFFER	2 (SPECIFIED)	OFFER	3 (SPECIFIED)	OFFER	4 (SPECIFIED)	OFFER	5 (SPECIFIED)	OFFER

SWITCHGEAR DATA										
CB/SD Make:										
CB Operating Mechanism			Stored energy		Stored energy		Stored energy		N/A	
Electric Motor Charging			Yes		Yes		Yes		N/A	
Electric Motor Racking			No		No		No		N/A	
Earth Switch Location:	Cable side		Cable Side		Cable side		Cable Side		Cable side	

SWITCHGEAR AUXILIARY EQUIPMENT DATA										
Closing Coil Voltage:	110 V DC		110 V DC		110 V DC		110 V DC		N/A	
Shunt Trip Coils Voltage:	110 V DC		110 V DC		110 V DC		110 V DC		N/A	
Additional Shunt Trip Coil Voltage:	N/A		N/A		N/A		N/A		N/A	
Under Voltage Release:	No		No		No		No		N/A	
Operation Counter:	Yes		Yes		Yes		Yes		N/A	
Spring Charge Motor Voltage:	110 V DC		110 V DC		110 V DC		110 V DC		N/A	
Electrical Racking Motor Voltage:	N/A		N/A		N/A		N/A		N/A	
Auxiliary Voltage Supply: (Heater, Light)	230V AC		230V AC		230V AC		230V AC		N/A	
Mechanical Trip / Close Pushbutton:	Trip - Yes Close- Blank off		Trip - Yes Close- Blank off		Trip - Yes Close- Blank off		Trip - Yes Close- Blank off		N/A	
Spring Charged Auxiliary Contacts:	Yes		Yes		Yes		Yes		N/A	
CB/Disconnecter Status Auxiliary Contacts:	Yes		Yes		Yes		Yes		N/A	

CB/Disconnecter Position Auxiliary Contacts:	Yes		Yes		Yes		Yes		N/A	
Earth Switch Status Auxiliary Contacts:	Yes		Yes		Yes		Yes		N/A	
Type No:	1 (SPECIFIED)	OFFER	2 (SPECIFIED)	OFFER	3 (SPECIFIED)	OFFER	4 (SPECIFIED)	OFFER	5 (SPECIFIED)	OFFER
ADDITIONAL EQUIPMENT										
Surge Arrestor/ Suppressor:	Yes		Yes		No		No		No	
Surge Arrestor/ Suppressor Make:										
Surge Arrestor Type:	Station class		Station Class							
Anti Condensation Space Heater:With Thermostat	No		No		No		Yes		Yes	
LV Compartment Light:	Yes		Yes		Yes		Yes		Yes	
TNC Switch:	No		Yes		Yes		Yes		No	
Local/ Remote Switch:	No		Yes		Yes		Yes		No	
Mimic Diagram:	Yes		Yes		Yes		Yes		Yes	
Voltmeter with Selector Switch	Yes		Yes		Yes		No		No	
Ammeter	Yes		Yes		Yes		No		No	
Power meter	No		Yes							
Selector Switch for Pendant/Remote	No		Yes		Yes		Yes		No	
Pendant Socket with 10m pendant cord with open/close push button	No		Yes		Yes		Yes		No	
Cable live indicators	Yes		Yes		Yes		Yes		Yes	
Key for interlocking	Yes		Yes		Yes		Yes		Yes	
VOLTAGE TRANSFORMERS										
Type (inductive/electronic):			Inductive						Inductive	
Connection Location:			Cable Side						Cable Side	
Withdrawable / Fixed:			Withdrawable						Withdrawable	
Residual Voltage Winding Required:			No						No	
Rated Output										
Rated Secondary Voltage:										
			As per SLD						As per SLD	
Rated Voltage Residual Voltage Winding:										
Class:										
Voltage Factor:										

Manufacturer:										
Type No:	1 (SPECIFIED)	OFFER	2 (SPECIFIED)	OFFER	3 (SPECIFIED)	OFFER	4 (SPECIFIED)	OFFER	5 (SPECIFIED)	OFFER
CURRENT TRANSFORMERS										
Purpose:			Metering		Protection		Protection			
Type (inductive/electronic):			Inductive		Inductive		Inductive			
Function:			Power Metering		General Protection IED		General Protection IED			
Accuracy class:										
Rated output:										
Accuracy Limit Factor:			As indicated on SLD		As indicated on SLD		As indicated on SLD			
Security Factor:										
Ratio:										
Purpose:			Protection							
Type (inductive/electronic):			Inductive							
Function:			Differential Line Protection							
Accuracy class:										
Rated output:										
Accuracy Limit Factor:			As indicated on SLD							
Security Factor:										
Ratio:										
Purpose:			Protection							
Type (inductive/electronic):			Inductive							
Function:			General Protection IED							
Accuracy class:										
Rated output:										
Accuracy Limit Factor:			As indicated on SLD							
Security Factor:										
Ratio:										
Manufacturer:										
PROTECTION RELAYS (all panels except SDF)										
Function:	Refer to 1001780-0000-DRG-EE-0003		Refer to 1001780-0000-DRG-EE-0003		Refer to 1001780-0000-DRG-EE-0003		Refer to 1001780-0000-DRG-EE-0003		Refer to 1001780-0000-DRG-EE-0003	
Relay Make:										
Relay Model:	SEL751 or equivalent		SEL751 or equivalent		SEL751A or equivalent		SEL751 or equivalent			
Function:										
Relay Make:										
Relay Model:										

Function:										
Relay Make:										
Relay Model:										
Type No:	1 (SPECIFIED)	OFFER	2 (SPECIFIED)	OFFER	3 (SPECIFIED)	OFFER	4 (SPECIFIED)	OFFER	5 (SPECIFIED)	OFFER
SUPPLEMENTARY INFORMATION										
Front Door & Rear Panel colour:	Grey		Grey		Grey		Grey		Grey	
<i>Regardless of any information provided in this technical detail sheet, the equipment to be provided will comply with the specified requirements</i>										
Name (Print): _____Signature: _____.										

DATA SHEET No. DS-EP-0001E: MEDIUM VOLTAGE SWITCHGEAR - 11kV MACASSAR WWTW DIESEL GENERATOR SWITCHBOARD

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Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	DATA SHEET No. DS-EP-0001E: MEDIUM VOLTAGE SWITCHGEAR - 11kV MACASSAR WWTW DIESEL GENERATOR SWITCHBOARD	BV	AZ	EB		Mar-24

GENERAL SYSTEM INFORMATION

System Operating Voltage:	11,5	System Frequency:	50 Hz	Phase Rotation:	Anti-Clockwise RWB
Maximum Fault Level:	31,5 kA	System earthing:	NECRT	Earth fault current:	300A
Reference single line diagram - Drawing number	1001780-0000-DRG-EE-0002	Reference protection functional diagram - Drawing number	1001780-0000-DRG-EE-0003		

MAKE AND MODEL

Make	ABB Unigear	System Frequency:	50 Hz		
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SWITCHBOARD RATING DATA

Rated Voltage:	12kV	BIL	95 kV	Rated Short Time Power-Frequency Withstand Voltage:	28 kV
Rated Frequency:	50 Hz	Rated Short-Time Withstand Current:	31.5 kA	Rated Short-Time Current Duration:	3 s
Rated Continuous Main Busbar Current:	1,250 A	Rated Peak Withstand Current	75 kA	Rated Internal Arc Classification:	AFLR
		Internal Arc Withstand Capability	31.5 kA	Internal Arc Withstand Duration	1 s
Partition Class	PM	Loss of Service Continuity	LSC2B		
Electrical Endurance Class of Circuit Breaker	E2	Mechanical Endurance Class of Circuit Breaker	M1		
Electrical Endurance Class of Switch-Disconnectors	E2	Mechanical Endurance Class of Switch-Disconnectors	M1		
Electrical Endurance Class of Contactors	N/A	Mechanical Endurance Class of Contactors	N/A	Electrical Endurance Class of Earthing Switches	E1

SWITCHBOARD CONSTRUCTION DATA										
Degree of Protection:	IP 4X	Painting:	Powder Coated	Colour:	Grey					
Busbar Arrangement:	Single	Total Number of Switchgear Panels:	9	Number of Voltage Transformers:	2					
Floor Frame	Yes	Gas Exhaust Ducts Required:	Yes	Switchboard air-or gas-insulated	Air					
Type No:	1 (SPECIFIED)	OFFER	2 (SPECIFIED)	OFFER	3 (SPECIFIED)	OFFER	4 (SPECIFIED)	OFFER	5 (SPECIFIED)	OFFER
Panel Function:	Incomer		Generator Feeder		Busbar Earth					
Panel Name:	Incomer		Generator Feeder 1 & 2		Busbar Earth					
Panel No.:	A2, A3, A4, A5, A6, A7 & A8		A1 & A9		A10					
Number of Type Panels:	7		2		1					
Panel Type:	Incoming/Outgoing Feeder with Vacuum Circuit Breaker		Vacuum Circuit Breaker		Earthing Switch					
Rated current:	630 A		630 A							
Panel Dimension: W/D/H (mm)										
MV Cable Entry / Bus Duct Entry:	Bottom		Bottom							
MV Cable Size:	As per SLD		As per SLD							
Control Cable Entry:	Bottom		Bottom							
Type No:	1 (SPECIFIED)	OFFER	2 (SPECIFIED)	OFFER	3 (SPECIFIED)	OFFER	4 (SPECIFIED)	OFFER	5 (SPECIFIED)	OFFER
SWITCHGEAR DATA										
CB/SD Make:										
CB/SD Model:										
CB Interrupting medium:	Vacuum		Vacuum							
CB Operating Mechanism	Stored energy		Stored energy							
Electric Motor Charging	Yes		Yes							
Electric Motor Racking	No		No							
Earth Switch Location:	Cable side		Cable side		Busbar side					
SWITCHGEAR AUXILIARY EQUIPMENT DATA										
Closing Coil Voltage:	110 V DC		110 V DC							
Shunt Trip Coils Voltage:	110 V DC		110 V DC							
Additional Shunt Trip Coil Voltage:	N/A		N/A							
Under Voltage Release:	No		No							
Operation Counter:	Yes		Yes							
Spring Charge Motor Voltage:	110 V DC		110 V DC							
Electrical Racking Motor Voltage:	N/A		N/A							

Auxiliary Voltage Supply: (Heater, Light)	230V AC		230V AC							
Mechanical Trip / Close Pushbutton:	Trip - Yes Close- Blank off		Trip - Yes Close- Blank off							
Spring Charged Auxiliary Contacts:	Yes		Yes							
CB/Disconnecter Status Auxiliary Contacts:	Yes		Yes							
CB/Disconnecter Position Auxiliary Contacts:	Yes		Yes							
Earth Switch Status Auxiliary Contacts:	Yes		Yes		Yes					
Type No:	1 (SPECIFIED)	OFFER	2 (SPECIFIED)	OFFER	3 (SPECIFIED)	OFFER	4 (SPECIFIED)	OFFER	5 (SPECIFIED)	OFFER
ADDITIONAL EQUIPMENT										
Surge Arrestor/ Suppressor:	Yes		No							
Anti Condensation Space Heater:With Thermostat	No		No							
LV Compartment Light:	Yes		Yes							
TNC Switch:	Yes		Yes							
Local/ Remote Switch:	Yes		Yes							
Mimic Diagram:	Yes		Yes		Yes					
Voltmeter with Selector Switch	Yes		No		No					
Ammeter	Yes		Yes		No					
Power meter	Yes									
Selector Switch for Pendant/Remote	Yes		Yes		No					
Pendant Socket with 10m pendant cord with open/close push button	Yes		Yes		No					
Cable live indicators	Yes		Yes		Yes					
Key for interlocking	Yes		Yes		Yes					
VOLTAGE TRANSFORMERS										
Type (inductive/electronic):	Inductive				Inductive					
Connection Location:	Cable side				Cable Side					
Withdrawable / Fixed:	Withdrawable				Withdrawable					
Rated Output	As per SLD				As per SLD					
Rated Secondary Voltage:										
Rated Voltage Residual Voltage Winding:										

Class:										
Type No:	1 (SPECIFIED)	OFFER	2 (SPECIFIED)	OFFER	3 (SPECIFIED)	OFFER	4 (SPECIFIED)	OFFER	5 (SPECIFIED)	OFFER
CURRENT TRANSFORMERS										
Purpose:	Metering		Protection							
Type (inductive/electronic):	Inductive		Inductive							
Function:	Power Metering		General Protection IED							
Accuracy class:	As indicated on SLD		As indicated on SLD							
Rated output:										
Accuracy Limit Factor:										
Security Factor:										
Ratio:										
Purpose:	Protection		Metering							
Type (inductive/electronic):	Inductive		Inductive							
Function:	Differential Line Protection		Ammeter							
Accuracy class:	As indicated on SLD		As indicated on SLD							
Rated output:										
Accuracy Limit Factor:										
Security Factor:										
Ratio:										
Purpose:	Protection									
Type (inductive/electronic):	Inductive									
Function:	General Protection IED									
Accuracy class:	As indicated on SLD									
Rated output:										
Accuracy Limit Factor:										
Security Factor:										
Ratio:										
Manufacturer:										
PROTECTION RELAYS (all panels except SDF)										
Function:	Refer to 1001780-0000-DRG-EE-0003		Refer to 1001780-0000-DRG-EE-0003		Refer to 1001780-0000-DRG-EE-0003					
Relay Make:										
Relay Model:	SEL751 or equivalent		SEL751A or approved equivalent							
Function:										
Relay Make:										
Relay Model:										
Function:										

Relay Make:										
Relay Model:										
Type No:	1 (SPECIFIED)	OFFER	2 (SPECIFIED)	OFFER	3 (SPECIFIED)	OFFER	4 (SPECIFIED)	OFFER	5 (SPECIFIED)	OFFER
SUPPLEMENTARY INFORMATION										
Front Door & Rear Panel colour:	Grey		Grey		Grey					
Digital power meter										
Quality of supply meter										
<i>Regardless of any information provided in this technical detail sheet, the equipment to be provided will comply with the specified requirements</i>										
Name (Print): _____ Signature: _____.										



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DESIGN BUILD OF MECHANICAL AND
ELECTRICAL WORKS FOR THE
UPGRADING AND EXPANSION OF THE
MACASSAR WASTEWATER
TREATMENT WORKS

191Q/2023/24

DATA SHEET No. DS-EP-0002A: SECONDARY SWITCHGEAR - TRANSFORMER FEEDERS

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Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	DATA SHEET No. DS-EP-0002A: SECONDARY SWITCHGEAR - TRANSFORMER FEEDERS	BV	AZ	EB		Mar-24

	DESCRIPTION	UNIT	SPECIFIED	OFFERED
	This data sheet is applicable to the switchgear in the following sub-stations: - Dewatering (CCVV)			
1	General			
1.01	Manufacturer		ABB	
1.02	Country of Origin			
1.03	Make/range		Safeplus	
1.04	Model			
2	Electrical System Characteristics			
2.01	Nominal system voltage	kV	11,5	
2.02	Frequency	Hz	50	
2.03	Supply neutral earthing		NERCRT	
2.04	Supply earth fault current	A	300	
3	Special Service Conditions			
3.01	Altitude (for above 1800 m)	m	n/a	
3.02	Pollution level (for above Level II)		Level IV	
3.03	Ambient temperature conditions (average/maximum))	°C	35/40	
3.04	Humidity above normal for indoor		N/A	
3.05	Abnormal vibrations, shock or tilting	Yes/No	No	
4	RMU Ratings			
4.01	Rated voltage	kV	12	
4.02	Rated frequency	Hz	50	
4.03	Rated lightning impulse peak withstand voltage	kV	95	
4.04	Rated short-duration power frequency r.m.s. withstand voltage	kV	28	
4.05	Rated short-time withstand r.m.s. current	kA	20	
4.06	Rated peak withstand current	kA	50	
4.07	Rated short-circuit breaking current	kA	20	
4.08	Rated short-circuit making current	kA	50	
5	Design and Construction			
5.01	Indoor or outdoor unit		Indoor	
5.02	Extensible or non-extensible unit		E	
5.03	Degree of protection if an outdoor kiosk		n/a	
5.04	Degree of protection of the ring main unit and kiosk		n/a	
5.05	Configuration of the ring main unit		CCFF and CCVV	
5.06	Separate cable test facilities required for switch-disconnectors	Yes/No	Yes	
5.07	Separate cable test facilities required for switch-fuse combinations	Yes/No	Yes	
5.08	Separate cable test facilities required for circuit-breakers	Yes/No	n/a	
5.09	Type of cable test facility			
5.10	Cable test facilities to be interlocked with associated earth switch and padlockable	Yes/No	Yes	
5.11	Interlocks with remote equipment	Yes/No	No	
5.12	Type required		n/a	
5.13	Auxiliary supply details		n/a	

	DESCRIPTION	UNIT	SPECIFIED	OFFERED
5.14	Interfacing details of remote equipment		n/a	
5.15	Insulating medium		SF6	
5.16	Insulating and/or interrupting medium of switch disconnectors		SF6	
5.17	Internal arc classification		IAC AFL 20 kA 0.5 s, in accordance with the requirements of SANS 62271-200	
6	Switch Disconnectors (Rings)			
6.01	Rated normal current of switch disconnectors	A	630	
6.02	Operating mechanism for closing and opening		Independent manual	
6.03	Remote tripping and closing of the switch disconnector	Yes/No	No	
6.04	Details of preferred auxiliary supply voltage	V	n/a	
6.05	Method of remote tripping and closing of the switch disconnector		n/a	
6.06	Auxiliary supply voltage	V	n/a	
6.07	Endurance class (electrical and mechanical)		E2 & M1	
7	Switch-Fuse Combinations (T-offs)			
7.01	Rating of transformer to be protected	kVA	800 & 1600	
7.02	Rated breaking current of switch	A	200	
7.03	Type of fuse links			
7.04	Dimension of fuse links	mm		
7.05	Rated current of fuse-link (CEF)	A	80 & 160	
7.06	The maximum permissible fuse-link rating			
7.07	Type of striker required			
7.08	Operating mechanism for closing			
7.09	Operating mechanism for tripping			
7.10	Remote tripping and closing of the switch of a switch-fuse combination	Yes/No		
7.11	Details of preferred auxiliary supply voltage	V		
7.12	Method of remote tripping and closing of the switch of a switch-fuse combination			
7.13	Details of preferred auxiliary supply voltage	V		
8	Circuit Breaker (T-off)			
8.01	Rating of transformer to be protected	kVA	2000 & 2500	
8.02	Rated normal current of a circuit-breaker	A	200	
8.03	Endurance class (electrical and mechanical)			
8.04	CT ratios for 200 A circuit breaker			
8.05	Protection CT type and class			
8.06	Protection relays: Manufacturer and Model		REF615	
8.07	Manufacturer			
8.08	Model			
8.09	Portable hand-held tester required			
8.10	Operating mechanism for closing			
8.11	Operating mechanism for tripping			
8.12	Remote tripping and closing	Yes/No	Yes	
8.13	Preferred auxiliary supply voltage	V	110VDC	
8.14	Preferred auxiliary supply current	A		
8.15	Method of remote tripping and closing			
8.16	Auxiliary supply specifications for voltage	V	110VDC	
8.17	Auxiliary supply specifications current:	A		
9	Busbars			
9.01	Busbars extensible RHS/LHS (facing from front)		LHS	
9.02	Method used to extend busbars			
9.03	Insulation medium of the busbars chamber		SF6	
10	Cable Termination Enclosures and Terminations			
10.01	Type of termination enclosure		Air-filled	
10.02	Type and size of cable(s)	mm ²	3 x 1c 300 mm ² Al PILC	
10.03	Type of termination			
11	Automation Requirements			
11.01	Load monitoring required (ring and/or t-off)	Yes/No	Yes	
11.02	Accuracy class and burden (VA) of required current transformers		n/a	

	DESCRIPTION	UNIT	SPECIFIED	OFFERED
11.03	Electronic ammeters required with LCD/LED display	Yes/No	No	
11.04	Electronic ammeter to make provision for communication with the remote terminal unit (RTU) for telecontrol (SCADA) purposes	Yes/No	Yes	
11.05	Type of ammeter (or multi-meter)			
11.06	RMU to be equipped with an RTU for remote indications, alarms and control	Yes/No	Yes	
11.07	DC voltage	V	110	
12	SF₆ Gas			
12.01	Quantity of SF ₆ in each separately filled compartment			
12.02	SF ₆ gas recovery and replenishing provided by supplier of RMU	Yes/No		
13	Live Circuit Indication			
13.01	Voltage presence identification systems (VPIS) required on all switching devices	Yes/No	Yes	
13.02	VPIS to include phase comparator connection points	Yes/No	Yes	
13.03	VDS offered instead of VPIS? Details to be provided.	Yes/No		
14	Earth Fault Indication			
14.01	Earth fault indication required	Yes/No	Yes	
14.02	Type of earth fault indication			
15	Raising Base (for indoor RMUs)			
15.01	Steel raising base required	Yes/No	Yes	
15.02	Is a gland plate required	Yes/No	Yes	
15.03	Height of the additional raising base	mm	300	
16	Accessories			
16.01	Type of waterproofing sealant for underside of RMU base			
16.02	Operating handle to be provided	Yes/No	Yes	
16.03	Special tools to install and maintain RMU to be provided	Yes/No	Yes	
17	Rating Plate			
17.01	State method used for attaching the rating plates			
18	Marking and Labelling			
18.01	Method used for attaching the labels			
18.02	Colour of main circuit designation labels		Black on white (sandwich board)	
18.03	Method used for the fixing and removal of the main circuit designation labels			
18.04	Mimic indication on front panel	Yes/No	Yes	
18.05	Details of information to be included on warning signs on kiosk doors		n/a	
	RMU Tests Required/Conducted	-		
19	General			
19.01	Type test certificate required/provided	Yes/No	Yes	
19.02	Routine test certificate required/provided	Yes/No	Yes	
20	Type Tests			
20.01	Type tests to SANS 1874	Yes/No	Yes	
20.02	Type tests for CTs	Yes/No	Yes	
20.03	Internal arc tests to SANS 1874	Yes/No	Yes	
20.04	Partial discharge testing of solid insulation (CTs, VTs and bushings)	Yes/No	Yes	
21	Routine Tests			
21.01	Routine tests to SANS 1874	Yes/No	Yes	
21.02	Partial discharge testing of solid insulation (CTs, VTs and bushings)	Yes/No	Yes	
21.03	CT tests	Yes/No	Yes	
21.04	Primary current injection tests on CT and relay combinations for circuit breakers	Yes/No	Yes	

					DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS				
			191Q/2023/24						
DATA SHEET No. DS-EP-0002B: SECONDARY SWITCHGEAR - EARTHING			CLIENT N°.				PAGE		
			ZUTARI N°.				REV. T0		
Rev.	TI	Description	By	Ckd	APP.	Aut.	Date		
T0	D	DATA SHEET No. DS-EP-0002B: SECONDARY SWITCHGEAR - EARTHING	BV	AZ	EB		Mar-24		
DESCRIPTION		UNIT	SPECIFIED		OFFERED				
This data sheet is applicable to the switchgear in the following sub-stations: - Generator Collector (CCCCCCCV) - Biogas (CHP) Collector (CCCCCV)									
1	<u>General</u>								
1.01	Manufacturer		ABB						
1.02	Country of Origin								
1.03	Make/range		Safeplus						
1.04	Model								
2	Electrical System Characteristics								
2.01	Nominal system voltage	kV	11,5						
2.02	Frequency	Hz	50						
2.03	Supply neutral earthing		NERCRT						
2.04	Supply earth fault current	A	300						
3	Special Service Conditions								
3.01	Altitude (for above 1800 m)	m	n/a						
3.02	Pollution level (for above Level II)		Level IV						
3.03	Ambient temperature conditions (average/maximum))	°C	35/40						
3.04	Humidity above normal for indoor		N/A						
3.05	Abnormal vibrations, shock or tilting	Yes/No	No						
4	RMU Ratings								
4.01	Rated voltage	kV	12						
4.02	Rated frequency	Hz	50						
4.03	Rated lightning impulse peak withstand voltage	kV	95						
4.04	Rated short-duration power frequency r.m.s. withstand voltage	kV	28						
4.05	Rated short-time withstand r.m.s. current	kA	20						
4.06	Rated peak withstand current	kA	50						
4.07	Rated short-circuit breaking current	kA	20						
4.08	Rated short-circuit making current	kA	50						
5	Design and Construction								
5.01	Indoor or outdoor unit		Indoor						
5.02	Extensible or non-extensible unit		E						
5.03	Degree of protection if an outdoor kiosk		n/a						
5.04	Degree of protection of the ring main unit and kiosk		n/a						
5.05	Configuration of the ring main unit		CCCCCCCV & CCCCCV						
5.06	Separate cable test facilities required for switch-disconnectors	Yes/No	Yes						
5.07	Separate cable test facilities required for switch-fuse combinations	Yes/No	Yes						
5.08	Separate cable test facilities required for circuit-breakers	Yes/No	n/a						
5.09	Type of cable test facility								
5.10	Cable test facilities to be interlocked with associated earth switch and padlockable	Yes/No	Yes						
5.11	Interlocks with remote equipment	Yes/No	No						
5.12	Type required		n/a						
5.13	Auxiliary supply details		n/a						

	DESCRIPTION	UNIT	SPECIFIED	OFFERED
5.14	Interfacing details of remote equipment		n/a	
5.15	Insulating medium		SF6	
5.16	Insulating and/or interrupting medium of switch disconnectors		SF6	
5.17	Internal arc classification		IAC AFL 20 kA 0.5 s. in accordance with the requirements of SANS 62271-200	
6	Switch Disconnectors (Rings)			
6.01	Rated normal current of switch disconnectors	A	630	
6.02	Operating mechanism for closing and opening		Independent manual	
6.03	Remote tripping and closing of the switch disconnector	Yes/No	No	
6.04	Details of preferred auxiliary supply voltage	V	n/a	
6.05	Method of remote tripping and closing of the switch disconnector		n/a	
6.06	Auxiliary supply voltage	V	n/a	
6.07	Endurance class (electrical and mechanical)		E2 & M1	
7	Circuit Breaker (T-off)			
7.01	Rating of NER to be supplied	A		
7.02	Rated normal current of a circuit-breaker	A	200	
7.03	Endurance class (electrical and mechanical)			
7.04	CT ratios for 200 A circuit breaker			
7.05	Protection CT type and class			
7.06	Protection relays: Manufacturer and Model		SEL751A	
7.07	Manufacturer			
7.08	Model			
7.09	Portable hand-held tester required			
7.10	Operating mechanism for closing			
7.11	Operating mechanism for tripping			
7.12	Remote tripping and closing	Yes/No	Yes	
7.13	Preferred auxiliary supply voltage	V	110VDC	
7.14	Preferred auxiliary supply current	A		
7.15	Method of remote tripping and closing			
7.16	Auxiliary supply specifications for voltage	V	110VDC	
7.17	Auxiliary supply specifications current:	A		
8	Busbars			
8.01	Busbars extensible RHS/LHS (facing from front)		LHS	
8.02	Method used to extend busbars			
8.03	Insulation medium of the busbars chamber		SF6	
9	Cable Termination Enclosures and Terminations			
9.01	Type of termination enclosure		Air-filled	
9.02	Type and size of cable(s)	mm ²	1 x 3c 50 mm ² Al PILC	
9.03	Type of termination			
10	Automation Requirements			
10.01	Load monitoring required	Yes/No	Yes	
10.02	Accuracy class and burden (VA) of required current transformers		n/a	
10.03	Electronic ammeters required with LCD/LED display	Yes/No	No	
10.04	Electronic ammeter to make provision for communication with the remote terminal unit (RTU) for telecontrol (SCADA) purposes	Yes/No	Yes	
10.05	Type of ammeter (or multi-meter)			
10.06	RMU to be equipped with an RTU for remote indications, alarms and control	Yes/No	Yes	
10.07	DC voltage	V	110	
11	SF₆ Gas			
11.01	Quantity of SF ₆ in each separately filled compartment			
11.02	SF ₆ gas recovery and replenishing provided by supplier of RMU	Yes/No		
12	Live Circuit Indication			
12.01	Voltage presence identification systems (VPIS) required on all switching devices	Yes/No	Yes	
12.02	VPIS to include phase comparator connection points	Yes/No	Yes	



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191Q/2023/24

DATA SHEET No. DS-EP-0003A: BATTERY TRIPPING UNITS

CLIENT N°.

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ZUTARI N°.

REV.
TO

Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	DATA SHEET No. DS-EP-0003A: BATTERY TRIPPING UNITS	BV	AZ	EB		Mar-24

	DESCRIPTION	UNIT	SPECIFIED	OFFERED
	This data sheet is applicable to the Battery Tripping Units for the following MV Switchboards: - Macassar Main intake 11,5kV Switchboard - Macassar Biogas & Renewable Generator 11,5kV Switchboard - Macassar Diesel Generator 11,5kV Switchboard - Macassar 11,5kV Main Incomers - Eskom Incoming Switching Station Switchboard			
1	<u>General</u>			
1.01	Manufacturer		Penbro Kelnick or equivalent	
1.02	Country of Origin			
1.03	Make/range			
1.04	Model		PEN 2458-129	
2	<u>BATTERY TRIPPING UNIT</u>			
2.01	Cabinet method of installation	Wall or Floor	Floor standing	
2.02	Minimum degree of protection in accordance with SANS 60529	IP	IP31	
2.03	Type of batteries		Ni-Cad	
2.04	Number of Cells	No		
2.05	Rating of batteries	Ahr		
2.06	Nominal Supply Voltage	Vac	230	
2.07	Nominal Output Voltage	Vdc	110	
2.08	Nominal rating of charger	Ahr		
2.09	Iron-type voltmeter	Yes/No	Yes	
2.10	Charger is EMC compliant	Yes/No	Yes	
2.11	Transformer with electrostatic shield between windings to provide isolation between mains and output	Yes/No	Yes	
2.12	1 stage load regulator (during boost)	Yes/No	Yes	
2.13	Automatic load disconnect (undervoltage protection)	Yes/No	Yes	
2.14	Earth leakage monitoring	Yes/No	Yes	
2.15	Automatic battery test	Yes/No	Yes	
3	<u>CAPACITY OF THE BATTERY TRIPPING UNIT</u>			
3.01	Battery Tripping Unit	Ah	(Minimum = quiescent load for 8 hrs + complete bus trip + 50%)	
3.02	Charger can power quiescent load and full bus trip with no batteries connected	Yes/No	Yes	
3.03	Batteries can be isolated from charger to allow battery maintenance	Yes/No	Yes	
3.04	Maximum charging time (to full capacity)	hours	8 hours	
3.05	Can charger automatically change over from trickle to boost charge	Yes/No	Yes	
3.06	Supply line protection device	Circuit breaker or Fuse	Circuit breaker	
3.07	Status monitoring: loss of supply, undervoltage, overvoltage, charge fail	Yes/No	Yes	
3.08	Interface for status monitoring by SCADA	Yes/No	Yes	
3.09	Interface protocol		Ethernet	

	DESCRIPTION	UNIT	SPECIFIED	OFFERED
4	TESTING			
4.01	Routine Test			
4.02	Routine Test certificates to be submitted	Yes/No	Yes	
4.03	Location of Routine Test Facility (Country / City)			
5	SUPPLEMENTARY DETAILS			
5.01	2 BTU required for Main Intake Substation. Each BTU must be able to supply the entire switchboard with continious power for a period of 8 hours.			
Regardless of any information provided in this technical detail sheet, the equipment to be provided will comply with the specified requirements				
Name (Print): _____ Signature: _____				

DATA SHEET No. DS-EP-0003B: BATTERY TRIPPING UNITS

CLIENT N°:

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Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	DATA SHEET No. DS-EP-0003B: BATTERY TRIPPING UNITS	BV	AZ	EB		Mar-24

	DESCRIPTION	UNIT	SPECIFIED	OFFERED
	This data sheet is applicable to the Battery Tripping Units for the following MV Switchboards: • All Secondary MV Substations with CCVV units			
1	General			
1.01	Manufacturer		Penbro Kelnick or equivalent	
1.02	Country of Origin			
1.03	Make/range			
1.04	Model		PEN 2458-129	
2	BATTERY TRIPPING UNIT			
2.01	Cabinet method of installation	Wall or Floor	Floor standing	
2.02	Minimum degree of protection in accordance with SANS 60529	IP	IP31	
2.03	Type of batteries		Ni-Cad	
2.04	Number of Cells	No		
2.05	Rating of batteries	Ahr		
2.06	Nominal Supply Voltage	Vac	230	
2.07	Nominal Output Voltage	Vdc	110	
2.08	Nominal rating of charger	Ahr		
2.09	Iron-type voltmeter	Yes/No	Yes	
2.10	Charger is EMC compliant	Yes/No	Yes	
2.11	Transformer with electrostatic shield between windings to provide isolation between mains and output	Yes/No	Yes	
2.12	1 stage load regulator (during boost)	Yes/No	Yes	
2.13	Automatic load disconnect (undervoltage protection)	Yes/No	Yes	
2.14	Earth leakage monitoring	Yes/No	Yes	
2.15	Automatic battery test	Yes/No	Yes	
3	CAPACITY OF THE BATTERY TRIPPING UNIT			
3.01	Battery Tripping Unit	Ah	(Minimum = quiescent load for 8 hrs + complete bus trip + 50%)	
3.02	Charger can power quiescent load and full bus trip with no batteries connected	Yes/No	Yes	
3.03	Batteries can be isolated from charger to allow battery maintenance	Yes/No	Yes	
3.04	Maximum charging time (to full capacity)	hours	8 hours	
3.05	Can charger automatically change over from trickle to boost charge	Yes/No	Yes	
3.06	Supply line protection device	Circuit breaker or Fuse	Circuit breaker	
3.07	Status monitoring: loss of supply, undervoltage, overvoltage, charge fail	Yes/No	Yes	
3.08	Interface for status monitoring by SCADA	Yes/No	Yes	
3.09	Interface protocol		Ethernet	
4	TESTING			
4.01	Routine Test			
4.02	Routine Test certificates to be submitted	Yes/No	Yes	
4.03	Location of Routine Test Facility (Country / City)			
5	SUPPLEMENTARY DETAILS			

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191Q/2023/24

DATA SHEET No. DS-EP-0004: DISTRIBUTION TRANSFORMERS

CLIENT N°.	PAGE
ZUTARI N°.	REV. T0

Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	DATA SHEET No. DS-EP-0004: DISTRIBUTION TRANSFORMERS	BV	AZ	EB		Mar-24

	DESCRIPTION	UNIT	SPECIFIED	OFFERED
	This data sheet is applicable to the following Transformers: - Dewatering (2 x 2500kVA) - Ultraviolet (2 x 800kVA) - Inlet Works (2 x 1600kVA) - Bioreactor (2 x 2500kVA) - Blowers (2 x 2000kVA) - Service Water (2 x 1600kVA)			
1	GENERAL			
1.01	Manufacturer			
1.02	Country of Origin			
1.03	Transformer Type(Oil/ Dry Type)		Oil-Type	
1.04	Location	Indoors / Outdoors	Outdoors	
2	Transformer Rating			
2.01	Rated Power	kVA	As per SLD	
2.02	Overload capability required		No	
2.03	Cooling (ONON/ANAN)		ONAN	
2.04	Temperature rise: top oil/winding res	°C	55/60	
2.05	Ambient temperature: average/max	°C	35/40	
2.06	Impedance	%		
2.07	Number of Phases		3	
2.08	Rated Frequency	Hz	50	
2.09	Vector Group		Dyn11	
3	Voltages			
3.01	Primary Voltage	kV	11.5	
3.02	Secondary Voltage	kV	420	
3.03	No Load Voltage Ratio		11.5/0.42	
4	Losses			
4.01	No-load Losses	W		
4.02	Full load Losses	W		
5	Tapping Method			
5.01	Number of Taps	No	5	
5.02	Tapping Range	%	0±2.5; ±5	
5.03	Switch or Bolted Links	Off-Load	Switch	
6	Insulation Level (LIWV)			
6.01	Medium Voltage	kV	95	
6.02	Low Voltage	kV	25	
6.03	Winding material (Cu/Al)		Cu	
7	CONSTRUCTION AND FITTINGS			
7.01	Tank type		Free-breathing	

	DESCRIPTION	UNIT	SPECIFIED	OFFERED
7.02	Tank cover of transformer to be bolted or welded		Bolted	
7.03	Conservator	Yes/No	Yes	
7.04	Pressure-relief device	Yes/No	No	
7.05	Dehydrating breather (Silica gel)	Yes/No	Yes	
7.06	Oil-level guage	Yes/No	Yes	
7.07	Oil-filling pipe	Yes/No	Yes	
7.08	Drain valve	Yes/No	Yes	
7.09	Underbase	Flat/Skid	Skid	
7.10	Fixing Holes	Yes/No	Yes	
7.11	Mounting Holes	Yes/No	No	
7.12	Jacking Pads	Yes/No	Yes	
7.13	Lifting Lugs	Yes/No	Yes	
7.14	Wheels and axles	Yes/No	No	
7.15	Corrosive Environment		Heavy, Type B (Coastal) pollution in accordance with SANS 60815-1	
7.16	Gas and Oil actuated relay	Yes/No	Yes	
7.17	Thermometer Pockets	Yes/No	Yes	
7.18	Dial thermometer with max indicator	Yes/No	Yes	
7.19	Thermometer contacts for alarm and trip	Yes/No	Yes	
7.20	Malthoid strip between platform and transformer	Yes/No	No	
7.21	Material of manufacture		3CR12	
	TERMINATIONS	-		
8	Medium Voltage Bushings			
8.01	Material			
8.02	Creepage Distance	mm		
8.03	Basic Insulation Level (BIL)	kV	95	
9	Low Voltage Bushings			
9.01	Material			
9.02	Creepage Distance	mm		
9.03	Basic Insulation Level (BIL)	kV	25	
	TRANSFORMER TESTS REQUIRED/CONDUCTED TO IEC 60076-1	-		
10	General			
10.01	Transformer Type Test certificate to be submitted	Yes/No	Yes	
10.02	Transformer Routine Test certificate to be submitted	Yes/No	Yes	
11	Type Tests			
11.01	Temperature-rise Test (IEC 60076-2)	Yes/No	Yes	
11.02	Dielectric Type Test (IEC 60076-3)	Yes/No	Yes	
11.03	Determination of Sound Level (IEC 60076-10) for each method of cooling for which a guaranteed sound level is specified	Yes/No	No	
11.04	Measurement of power taken by the fan and liquid pump motors	Yes/No	No	
12	Special Tests			
12.01	Dielectric Special Test (IEC 60076-3)	Yes/No	No	
12.02	Winding Hot-Spot Temperature Rise Measurement	Yes/No	No	
12.03	Determination of capacitances windings-to-earth and between windings	Yes/No	No	
12.04	Measurement of dissipation factor tan δ of the insulation system capacitance	Yes/No	No	
12.05	Determination of transient voltage transfer characteristics (Annex B of IEC 60076-3:2000)	Yes/No	No	
12.06	Measurement of zero sequence impedance(s) on three phase transformers (11.6)	Yes/No	No	
12.07	Short Circuit withstand test (IEC 60076-5)	Yes/No	No	
12.08	Measurement of d.c insulation resistance each winding to earth and between windings	Yes/No	No	
12.09	vacuum deflection test on liquid immersed transformers (11.9)	Yes/No	No	
12.10	Pressure deflection test on liquid immersed transformers (11.10)	Yes/No	No	
12.11	Vacuum tightness test on site on liquid immersed transformers (1.11)	Yes/No	No	
12.12	Measurement of frequency response (Frequency Response Analysis or FRA). The test procedure shall be agreed between manufacturer and purchaser.	Yes/No	No	
12.13	Check of external coating (ISO 2178 and ISO 2409 or as specialised)	Yes/No	No	
12.14	Measurement of dissolved gasses in dielectric liquid	Yes/No	No	
12.15	Mechanical test or assessment of tank for suitability for transport (to customer specification)	Yes/No	No	

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Regardless of any information provided in this technical detail sheet, the equipment to be provided will comply with the specified requirements

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DATA SHEET No. DS-EP-0005: ISOLATION TRANSFORMERS

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Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	DATA SHEET No. DS-EP-0005: ISOLATION TRANSFORMERS	BV	AZ	EB		Mar-24

	DESCRIPTION	UNIT	SPECIFIED	OFFERED
	This data sheet is applicable to the following Transformers: • Isolation Transformers			
1	GENERAL			
1.01	Manufacturer			
1.02	Country of Origin			
1.03	Transformer Type(Oil/ Dry Type)		Oil-Type	
1.04	Location, is the transformer to be located Indoors or Outdoors		Outdoors	
2	Transformer Rating			
2.01	Rated Power	kVA	7500	
2.02	Overload capability required		No	
2.03	Cooling (ONON/ANAN)		ONAN	
2.04	Temperature rise: top oil/winding res	°C	55/60	
2.05	Ambient temperature: average/max	°C	35/40	
2.06	Impedance	%		
2.07	Number of Phases		3	
2.08	Rated Frequency	Hz	50	
2.09	Vector Group		Dyn11	
3	Voltages			
3.01	Primary Voltage	kV	11.5	
3.02	Secondary Voltage	kV	11.5	
3.03	No Load Voltage Ratio		11.5/11,5	
4	Losses			
4.01	No-load Losses	W		
4.02	Full load Losses	W		
5	Tapping Method			
5.01	Number of Taps	Yes	12	
5.02	Tapping Range	%	0 ±7.5	
5.03	Switch or Bolted Links	On-Load	Switch	
6	Insulation Level (LIWV)			
6.01	Medium Voltage	kV	95	
6.02	Low Voltage	kV	25	
6.03	Winding material (Cu/Al)		Cu	
7	CONSTRUCTION AND FITTINGS			
7.01	Tank type		Free-breathing	
7.02	Tank cover of transformer to be bolted or welded		Bolted	
7.03	Conservator	Yes/No	Yes	
7.04	Pressure-relief device	Yes/No	No	
7.05	Dehydrating breather (Silica gel)	Yes/No	Yes	

	DESCRIPTION	UNIT	SPECIFIED	OFFERED
7.06	Oil-level guage	Yes/No	Yes	
7.07	Oil-filling pipe	Yes/No	Yes	
7.08	Drain valve	Yes/No	Yes	
7.09	Underbase	Flat/Skid	Skid	
7.10	Fixing Holes	Yes/No	Yes	
7.11	Mounting Holes	Yes/No	No	
7.12	Jacking Pads	Yes/No	Yes	
7.13	Lifting Lugs	Yes/No	Yes	
7.14	Wheels and axles	Yes/No	No	
7.15	Corrosive Environment		Heavy, Type B (Coastal) pollution in accordance with SANS 60815-1	
7.16	Gas and Oil actuated relay	Yes/No	Yes	
7.17	Thermometer Pockets	Yes/No	Yes	
7.18	Dial thermometer with max indicator	Yes/No	Yes	
7.19	Thermometer contacts for alarm and trip	Yes/No	Yes	
7.20	Malthoid strip between platform and transformer	Yes/No	No	
7.21	Material of manufacture		3CR12	
	TERMINATIONS	-		
8	Medium Voltage Bushings			
8.01	Material			
8.02	Creepage Distance	mm		
8.03	Basic Insulation Level (BIL)	kV	95	
	TRANSFORMER TESTS REQUIRED/CONDUCTED TO IEC 60076-1	-		
9	General			
9.01	Transformer Type Test certificate to be submitted	Yes/No	Yes	
9.02	Transformer Routine Test certificate to be submitted	Yes/No	Yes	
10	Type Tests			
10.01	Temperature-rise Test (IEC 60076-2)	Yes/No	Yes	
10.02	Dielectric Type Test (IEC 60076-3)	Yes/No	Yes	
10.03	Determination of Sound Level (IEC 60076-10) for each method of cooling for which a guaranteed sound level is specified	Yes/No	No	
10.04	Measurement of power taken by the fan and liquid pump motors	Yes/No	No	
11	Special Tests			
11.01	Dielectric Special Test (IEC 60076-3)	Yes/No	No	
11.02	Winding Hot-Spot Temperature Rise Measurement	Yes/No	No	
11.03	Determination of capacitances windings-to-earth and between windings	Yes/No	No	
11.04	Measurement of dissipation factor tan δ of the insulation system capacitance	Yes/No	No	
11.05	Determination of transient voltage transfer characteristics (Annex B of IEC 60076-3:2000)	Yes/No	No	
11.06	Measurement of zero sequence impedance(s) on three phase transformers (11.6)	Yes/No	No	
11.07	Short Circuit withstand test (IEC 60076-5)	Yes/No	No	
11.08	Measurement of d.c insulation resistance each winding to earth and between windings	Yes/No	No	
11.09	vacuum deflection test on liquid immersed transformers (11.9)	Yes/No	No	
11.10	Pressure deflection test on liquid immersed transformers (11.10)	Yes/No	No	
11.11	Vacuum tightness test on site on liquid immersed transformers (1.11)	Yes/No	No	
11.12	Measurement of frequency response (Frequency Response Analysis or FRA). The test procedure shall be agreed between manufacturer and purchaser.	Yes/No	No	
11.13	Check of external coating (ISO 2178 and ISO 2409 or as specialised)	Yes/No	No	
11.14	Measurement of dissolved gasses in dielectric liquid	Yes/No	No	
11.15	mechanical test or assessment of tank for suitability for transport (to customer specification)	Yes/No	No	
11.16	Determination of weight with transformer arranged for transport. For transformer up to 1.6MVA by measurement. For larger transformers by measurement or calculation as agreed between manufacturer and purchaser.	Yes/No	No	
12	Routine Tests			
12.01	Measurement of winding resistance	Yes/No	Yes	
12.02	Measurement of voltage ratio and check of phase displacement	Yes/No	Yes	
12.03	Measurement of short-circuit impedance and load loss	Yes/No	Yes	
12.04	Measurement of no-load loss and current	Yes/No	Yes	
12.05	Dielectric routine test (IEC 60076-3)	Yes/No	Yes	

	DESCRIPTION	UNIT	SPECIFIED	OFFERED
12.06	Test on on-load tap-changers, where appropriate	Yes/No	N/A	
12.07	Leak testing with pressure for liquid-immersed transformers (tightness test)	Yes/No	Yes	
12.08	Tightness tests and pressure tests for tanks for gas-filled transformers (refer to 60076-15)	Yes/No	N/A	
12.09	Check of the ratio and polarity of built-in current transformers	Yes/No	N/A	
12.10	Check of core and frame insulation for liquid immersed transformers with core or frame insulation	Yes/No	Yes	
12.11	Measurement of No Load Loss and Current at 90% and 110% of Rated Voltage	Yes/No	Yes	
13	LABELLING AND MARKING			
13.01	Labelling and Marking to IEC 60076-1	Yes/No	Yes	
14	RATING PLATES			
14.01	Rating plates to IEC 60076-1	Yes/No	Yes	
15	OVERALL DIMENSIONS			
15.01	Length	mm		
15.02	Width	mm		
15.03	Height	mm		
15.04	Total mass	kg		
15.05	Oil Volume	liters		
16	FINISHING			
16.01	Colour of transformer		Avocado Green	
16.02	Paintwork finish		Matt	
17	SUPPLEMENTARY DETAILS			
17.01	The transformers shall be double-wound core, three phase, oil-immersed units designed for natural (ONAN) cooling suitable for installation outdoors at unattended substations, and shall comply with SANS 780			
17.02	The transformers will be earthed utilizing a 300A NER on the secondary side of the transformer at the star-point connection.			
Regardless of any information provided in this technical detail sheet, the equipment to be provided will comply with the specified requirements				
Name (Print): _____ Signature: _____				



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DESIGN BUILD OF MECHANICAL AND
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TREATMENT WORKS

191Q/2023/24

DATA SHEET No. DS-EP-0006: MV CABLES AND CABLE SYSTEMS

CLIENT N°.

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Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	DATA SHEET No. DS-EP-0006: MV CABLES AND CABLE SYSTEMS	BV	AZ	EB		Mar-24

	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1	MEDIUM VOLTAGE CABLES			
1.01	Manufacturer		Aberdare or equivalent	
1.02	Country of Origin			
1.03	Operating Voltage	kV	11,5	
1.04	Number of Cores	No	3 and 1	
1.05	Size	mm ²	Various, see SLD	
1.06	Type	Screened/ Belted	Screened	
1.07	Conductor Type	Cu/Al	Al	
1.08	Insulation	PILC/ XLPE	PILC for CoCT; XLPE for Eskom	
1.09	Armouring	DSTA/SWA	DSTA for PILC, SWA for XLPE	
1.10	Serving		PVC	
1.11	Full Load Current	A	Various, see SLD	
1.12	Earth Fault Current	A		
1.13	Bear SANS Mark	Yes/No	Yes	
2	MEDIUM VOLTAGE CABLE TERMINATION KIT			
2.01	Manufacturer		Aberdare or equivalent	
2.02	Country of Origin			
2.03	Operating Voltage	kV	11	
2.04	Size	mm ²	Various, see SLD	
2.05	Cable Conductors	Cu/Al	Al	
2.06	Type of Lugs		Shear-off	
2.07	Full Earth Kit required	Yes/No	Yes	
2.08	Heat Shrink Type required	Yes/No	Yes	
2.09	Complete Kit by one Manufacturer	Yes/No	Yes	
2.10	Type Test Certificate	Yes/No	Yes	
2.11	Bear SANS Mark	Yes/No	Yes	
3	MEDIUM VOLTAGE CABLE JOINT KIT			
3.01	Manufacturer		Aberdare or equivalent	
3.02	Country of Origin			
3.03	Operating Voltage	kV	11	
3.04	Size	mm ²		
3.05	Cable Conductors	Cu/Al	Al	
3.06	Type of Ferrules		Shear-off	
3.07	Full Earth Kit required	Yes/No	Yes	
3.08	Type required (Heatshrink / Cast Iron)		Heatshrink	
3.09	Complete Kit by one Manufacturer	Yes/No	Yes	
3.10	Type Test Certificate	Yes/No	Yes	
3.11	Bear SANS Mark	Yes/No		
4	INSTALLATION			
4.01	Depth	mm (to cable centre)	See Project Specification and Std drawings	
4.02	Outdoor Cable Markers	Yes/No	Yes	

	DESCRIPTION	UNIT	SPECIFIED	OFFERED
Regardless of any information provided in this technical detail sheet, the equipment to be provided will comply with the specified requirements				
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DATA SHEET No. DS-EP-0007: NECRT EARTHING SYSTEM

CLIENT N°.

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Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	DATA SHEET No. DS-EP-0007: NECRT EARTHING SYSTEM	BV	AZ	EB		Mar-24

	DESCRIPTION	UNIT	SPECIFIED	OFFERED
	This data sheet is applicable to the following NECRT: • NECRT units connected to system via MV Main Intake Switchboard breakers A3 & B4			
1	GENERAL			
1.01	Manufacturer			
1.02	Model / type			
1.03	Country of Origin			
1.04	Transformer Type		Oil-Type	
1.05	Location	Indoors / Outdoors	Outdoors	
1.06	Corrosive Environment		Heavy, Type B (Coastal) pollution in accordance with SANS 60815-1	
2	System Conditions			
2.01	Nominal system voltage (Un)	kV	11,5	
2.02	Maximum System Voltage (Um)	kV	12	
2.03	Number of phases		3	
2.04	Nominal system frequency	Hz	50	
2.05	System earthing		Non-Effectively Earthed	
3	Rated Requirements			
3.01	Rated Current	A	300	
3.02	Nominal Short Time (10 s) Current of NEC and NER	(r.m.s.)A	360	
3.03	Nominal Continuous Current of NEC and NER	(r.m.s.)A	10	
3.04	Zero Sequence Reactance (Xo)	Ω/ph		
3.05	Zero Sequence Resistance (R0) at 100 °C	Ω/ph		
3.06	Zero Sequence Impedance (Z'o) at 100 °C	Ω/ph		
3.07	Rated Power-Frequency Withstand Voltage (r.m.s) (Ud)	kV	28	
3.08	Rated Lightning Impulse Withstand Voltage (peak) (Up)	kV	95	
3.09	HV Bushings Minimum Nominal Specific Creepage Distance	mm/kV	Comply with SANS 876	
4	NEC			
4.01	Zero Sequence Reactance (Xe)	Ω		
4.02	Zero Sequence Resistance (Re) at 100 °C	Ω		
4.03	No Load Loss of NEC at U0	kW		
4.04	Flux Density of NEC Core	T		
4.05	Magnetization Current	(r.m.s.)A		
4.06	Current Density at Nominal Short Time Current	A/mm ²		
4.07	Insulation Level BIL	kV	95	
4.08	Vector Group			
5	NER			
5.01	Rated Voltage	kV	11,5	
5.02	Continuous Nominal Current	A		
5.03	Rated Current for 10 seconds	A		
5.04	Resistance at 100 °C	Ω		
5.05	Temperature Coefficient at 100 °C	$\Omega/^{\circ}C$		

	DESCRIPTION	UNIT	SPECIFIED	OFFERED
5.06	Insulation Level BIL	kV	95	
5.07	Specific Heat Capacity	kJ/kg°C		
5.08	Temperature Range	°C		
5.09	Pressure Relief Valve	kPA		
6	Auxiliary Transformer			
6.01	Nominal Rating	kVA	315	
6.02	Primary Nominal Voltage	kV	11,5	
6.03	No Load Secondary Voltage	V	420	
6.04	Vector Group Dyn11 or Yzn11		Dyn11	
6.05	Flux Density of Aux Core	T	1.75	
6.06	Magnetizing Current	A		
6.07	Load Loss	kW	<2	
6.08	No-Load Loss	kW	<0.5	
6.09	Percentage Impedance (SANS 780)	%	4.5	
6.10	Number of Taps	No	5	
6.11	Tapping Range	%	0±2.5; ±5	
6.12	Cooling (ONON/ANAN)		ONAN	
7	Temperature Rise (at site altitude)			
7.01	The Following Service Conditions Can Occur:			
7.02	I: Passage of Maximum Continuous Neutral Current	A	10	
7.03	II: Passage of Rated Current of Auxiliary Transformer	A	1.75	
7.04	III: Passage of Nominal Short Time Current for 10 s	A	360	
7.05	Top Oil Temperature for Condition:			
7.06	a) I	°C	55	
7.07	b) II	°C	55	
7.08	c) III	°C	75	
7.09	d) I and II	°C	55	
7.10	e) I and II and III	°C	75	
7.11	NEC Winding Temperature (calculated) for Condition:			
7.12	a) I	°C		
7.13	b) II	°C		
7.14	c) III	°C		
7.15	d) I and II	°C		
7.16	e) I and II and III	°C		
7.17	Metallic NER Temperature (measured) for Condition:			
7.18	a) I	°C		
7.19	b) II	°C		
7.20	c) III	°C		
8	Material			
8.01	NEC winding			
8.02	AUX HV Winding			
8.03	AUX LV Winding			
8.04	Grade of NER Elements			
9	Material Thickness			
9.01	Tank Top	mm		
9.02	Tank Bottom	mm		
9.03	Tank Sides	mm		
9.04	Conservator	mm		
9.05	Radiator Tubes (if any)	mm		
10	Housing and Corrosion Protection			
10.01	Material		3CR12	
10.02	Corrosion Protection - Coastal		ISO 12944 (C5)	
10.03	Tank Colour		Admiralty Grey	

	DESCRIPTION	UNIT	SPECIFIED	OFFERED
10.04	Conservator Colour		White	
11	Current Transformers			
11.01	REF and Differential:			
11.02	a) Ratio		2400/1 MR	
11.03	b) Accuracy class		TPS	
11.04	c) Max excitation current at 300 V	mA	100	
11.05	d) Max internal resistance on 600/1 ration	Ω	2.4	
11.06	e) Secondary voltage/turn	V/turn	0.5	
11.07	f) Secondary internal resistance / turn	mΩ/turn	4	
11.08	g) Location		Nearer to earthed terminal	
11.09	IDMTEF:			
11.10	a) Ratio		100/1	
11.11	b) Accuracy Class		10P10	
11.12	c) Location		Earthed end of NER near resistor	
12	CONSTRUCTION AND FITTINGS			
12.01	Tank type		Free-breathing	
12.02	Tank cover of transformer to be bolted or welded		Bolted	
12.03	Conservator	Yes/No	Yes	
12.04	Pressure-relief device	Yes/No	No	
12.05	Dehydrating breather (Silica gel)	Yes/No	Yes	
12.06	Oil-level guage	Yes/No	Yes	
12.07	Oil-filling pipe	Yes/No	Yes	
12.08	Drain valve	Yes/No	Yes	
12.09	Underbase	Flat/Skid	Skid	
12.10	Fixing Holes	Yes/No	Yes	
12.11	Mounting Holes	Yes/No	No	
12.12	Jacking Pads	Yes/No	Yes	
12.13	Lifting Lugs	Yes/No	Yes	
12.14	Wheels and axles	Yes/No	No	
12.15	Corrosive Environment		Heavy, Type B (Coastal) pollution in accordance with SANS 60815-1	
12.16	Gas and Oil actuated relay	Yes/No	Yes	
12.17	Thermometer Pockets	Yes/No	Yes	
12.18	Dial thermometer with max indicator	Yes/No	Yes	
12.19	Thermometer contacts for alarm and trip	Yes/No	Yes	
12.20	Malthoid strip between platform and transformer	Yes/No	No	
12.21	Material of manufacture		3CR12	
	TESTS REQUIRED/CONDUCTED TO IEC 60076-1	-		
13	General			
13.01	Transformer Type Test certificate to be submitted	Yes/No	Yes	
13.02	Transformer Routine Test certificate to be submitted	Yes/No	Yes	
14	Type Tests			
14.01	Temperature-rise Test (IEC 60076-2)	Yes/No	Yes	
14.02	Dielectric Type Test (IEC 60076-3)	Yes/No	Yes	
14.03	Determination of Sound Level (IEC 60076-10) for each method of cooling for which a guaranteed sound level is specified	Yes/No	No	
14.04	Measurement of power taken by the fan and liquid pump motors	Yes/No	No	
15	Special Tests			
15.01	Dielectric Special Test (IEC 60076-3)	Yes/No	No	
15.02	Winding Hot-Spot Temperature Rise Measurement	Yes/No	No	
15.03	Determination of capacitances windings-to-earth and between windings	Yes/No	No	
15.04	Measurement of dissipation factor tan δ of the insulation system capacitance	Yes/No	No	
15.05	Determination of transient voltage transfer characteristics (Annex B of IEC 60076-3:2000)	Yes/No	No	
15.06	Measurement of zero sequence impedance(s) on three phase transformers (11.6)	Yes/No	No	
15.07	Short Circuit withstand test (IEC 60076-5)	Yes/No	No	
15.08	Measurement of d.c insulation resistance each winding to earth and between windings	Yes/No	No	



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191Q/2023/24

**DATA SHEET No. DS-EE-0010A: LV SWITCHGEAR AND CONTROLGEAR ASSEMBLIES -
MOTOR CONTROL CENTRES**

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Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	DATA SHEET No. DS-EE-0010A: LV SWITCHGEAR AND CONTROLGEAR ASSEMBLIES - MOTOR CONTROL CENTRES	HG	DS	EB		Mar-24

	DESCRIPTION	UNIT	SPECIFIED	OFFERED
	This data sheet is applicable to the following Motor Control Centres: • Inlet Works • Primary Settling Tanks • Blower • Dewatering • Waste Activated Sludge • Primary Sludge • Bioreactor • Service Water • UV Disinfection • Secondary Settling Tanks			
1	GENERAL			
1.01	MCC Manufacturer			
2	CONSTRUCTION REQUIREMENTS			
2.01	Steel Work Manufacturer			
2.02	Size of Panel	HxWxD	H <2200	
2.03	Doors / Removable Panels		Doors	
2.04	Corrosion protection		Epoxy coated HDG	
2.05	Gland Plates		Not painted; Alu for single core cables	
2.06	Estimated Weight	kg		
	ELECTRICAL COMPONENTS	-		
3	Air Circuit Breakers			
3.01	Manufacturer			
3.02	Type		Withdrawable	
3.03	Model			
3.04	Overload release		Electronic	
3.05	Short-circuit release		Electronic	
3.06	Motorised	Yes / No	Yes	
4	Moulded Case Circuit Breakers			
4.01	Manufacturer			
4.02	Type		Fixed	
4.03	Model			
4.04	Overload release		Thermal/ Electronic	
4.05	Short-circuit release		Magnetic/ Electronic	
5	Miniature Circuit Breakers			
5.01	Manufacturer			
5.02	Type			
5.03	Model			
5.04	Tripping Curve		C or as per SLD	
6	Fuse Switch-Disconnecter			
6.01	Manufacturer			

	DESCRIPTION	UNIT	SPECIFIED	OFFERED
6.02	Model			
7	High Rupture Capacity (HRC) Fuse Links			
7.01	Manufacturer			
7.02	Model			
8	Surge Arrestors			
8.01	Power Circuits - Manufacturer			
8.02	Power Circuits - Model			
8.03	Power Circuits - Rating	kA		
8.04	Control Circuits - Manufacturer			
8.05	Control Circuits - Model			
9	Contactors			
9.01	Manufacturer			
9.02	Model			
10	Intelligent Motor Starter			
10.01	Manufacturer			
10.02	Type			
10.03	Model			
10.04	Rated Current	A		
10.05	Fieldbus Enabled	Yes / No	Yes	
10.06	Fieldbus Protocol		Ind. Ethernet	
10.07	Voltage Measuring Unit	Yes / No	Yes	
10.08	Ground Fault Measuring Unit	Yes / No	For submersible equipment	
10.09	HMI	Yes / No	Yes	
11	Miniature Relays			
11.01	Manufacturer			
11.02	Model			
12	Control switches and pushbuttons			
12.01	Manufacturer			
12.02	Model			
13	Indicating Lamps			
13.01	Manufacturer			
13.02	Model			
14	Power Meter for incomer(s)			
14.01	Manufacturer			
14.02	Model			
14.03	Communication Protocol		Ind. Ethernet	
14.04	Harmonics Measurement	Yes / No	Yes	
14.05	Time of use measurement	Yes / No	Yes	
14.06	Datasheet provided with tender	Yes / No	Yes	
14.07	Data logging functionality	Yes / No	Yes	
14.08	Metering compliance standard		IEC 61557-12 <=0.5	
15	Control-Circuit and auxiliary supply transformer			
15.01	Manufacturer			
16	Power Factor Correction			
16.01	Controller			
16.02	Manufacturer			
16.03	Model			



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**DATA SHEET No. DS-EE-0010B: LV SWITCHGEAR AND CONTROLGEAR ASSEMBLIES -
LOCAL CONTROL PANELS**

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T0	D	DATA SHEET No. DS-EE-0010B: LV SWITCHGEAR AND CONTROLGEAR ASSEMBLIES - LOCAL CONTROL PANELS	HG	DS	EB		Mar-24

	DESCRIPTION	UNIT	SPECIFIED	OFFERED
	This data sheet is applicable to the following Local Control Panels: • Blowers • Odour Control • UV Disinfection • Poly Make-up and Dosing • Chlorine Disinfection • Belt Press • Water Softening • Gas Cleaning • Cranes			
1	GENERAL			
1.01	LCP Manufacturer			
2	CONSTRUCTION REQUIREMENTS			
2.01	Steel Work Manufacturer			
2.02	Size of Panel	HxWxD	H <1600	
2.03	Spare Space Required	%	>=35	
2.04	Corrosion protection		Epoxy coated HDG	
	ELECTRICAL COMPONENTS	-		
3	Moulded Case Circuit Breakers			
3.01	Manufacturer			
3.02	Type		Fixed	
3.03	Model			
3.04	Overload release		Thermal/ electronic	
3.05	Short-circuit release		Magnetic/ electronic	
4	Miniature Circuit Breakers			
4.01	Manufacturer			
4.02	Type			
4.03	Model			
4.04	Rated Current	A		
4.05	Service short-circuit breaking capacity (Ics)	kA		
4.06	Tripping Curve		C or as per SLD	
5	Fuse-Switch-Disconnecter			
5.01	Manufacturer			
5.02	Model			
6	High Rupture Capacity (HRC) Fuse Links			
6.01	Manufacturer			
6.02	Model			
7	Surge Arrestors			
7.01	Power Circuits - Manufacturer			

DATA SHEET No. DS-EE-0010S: DISTRIBUTION BOARDS AND KIOSKS

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T0	D	DATA SHEET No. DS-EE-0010S: DISTRIBUTION BOARDS AND KIOSKS	HG	DS	EB		Mar-24

	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1	OPERATING ENVIRONMENT			
1.01	Site Conditions - Altitude	m		
1.02	Site Conditions - Min. / Max Ambient Temp.	°C / °C		
1.03	Site Conditions - Max. Relative Humidity	%		
2	STREETLIGHTING KIOSKS			
2.01	Manufacturer			
2.02	Type			
	COMPONENTS	-		
3	Moulded Case Circuit Breakers			
3.01	Manufacturer			
3.02	Model			
3.03	Service short-circuit breaking capacity (Ics)	kA		
3.04	Overload release		Thermal/ electronic	
3.05	Short-circuit release		Magnetic/ electronic	
4	Miniature Circuit Breakers			
4.01	Manufacturer			
4.02	Type			
4.03	Model			
4.04	Rated Current	A		
4.05	Service short-circuit breaking capacity (Ics)	kA		
4.06	Tripping Curve		C or as per SLD	
5	Fuse-Switch-Disconnecter			
5.01	Manufacturer			
5.02	Model			
6	Contactors			
6.01	Manufacturer			
6.02	Model			
6.03	Coordination			
7	GENERAL			
7.01	Warranty / guarantee	months	12	
7.02	Delivery time (after official order number received)	weeks		
8	SUPPLEMENTARY DETAILS			

DATA SHEET No. DS-EE-0011: LV CABLES

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T0	D	DATA SHEET No. DS-EE-0011: LV CABLES	HG	DS	EB		Mar-24

	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1	LOW VOLTAGE CABLES			
1.01	Manufacturer			
1.02	Operating Voltage	V	600/1000	
1.03	Number of Cores	No	Fire resistant cables for generator and fire equipment. See Specifications and SLDs for others.	
1.04	Size	mm ²		
1.05	Conductor Type	Cu/Al		
1.06	Cable Type			
1.07	Full Load Current	A		
2	VSD EMC Cables			
2.01	Manufacturer			
2.02	Operating Voltage	V	600/1000	
2.03	Cable Type		EMC, Double Screened	
3	ENCAPSULATED BUSBAR SYSTEM FOR MCC			
3.01	Manufacturer			
4	SUPPLEMENTARY DETAILS			

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DATA SHEET No. DS-EE-0012: CABLE SUPPORTS

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DATA SHEET No. DS-EE-0014A: LIGHTING

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Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	DATA SHEET No. DS-EE-0014A: LIGHTING	HG	EB	EB		Mar-24

	DESCRIPTION	UNIT	SPECIFIED	OFFERED
	LIGHTING ACCESSORIES			
1	Photocell (Day/Night Switch) (for kiosk)			
1.01	Manufacturer			
1.02	Model			
1.03	SABS approved	Yes / No	Yes	
2	Lighting Ballast			
2.01	Manufacturer			
2.02	Type			
2.03	Details			
2.04	SABS approved	Yes/No	Yes	
3	GRP Poles for mounting street/area lights			
3.01	Manufacturer /Supplier			
4	SINGLE CORE PVC INSULATED CABLE			
4.01	Manufacturer			
4.02	Type			
5	HOUSE WIRE			
5.01	Manufacturer			
5.02	Type			
6	TRUNKING			
6.01	Manufacturer / Type			
6.02	Details			
7	CONDUITS (HDG)			
7.01	Manufacturer / Type			
7.02	Material	PVC/HDG	HDG	
8	CONDUITS (PVC)			
8.01	Manufacturer / Type			
8.02	Material	PVC/HDG	PVC	
9	SUPPLEMENTARY DETAILS			

Regardless of any information provided in this technical data sheet, the equipment to be provided will comply with the specified requirements

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DATA SHEET No. DS-EE-0014B: LUMINAIRE SCHEDULE					CLIENT N°.			PAGE
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Rev.	TI	Description	By	Ckd	APP.	Aut.	Date	
T0	D	DATA SHEET No. DS-EE-0014B: LUMINAIRE SCHEDULE	HG	EB	EB		Mar-24	
Luminaire / Device Type:	Image:	Description:	Supplier / Manufacturer:	Product Name / Code:	Lamp Type:	Mounting Method	OFFERED	
D		LED Streetlight	BEKA Schröder, similar or equivalent	LEDLUME MINI	37W	Pole mounted		
E		LED Floodlight	BEKA Schröder, similar or equivalent	LEDFLOOD MIDI	147W	Pole mounted		



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WASTEWATER TREATMENT WORKS

191Q/2023/24

DATA SHEET No. DS-EE-0023A: VARIABLE FREQUENCY CONVERTERS - VFCs SMALLER THAN 90kW

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Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	DATA SHEET No. DS-EE-0023A: VARIABLE FREQUENCY CONVERTERS - VFCs SMALLER THAN 90kW	HG	DS	EB		Mar-24

	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1	GENERAL			
1.01	Manufacturer			
1.02	Model			
1.03	Place of manufacture			
1.04	Expected life (for spares availability)	Years		
	ELECTRICAL SERVICE CONDITIONS	-		
2	Supply network characteristics			
2.01	Source impedance (at minimum fault level) at PCC	Ohms		
2.02	Fault level (maximum) at PCC	MVA		
2.03	Fault level (n-1 contingency/minimum) at PCC	MVA		
2.04	Voltage total harmonic distortion limit at PCC	%	30	
3	VFC input current harmonic limits and actual			
3.01	5th	%		
3.02	7th	%		
3.03	11th	%		
3.04	13th	%		
3.05	17th	%		
3.06	19th	%		
3.07	23rd	%		
3.08	25th	%		
3.09	29th	%		
3.10	31st	%		
3.11	THD	%		
4	ENVIRONMENTAL SERVICE CONDITIONS			
4.01	Forced ventilation or Air Conditioning in VFC room	FV/AC	AC	
4.02	Airflow required per VFC	m³/s		
4.03	Heat load per VFC	kW		
5	LOAD DETAILS			
5.01	Type of motor-driven load		As per mechanical specification	
5.02	Load torque characteristic		Quadratic	
5.03	Number of operation quadrants		1	
5.04	Operating speed range		As per mechanical specification	
6	CONVERTER CONFIGURATION			
6.01	Form of converter (package/chassis/cabinet unit)		Package	
6.02	Rectifier type: diode- or active front end (DFE/AFE)		DFE	
6.03	Rectifier pulse number		6	
6.04	Input semi-conductor fuses	Yes/No	Yes	
6.05	Input contactor	Yes/No	Yes	

	DESCRIPTION	UNIT	SPECIFIED	OFFERED
7	CONVERTER FILTERS			
7.01	Line-side reactor	Yes/No	Yes	
7.02	Line-side reactor relative short-circuit voltage	%		
7.03	Line harmonic filters (LHF)	Yes/No		
7.04	LHF free-standing (FS) or integral to VFC (I)	FS/I		
7.05	Motor-side reactor	Yes/No	Yes, > 50kW	
7.06	Motor-side dv/dt filter	Yes/No	Yes, cable length > 100m	
7.07	Motor-side sine filter	Yes/No		
7.08	Motor-side common-mode filter	Yes/No		
8	CONVERTER PROTECTION			
8.01	Overcurrent and overload	Yes/No	Yes	
8.02	Undervoltage and overvoltage	Yes/No	Yes	
8.03	Phase loss and unbalance	Yes/No	Yes	
8.04	Earth fault	Yes/No	Yes	
8.05	Over-temperature	Yes/No	Yes	
8.06	DC link overvoltage and overcurrent	Yes/No	Yes	
8.07	Over-temperature of DC link reactor (if installed)	Yes/No	Yes	
9	MOTOR PROTECTION			Indicate if provided by VFC or MPR
9.01	Short-circuit	Yes/No	Yes	
9.02	Start(max starting time)/Stall	Yes/No	Yes	
9.03	Earth fault	Yes/No	Yes	
9.04	Overload	Yes/No	Yes	
9.05	Number of starts	Yes/No	Yes	
9.06	Loss of phase	Yes/No	Yes	
9.07	Unbalance	Yes/No	Yes	
9.08	Loss of load/undercurrent	Yes/No	Yes	
9.09	Thermal by means of motor thermistors/RTDs	Yes/No	Yes	
10	CONVERTER RATINGS			
10.01	Rated system voltage	V	420	
10.02	Line-side rated current	A		
10.03	Input total power factor	pu		
10.04	Line-side displacement power factor	pu		
10.05	Rated continuous output current	A		
10.06	Overload capability and time	A & s		
10.07	Efficiency of complete drive module	%		
10.08	Total losses of complete drive module	W		
11	CONTROL PERFORMANCE REQUIREMENTS			
11.01	Open loop speed control	Yes/No	Yes	
11.02	Steady state deviation band	%	±1 to ±2	
12	OPERATOR CONTROL INTERFACE			
12.01	Integral operator control interface		Yes	
12.02	Remote operator control interface in compartment door		Yes	
13	PROCESS CONTROL INTERFACE			
13.01	Compliant with SANS 61800-7	No/Yes	Yes	
13.02	Communications Interface Quantity	No.		
13.03	Communications Interface Type(s) and Connector(s)	No.		
13.04	Communications Interface Protocol(s)		Ind. Ethernet	
13.05	Communications Interface Power Drive System Profile	Process / Drive/ Motion Control	Process	
13.06	Communications Interface Message Structure to SANS 61800-7		Yes	

	DESCRIPTION	UNIT	SPECIFIED	OFFERED
14	TESTING			
14.01	Where indicated the following tests shall be carried out in addition to the specified mandatory tests:			
15	Drive System Site Tests			
15.01	Witnessed factory acceptance test	Yes/No	Yes as part of MCC FAT	
16	SUPPLEMENTARY DETAILS			
Regardless of any information provided in this technical data sheet, the equipment to be provided will comply with the specified requirements				
Name (Print): _____ Signature: _____.				



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DESIGN BUILD OF MECHANICAL AND
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WASTEWATER TREATMENT WORKS

191Q/2023/24

DATA SHEET No. DS-EE-0023B: VARIABLE FREQUENCY CONVERTERS - VFCs LARGER
THAN 90kW

CLIENT N°.					PAGE
ZUTARI N°.					REV. T0
	By	Ckd	APP.	Aut.	Date
R	HG	DS	EB		Mar-24

	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1	GENERAL			
1.01	Manufacturer			
1.02	Model			
1.03	Place of manufacture			
1.04	Expected life (for spares availability)	Years		
1.05	Contractor to submit harmonic calculations (with and without mitigation) with Tender	Yes/No	Yes	
	ELECTRICAL SERVICE CONDITIONS	-		
2	Supply network characteristics			
2.01	Source impedance (at minimum fault level) at PCC	Ohms		
2.02	Fault level (maximum) at PCC	MVA		
2.03	Fault level (n-1 contingency/minimum) at PCC	MVA		
2.04	Voltage total harmonic distortion limit at PCC	%	8	
3	VFC input current harmonic limits and actual			
3.01	5th	%		
3.02	7th	%		
3.03	11th	%		
3.04	13th	%		
3.05	17th	%		
3.06	19th	%		
3.07	23rd	%		
3.08	25th	%		
3.09	29th	%		
3.10	31st	%		
3.11	THD	%		
4	ENVIRONMENTAL SERVICE CONDITIONS			
4.01	Forced Ventilation (FV) or Air Conditioning (AC) in VFC room	FV/AC	AC	
4.02	Airflow required per VFC	m ³ /s		
4.03	Heat load per VFC	kW		
5	LOAD DETAILS			
5.01	Type of motor-driven load		As per mechanical specification	
5.02	Load torque characteristic		Quadratic	
5.03	Number of operation quadrants		1	
5.04	Dynamic braking required		No	
5.05	Operating speed range		As per mechanical specification	
6	CONVERTER CONFIGURATION			
6.01	Form of converter (package/chassis/cabinet unit)		Package	
6.02	Rectifier type: diode- or active front end (DFE/AFE)		AFE	
6.03	Rectifier pulse number		6	
6.04	Input switch-disconnector	Yes/No	Yes	
6.05	Input semi-conductor fuses	Yes/No	Yes	
6.06	Input contactor	Yes/No	Yes	

	DESCRIPTION	UNIT	SPECIFIED	OFFERED
7	CONVERTER FILTERS			
7.01	Line-side reactor	Yes/No	Yes	
7.02	Line-side reactor relative short-circuit voltage	%		
7.03	Line harmonic filters (LHF)	Yes/No		
7.04	LHF free-standing (FS) or integral to VFC (I)	FS/I		
7.05	Motor-side reactor	Yes/No	Yes, > 50kW	
7.06	Motor-side dv/dt filter	Yes/No	Yes, cable length > 100m	
7.07	Motor-side sine filter	Yes/No		
7.08	Motor-side common-mode filter	Yes/No		
8	CONVERTER PROTECTION			
8.01	Overcurrent and overload	Yes/No	Yes	
8.02	Undervoltage and overvoltage	Yes/No	Yes	
8.03	Phase loss and unbalance	Yes/No	Yes	
8.04	Earth fault	Yes/No	Yes	
8.05	Over-temperature	Yes/No	Yes	
8.06	DC link overvoltage and overcurrent	Yes/No	Yes	
8.07	Over-temperature of DC link reactor (if installed)	Yes/No	Yes	
9	MOTOR PROTECTION			Indicate if provided by VFC or MPR
9.01	Short-circuit	Yes/No	Yes	
9.02	Start(max starting time)/Stall	Yes/No	Yes	
9.03	Earth fault	Yes/No	Yes	
9.04	Overload	Yes/No	Yes	
9.05	Number of starts	Yes/No	Yes	
9.06	Loss of phase	Yes/No	Yes	
9.07	Unbalance	Yes/No	Yes	
9.08	Loss of load/undercurrent	Yes/No	Yes	
9.09	Thermal by means of motor thermistors/RTDs	Yes/No	Yes	
10	CONVERTER RATINGS			
10.01	Rated system voltage	V	420	
10.02	Line-side rated current	A		
10.03	Input total power factor	pu		
10.04	Line-side displacement power factor	pu		
10.05	Rated continuous output current	A		
10.06	Overload capability and time	A & s		
10.07	Efficiency of complete drive module	%		
10.08	Total losses of complete drive module	W		
11	CONTROL PERFORMANCE REQUIREMENTS			
11.01	Open loop speed control	Yes/No	Yes	
11.02	Steady state deviation band	%	±1 to ±2	
12	OPERATOR CONTROL INTERFACE			
12.01	Integral operator control interface		Yes	
12.02	Remote operator control interface in compartment door		Yes	
13	PROCESS CONTROL INTERFACE			
13.01	Compliant with SANS 61800-7	No/Yes	Yes	
13.02	Communications Interface Quantity	No.		
13.03	Communications Interface Type(s) and Connector(s)	No.		
13.04	Communications Interface Protocol(s)		Ind Ethernet	
13.05	Communications Interface Power Drive System Profile	Process / Drive/ Motion Control	Process	
13.06	Communications Interface Message Structure to SANS 61800-7		Yes	

	DESCRIPTION	UNIT	SPECIFIED	OFFERED
14	TESTING			
14.01	Where indicated the following tests shall be carried out in addition to the specified mandatory tests:			
15	Drive System Site Tests			
15.01	Witnessed factory acceptance test	Yes/No	Yes as part of MCC FAT	
16	SUPPLEMENTARY DETAILS			
Regardless of any information provided in this technical data sheet, the equipment to be provided will comply with the specified requirements				
Name (Print): _____ Signature: _____				

DATA SHEET No. DS-EE-0025A: LV ELECTRICAL MOTORS - MOTORS < 50kW

CLIENT N°:	PAGE
ZUTARI N°:	REV. T0

Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	DATA SHEET No. DS-EE-0025A: LV ELECTRICAL MOTORS - MOTORS < 50kW	HG	DS	EB		Mar-24

	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1	GENERAL			
1.01	Manufacturer			
1.02	Model			
2	MOTOR RATING			
2.01	Duty type		S1	
2.02	Output margin above load absorbed power	%	20	
2.03	Speed at rated output, voltage and frequency	rpm		
2.04	Full load current	A		
2.05	Rated torque	Nm		
3	WINDINGS TYPE, INSULATION & TEMPERATURE RISE			
3.01	Stator winding type (random/formed diamond coil)		Formed	
3.02	Insulation and impregnation system		VPI	
3.03	Insulation thermal class	(F/H)	F	
3.04	Temperature rise class	(B/F)	B	
3.05	Maximum temperature rise at rated output (Zone A supply)	K		
3.06	Maximum temperature rise at rated output (Zone C supply)	K		
3.07	Windings thermal protection (thermistor/PT100) per winding			
4	GENERAL PERFORMANCE			
4.01	Efficiency at rated output	%		
4.02	Efficiency at rated 75% output	%		
4.03	Efficiency at rated 50% output	%		
4.04	Power factor at rated output	pu		
4.05	Power factor at 75% rated output	pu		
4.06	Power factor at 50% rated output	pu		
4.07	Sound power level at rated load	dBA		
5	STARTING PERFORMANCE			
5.01	Motor moment of inertia	kg.m ²		
5.02	Number of starts per hour (cold/hot)		6/2	
5.03	Starting current (x full load current)	A		
5.04	Starting torque (x rated torque)	N m		
5.05	Pull-up torque (x rated torque)	N m		
5.06	Breakdown torque (x rated torque)	N m		
5.07	Starting power factor	pu		
5.08	Run up time of driven load (state pu starting current)	s		
6	DRIVEN LOAD AND COUPLING			
6.01	Load moment of inertia at motor speed	kg.m ²		
6.02	Coupling method (direct/gearbox/v-belt)			
7	BEARINGS			
7.01	Manufacturer			
7.02	DE bearing type (ball/roller/sleeve)		Ball/roller	



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DATA SHEET No. DS-EE-0025B: LV ELECTRICAL MOTORS - 50 kW < MOTORS < 150 kW

CLIENT N°:	PAGE
ZUTARI N°:	REV. T0

Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	DATA SHEET No. DS-EE-0025B: LV ELECTRICAL MOTORS - 50 kW < MOTORS < 150 kW	HG	DS	EB		Mar-24

	DESCRIPTION	UNIT	SPECIFIED	OFFERED
0.01	GENERAL			
1	Manufacturer			
1.01	Model			
2	MOTOR RATING			
2.01	Duty type		S1	
2.02	Output margin above load absorbed power	%	20	
2.03	Speed at rated output, voltage and frequency	rpm		
2.04	Full load current	A		
2.05	Rated torque	Nm		
3	WINDINGS TYPE, INSULATION & TEMPERATURE RISE			
3.01	Stator winding type (random/formed diamond coil)		Formed	
3.02	Insulation and impregnation system		VPI	
3.03	Insulation thermal class	(F/H)	F	
3.04	Temperature rise class	(B/F)	B	
3.05	Maximum temperature rise at rated output (Zone A supply)	K		
3.06	Maximum temperature rise at rated output (Zone C supply)	K		
3.07	Windings thermal protection (thermistor/PT100) per winding		Thermistor	
4	GENERAL PERFORMANCE			
4.01	Efficiency at rated output	%		
4.02	Efficiency at rated 75% output	%		
4.03	Efficiency at rated 50% output	%		
4.04	Power factor at rated output	pu		
4.05	Power factor at 75% rated output	pu		
4.06	Power factor at 50% rated output	pu		
4.07	Sound power level at rated load	dBA		
5	STARTING PERFORMANCE			
5.01	Motor moment of inertia	kg.m ²		
5.02	Number of starts per hour (cold/hot)		6/2	
5.03	Starting current (x full load current)	A		
5.04	Starting torque (x rated torque)	N m		
5.05	Pull-up torque (x rated torque)	N m		
5.06	Breakdown torque (x rated torque)	N m		
5.07	Starting power factor	pu		
5.08	Run up time of driven load (state pu starting current)	s		
6	DRIVEN LOAD AND COUPLING			
6.01	Load moment of inertia at motor speed	kg.m ²		
6.02	Coupling method (direct/gearbox/v-belt)			



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DATA SHEET No. DS-EE-0025C: LV ELECTRICAL MOTORS - MOTORS > 150 kW

CLIENT N°:	PAGE
ZUTARI N°:	REV. T0

Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	DATA SHEET No. DS-EE-0025C: LV ELECTRICAL MOTORS - MOTORS > 150 kW	HG	DS	EB		Mar-24

	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1	GENERAL			
1.01	Manufacturer			
1.02	Model			
2	MOTOR RATING			
2.01	Duty type		S1	
2.02	Output margin above load absorbed power	%	20	
2.03	Speed at rated output, voltage and frequency	rpm		
2.04	Full load current	A		
2.05	Rated torque	Nm		
3	WINDINGS TYPE, INSULATION & TEMPERATURE RISE			
3.01	Stator winding type (random/formed diamond coil)		Formed	
3.02	Insulation and impregnation system		VPI	
3.03	Insulation thermal class	(F/H)	F	
3.04	Temperature rise class	(B/F)	B	
3.05	Maximum temperature rise at rated output (Zone A supply)	K		
3.06	Maximum temperature rise at rated output (Zone C supply)	K		
3.07	Windings thermal protection (thermistor/PT100) per winding		2xPT100	
4	GENERAL PERFORMANCE			
4.01	Efficiency at rated output	%		
4.02	Efficiency at rated 75% output	%		
4.03	Efficiency at rated 50% output	%		
4.04	Power factor at rated output	pu		
4.05	Power factor at 75% rated output	pu		
4.06	Power factor at 50% rated output	pu		
4.07	Sound power level at rated load	dBA		
4.08	Silencer required	Yes / No	Yes	
5	STARTING PERFORMANCE			
5.01	Motor moment of inertia	kg.m ²		
5.02	Number of starts per hour (cold/hot)		6/2	
5.03	Starting current (x full load current)	A		
5.04	Starting torque (x rated torque)	N m		
5.05	Pull-up torque (x rated torque)	N m		
5.06	Breakdown torque (x rated torque)	N m		
5.07	Starting power factor	pu		
5.08	Run up time of driven load (state pu starting current)	s		
6	DRIVEN LOAD AND COUPLING			
6.01	Load moment of inertia at motor speed	kg.m ²		
6.02	Coupling method (direct/gearbox/v-belt)			
7	BEARINGS			
7.01	Manufacturer			

	DESCRIPTION	UNIT	SPECIFIED	OFFERED
7.02	DE bearing type (ball/roller/sleeve)		Ball/roller	
7.03	DE bearing lubrication type (sealed/regreasable)			
7.04	DE bearing life (L10)	h		
7.05	DE bearing regrease interval	h		
7.06	NDE bearing type (ball/roller/sleeve)		Ball/roller	
7.07	NDE bearing lubrication type (sealed/regreasable)			
7.08	NDE bearing life (L10)	h		
7.09	NDE bearing regrease interval	h		
7.10	Bearing thermal protection (thermistor/PT100)		PT100	
7.11	Insulated bearing to reduce bearing currents	Yes / No	Yes	
7.12	Earthing of drive shaft to reduce bearing currents	Yes / No	Yes	
8	DIMENSIONS AND WEIGHT			
8.01	Motor frame number			
8.02	Motor weight	kg		
9	VARIABLE SPEED APPLICATIONS			
9.01	Maximum safe operating speed	rpm		
9.02	Peak voltage withstand level	V		
9.03	Voltage gradient withstand level	V/s		
9.04	Separately-powered cooling fan			
10	OPTIONAL ITEMS			
10.01	Anti-condensation heaters	Yes / No	Yes	
10.02	Adjusting bolts required	Yes / No	Yes	
	FACTORY TESTS	-		
11	Routine tests in addition to SANS 1804-2 requirements			
11.01	Insulation resistance check	Yes / No	Yes	
12	Type tests in addition to SANS 1804-2 requirements			
12.01	Current vs speed curve	Yes / No	Yes	
12.02	Torque vs speed curve	Yes / No	Yes	
13	DRAWINGS/CURVES TO BE PROVIDED WITH TENDER			
13.01	Motor general arrangement with dimensions	Yes / No	Yes	
13.02	Main terminal box with fault rating indicated	Yes / No	Yes	
13.03	Current vs speed curve	Yes / No	Yes	
13.04	Torque vs speed curve	Yes / No	Yes	
14	SUPPLEMENTARY DETAILS			
Regardless of any information provided in this technical data sheet, the equipment to be provided will comply with the specified requirements				
Name (Print): _____ Signature: _____				



DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS

CLIENT N°.	
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REV.

Date

By	Ckd	APP.	Aut.	Date
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191Q/2023/24

DATA SHEET No. DS-EE-0050: DIESEL POWERED GENERATOR SETS

CLIENT N°.

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T0

Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	DATA SHEET No. DS-EE-0050: DIESEL POWERED GENERATOR SETS	HG	DS	EB		Mar-24

	DESCRIPTION	UNIT	SPECIFIED	OFFERED
	This data sheet is applicable to the Diesel Generators:			
1	GENSET REQUIREMENTS			
1.01	Local Genset supplier			
1.02	Genset Manufacturer			
1.03	Typical generator power output (COP)	kVA		
1.04	Typical generator power output (PRP)	kVA		
1.05	Typical generator power output (ESP)	kVA		
1.06	Generator power output after site derating (COP)	kVA		
1.07	Generator power output after site derating (PRP)	kVA		
1.08	Generator power output after site derating (ESP)	kVA		
1.09	Alternative generator system			
1.10	Number of units required	No.		
1.11	Typical generator power output (PRP)	kVA		
1.12	Generator power output after site derating (PRP)	kVA		
2	ENGINE			
2.01	Manufacturer			
2.02	Model Number			
2.03	Type			
2.04	Rating			
2.05	Revolutions at 100 % load r/min	r/min	1500	
2.06	Starting time from no load to full load	Max/Min	1 min maximum	
2.07	Guarantee that the engine will deliver full load within the required starting period	Yes/No	Yes	
2.08	Guaranteed fuel consumption under site conditions			
2.09	Full load l/kWh	l/kWh		
2.10	3/4 load l/kWh	l/kWh		
2.11	1/2 load l/kWh	l/kWh		
2.12	Drip tray to be provided	Yes/No	Yes, or functional equivalent to drip tray	
2.13	Type of service (excluding load test)		Unlimited Prime	
3	COOLING			
3.01	Cooling medium	air/water/ other	Water	
3.02	Method of cooling, if one method preferred		Radiator	
4	EXHAUST SYSTEM			
4.01	Type of exhaust system		Industrial	
4.02	Exhaust emission tier level		Tier 2	
4.03	Material for lagging		409 Stainless Steel	
4.04	Cladding required	Yes/No	Yes	
4.05	Type of cladding		Stainless Steel	
5	ALTERNATOR			
5.01	Manufacturer			
5.02	Model number			
5.03	Proposed rated standby output power	kVA		

	DESCRIPTION	UNIT	SPECIFIED	OFFERED
5.04	Prime power	kVA		
5.05	Main air circuit breaker rating	A		
5.06	Motor starting capability @ 30% voltage dip	skVA		
5.07	Range of adjustment of nominal voltage %		± 10	
5.08	Steady state voltage regulation at 0.8 power factor and 4.5% engine speed variations	%	± 3	
5.09	Frequency	Hz	50 ± 2	
5.10	Nominal speed	r/min	1500	
5.11	Maximum rated overspeed %	%	120	
5.12	Excitation method		Brushless	
5.13	Parallel operation required	Yes/No	Yes	
5.14	Neutral earthing method		Through MV NER&NEC (NERCT)	
5.15	Anti-condensation heaters required?	Yes/No	Yes	
6	ALTERNATOR PROTECTION			
6.01	Is sustained short-circuit current rating required?	Yes/No	Yes	
6.02	If Yes, minimum value of current		≥ 3 x I _n sust.10secs	
6.03	Under/overspeed protection required?	Yes/No	Yes	
6.04	Under/over frequency protection required	Yes/No	Yes	
6.05	Over current protection required	Yes/No	Yes	
6.06	Specific earth fault protection requirements		Sensitive E/F	
7	ALTERNATOR CONSTRUCTION			
7.01	Single bearing arrangement	Yes/No	Yes	
7.02	Alternator insulation class			
7.03	Stator		H	
7.04	Rotor		H	
7.05	Exciter		H	
7.06	Maximum alternator temperature rise	°C		
8	TRANSIENT OUTPUT VARIATIONS			
8.01	Maximum permissible voltage drop	%	30	
8.02	during sudden application of a load step of	kVA	90% of nominal	
8.03	for a maximum duration of	msec	300	
8.04	Maximum frequency deviation of	%	20	
8.05	during sudden application of a load step	kVA	90% of nominal	
9	MECHANICAL BUILD			
9.01	Simplex or duplex frame			
9.02	Dimensions			
9.03	Length	mm		
9.04	Width	mm		
9.05	Height	mm		
9.06	Overall mass of set (for lifting purposes)	kg		
9.07	Layout drawing of proposed construction required	Yes/No	Yes	
10	LOUVRES			
10.01	Sound level at 7m		65dBA	
10.02	Intake louvres size according to manufacturers requirements (W x H)	mm X mm		
10.03	Outlet louvres size according to manufacturers requirements (W x H)	mm X mm		
10.04	Intake louvres sound attenuator depth required	mm		
10.05	Outlet louvres sound attenuator depth required	mm		
11	CONTROL PANEL AND ENGINE CONTROLLERS			
11.01	Automatic / Manual		Automatic	
11.02	Remote / Local		Remote	
11.03	Make of controllers		Deepsea or equivalent	
11.04	Model of engine controller		Deepsea or equivalent	
11.05	Model of synchronisation and load share controller		DSE 8660 MKII or equivalent	
11.06	Remote monitoring	Yes / No	Industrial Ethernet	
11.07	Automatic Mains Sensing incorporated	Yes / No	Yes	
11.08	Change over switch incorporated		Yes, and rotary switch in MV switchgear	

	DESCRIPTION	UNIT	SPECIFIED	OFFERED
12	FUEL SYSTEM			
12.01	Bulk fuel tank		Yes, external	
12.02	Day fuel tank	Yes/No	Yes	
12.03	Location		Bulk Fuel storage	
12.04	Capacity of tank	L	2 x min.24000	
12.05	Generating time at rated output	hr	24	
12.06	Bulk tank dimensions	mm		
12.07	Fuel lines/pipes – type		Stainless Steel 316	
12.08	Fuel tank material		Marine Grade Stainless Steel 316	
12.09	Fuel tank filter type			
12.10	Fuel pump	Hand/Electric	Electric (duty / standby)	
12.11	Method to determine bulk tank fuel level		Ultrasonic level sensor	
12.12	Fill of fuel to full level for commissioning	Yes/No	Yes	
12.13	First fill of fuel to full level after commissioning	Yes/No	Yes	
13	BATTERIES AND BATTERY CHARGER			
13.01	Starter battery type			
13.02	Manufacturer			
13.03	Voltage	V	24/26	
13.04	Capacity	Ah	6 consecutive cold starts	
14	EARTHING			
14.01	Earthing system	Type	TN-S	
14.02	Neutral earthed in	Alt/CO panel/ source	4 pole, earthed in alternator and source	
15	CORROSION PROTECTION AND FINISH			
15.01	Are tests on painted surfaces required	Yes/No	Yes, visual inspection	
15.02	Final colour of finishes (SANS 1091)			
15.03	Engine			
15.04	Alternator			
15.05	Frame			
15.06	Enclosure			
15.07	Control panel colour		Red	
16	FIRE PROTECTION			
16.01	Type of approved fire extinguishers to be fitted		5kg CO2	
16.02	Cable fire-retardant characteristics			
16.03	Fail safe fuel shut-off system type		Mechanical	
16.04	Bund for full capacity plus 10% required around bulk tank	Yes/No	Yes	
16.05	Fireman switch		Yes	
17	TESTS			
17.01	Type tests and certificates required		Yes	
17.02	Factory acceptance test prior to shipping required		Yes	
17.03	Location of factory acceptance testing			
17.04	Operational works and load test required		Yes	
17.05	Minimum duration of test hr	Min	30 Min	
17.06	Site tests required		Yes	
18	DUMMY LOADS			
18.01	Dummy loads required	Yes / No	No	
18.02	Min. loading of generator engine	% of Generator Capacity	0.3	

	DESCRIPTION	UNIT	SPECIFIED	OFFERED
19	GENERAL			
19.01	Datasheet from manufacturer included with tender	Yes/No	Yes	
20	SUPPLEMENTARY DETAILS			
Regardless of any information provided in this technical data sheet, the equipment to be provided will comply with the specified requirements				
Name (Print): _____ Signature: _____				



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DESIGN BUILD OF MECHANICAL AND
ELECTRICAL WORKS FOR THE UPGRADING
AND EXPANSION OF THE MACASSAR
WASTEWATER TREATMENT WORKS

191Q/2023/24

DATA SHEET No. DS-EE-0022: LV GROUP/CENTRALISED PFC

CLIENT N°: PAGE
ZUTARI N°: REV.
T0

Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	DATA SHEET No. DS-EE-0022: LV GROUP/CENTRALISED PFC	HG	DS	EB		Mar-24

	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1	FORM OF COMPENSATION			
1.01	Manufacturer			
1.02	Model			
1.03	Group or centralized		Group	
1.04	Fixed or Automatically Controlled		Auto controlled	
1.05	Number of banks	No.		
1.06	Number of steps	No.		
2	CAPACITOR BANKS			
2.01	Rating of banks (unadjusted for voltage and series reactor)	kVAr		
2.02	Manufacturer			
2.03	Place of manufacture			
2.04	Range of units (name)			
2.05	Internally fused		Yes	
2.06	Internal discharge device		Yes	
2.07	Capacitor unit rated continuous voltage	%	120	
2.08	Capacitor unit rated continuous current	%	150	
2.09	Capacitor unit losses			
2.10	Dielectric	W/kVAr		
2.11	Total	W/kVAr		
3	REACTORS			
3.01	Damping (inrush) reactors required			
3.02	Type of reactor (iron- or air-core)			
3.03	Detuning (blocking) reactors required	Yes/No		
3.04	Type of reactor (iron- or air-core)			
3.05	Reactor tuning frequency	%		
3.06	Manufacturer of iron-core reactors			
3.07	Place of manufacture			
3.08	Manufacturer of air-core reactors			
3.09	Place of manufacture			
3.10	Thermal class of dry type reactors	F		
4	SWITCHGEAR AND CONTROLGEAR			
4.01	ACBs			
4.02	Manufacturer			
4.03	Model			
5	MCCBs			
5.01	Manufacturer			
5.02	Model			
6	HRC fuses			
6.01	Manufacturer			
6.02	Model			



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MACASSAR WASTEWATER TREATMENT
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191Q/2023/24

CLIENT N°:

PAGE

ZUTARI N°:

REV.
TO

DATA SHEET No. DS-EE-0024: LOW VOLTAGE SOFT STARTERS

Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	DATA SHEET No. DS-EE-0024: LOW VOLTAGE SOFT STARTERS	HG	DS	EB		Mar-24
	DESCRIPTION	UNIT	SPECIFIED	OFFERED			
1	MAKES AND MODELS						
1.01	Rated power up to 15 kW						
1.02	Rated power over 15 kW up to 30 kW						
1.03	Rated power over 30 kW up to 55 kW						
1.04	Rated power over 55 kW						
2	CHARACTERISTICS OF SOFT STARTERS						
2.01	Type of Equipment						
3	Two phase control allowed up to 15 kW		Yes				
3.01	Controlled phases fully controlled						
3.02	In-delta connection allowed		No				
4	Ratings						
4.01	Rated operational voltage	V	420				
4.02	Rated insulation voltage	V					
4.03	Rated impulse withstand voltage	kV					
4.04	Rated frequency	Hz	50				
4.05	Utilization category		AC-53a				
5	Protection Functions						
5.01	Overtemperature/thermal protection	Yes/No	Yes				
5.02	Electronic motor overload	Yes/No	Yes				
5.03	Phase loss	Yes/No	Yes				
5.04	Phase unbalance	Yes/No	Yes				
5.05	Phase sequence	Yes/No	Yes				
5.06	Overcurrent/short-circuit	Yes/No	Motors >55 kW				
5.07	Earth fault	Yes/No	Motors >55 kW				
5.08	Starts per hour	Yes/No	Motors >55 kW				
5.09	Stall (locked rotor under starting conditions)	Yes/No	Motors >55 kW				
5.10	Thermistor/RTD input	Yes/No	Motors >55 kW				
5.11	Underload (undercurrent)	Yes/No	Yes				
5.12	Over- and undervoltage	Yes/No	Yes				
5.13	Jam (locked rotor under running conditions)	Yes/No	Yes				
5.14	Type 2 co-ordination with upstream SCPD	Yes/No	Yes				
6	Control Settings						
6.01	Initial start voltage		Yes				
6.02	Start ramp time		Yes				
6.03	Motor full load current		Yes				
6.04	Current limit		Yes				
6.05	Kickstart (voltage/current boost)		Yes				
6.06	Torque control		Yes				
	LINE-, BYPASS AND PFC CONTACTORS	-					

[illegible]

Regardless of any information provided in this technical data sheet, the equipment to be provided will comply with the specified requirements

Name (Print): _____ Signature: _____

 CITY OF CAPE TOWN ISIXEKO SASEKAPA STAD KAAPSTAD Making progress possible. Together.				DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS																															
TITLE ELECTRONIC SUMMARY SHEET				CLIENT N°.	PAGE																														
				ZUTARI N°.	REV. T0																														
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CONTROL AND INSTRUMENTATION TECHNICAL DATASHEETS

	DATASHEET DESCRIPTION	NUMBERING
TD01	Control, Instrumentation, Data Cables and Junction Boxes	DS-II-0001
TD02	Programmable Logic Controllers, Programmable Logic	DS-II-0002
TD03	Supervisory Control and Data Acquisition System	DS-II-0003
TD04	Instrumentation	DS-II-0004
TD05	Virtual Reality and Augmented Reality	DS-II-0005
TD06	Substation Automation and Protection	DS-II-0006



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MACASSAR WASTEWATER
TREATMENT WORKS

191Q/2023/24

**DATA SHEET No. DS-II-0001: CONTROL, INSTRUMENTATION, DATA CABLES
AND JUNCTION BOXES**

CLIENT N°.	PAGE
ZUTARI N°.	REV. T0
By AN	Ckd CdJ
APP. EB	Aut.
Date Mar-24	

Instructions on Filling Out This Form

I - Potential Suppliers should fill out the Offered Column

II - The explanatory notes at the end of the Data Sheet are to be filled out by the Issuer and not by Suppliers.

Supplier:		Quantity:	
DESCRIPTION	UNIT	SPECIFIED	OFFERED
1 CONTROL CABLES			
1.01 Manufacturer			
1.02 Rated Insulation Voltage	V	Refer to Detailed Electronic Specification	
1.03 Operating Voltage	V		
1.04 Number of Cores	No		
1.05 Size	mm ²		
1.06 Conductor Type	Cu/Al		
1.07 Cable Type			
1.08 Full Load Current	A		
1.09 Armouring	Yes/No		
2 INSTRUMENTATION CABLES			
2.01 Manufacturer			
2.02 Rated Insulation Voltage	V	Refer to Detailed Electronic Specification	
2.03 Operating Voltage	V		
2.04 Size	mm ²		
2.05 Cable Type			
2.06 Screened	Unscreened / Overall screened / Individual and overall Screened		
2.07 Armouring	Yes/No		
3 INSTRUMENTATION CABLES (EX)			
3.01 Manufacturer			
3.02 Rated Insulation Voltage	V	Refer to Detailed Electronic Specification	
3.03 Operating Voltage	V		
3.04 Size	mm ²		
3.05 Cable Type			
3.06 Screened	Unscreened / Overall screened / Individual and overall Screened		
3.07 Armouring	Yes/No		
3.08 EX Rated	Yes / No	Yes	
3.09 EX Rating		As per section 14.10 of the Electronics Spec	

	DESCRIPTION	UNIT	SPECIFIED	OFFERED
4	MULTIMODE FIBRE OPTIC			
4.01	Manufacturer			
4.02	Type		Multimode	
4.03	Armouring	Yes/No	Yes, for outdoor exposed cables	
4.04	Armouring Type		Steel Tape Armoured	
4.05	Termination preference type		LC	
4.06	Cores	No	min 12	
4.07	Cable Category		min OM 2	
4.08	Modal Bandwidth	MHz.km	min 500 / 500	
5	SINGLE FIBRE OPTIC			
5.01	Manufacturer			
5.02	Type		Single Mode	
5.03	Armouring	Yes/No	Yes	
5.04	Armouring Type		Steel Tape Armoured	
5.05	Termination preference type		LC	
5.06	Cores	No	min 12	
5.07	Cable Category		OS 2	
5.08	Modal Bandwidth	MHz.km	min 500 / 500	
6	DATA CABLES: ETHERNET			
6.01	Manufacturer			
6.02	Type		CAT6 STP	
6.03	Armouring	Yes/No	No, APL for outdoor exposed cables	
6.04	Termination Type		RJ 45 Shielded with moulded boot or M12 Shielded Stainless Steel	
7	DATA CABLES: PROFINET			
7.01	Manufacturer			
7.02	Type		CAT6 STP	
7.03	Armouring	Yes/No	No, APL for outdoor exposed cables	
7.04	Termination Type		RJ 45 Shielded with moulded boot or M12 Shielded Stainless Steel	
8	INSTRUMENTATION TERMINATION JUNCTION BOXES			
8.01	Manufacturer		Pratley or equivalent	
8.02	Type		Enviro or equivalent	
8.03	Enclosure Material		Poly Carbonate	
8.04	Enclosure Colour		Black	
8.05	Enclosure Rating	IP	66/68	
8.06	Enclosure Mounting	Floor Standing / wall mounted	Wall or pedestal mounted on purpose made stands or brackets	
9	SOLENOID VALVE JUNCTION BOXES			
9.01	Manufacturer			
9.02	Enclosure Material		Stainless Steel 3CR12	
9.03	Enclosure Colour		Orange	
9.04	Enclosure Rating	IP	65	
9.05	Enclosure Mounting	Floor Standing / wall mounted	Pedestal or Wall Mounted	
9.06	Epoxy Powder Coated	Yes / No	Yes	
9.07	Valve Block Size	4/8/10 way		
9.08	Air Tubing type	Indoor/Outdoor	Indoor and Outdoor Where Required	
9.09	Air Tubing size	6/8/10 mm	8 mm	
9.10	Air Tubing fitting	Fixed/Connector	Connector	

	DESCRIPTION	UNIT	SPECIFIED	OFFERED
10	SUPPLEMENTARY DETAILS			

Regardless of any information provided in this technical data sheet, the equipment to be provided will comply with the specified requirements.

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191Q/2023/24

DATA SHEET No. DS-II-0002: PROGRAMMABLE LOGIC CONTROLLERS

CLIENT N°.	PAGE
ZUTARI N°.	REV. T0

Rev.	TI	Description	By	Ckd	APP.	Aut.	Date
T0	D	DATA SHEET No. DS-II-0002: PROGRAMMABLE LOGIC CONTROLLERS	AN	CdJ	EB		Mar-24

Instructions on Filling Out This Form

I - Potential Suppliers should fill out the Offered Column

II - The explanatory notes at the end of the Data Sheet are to be filled out by the Issuer and not by Suppliers.

Supplier: Quantity:

	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1	PROGRAMMABLE LOGIC CONTROLLERS			
1.01	Manufacturer		Modicon, Siemens, Allen Bradley, or equivalent as per CoCT Standard Specification	
1.02	Model		Modicon M340, Modicon M580, Siemens S7-1500, Allen Bradley ControlLogix or equivalent as per CoCT Standard Specification	
1.03	CPU	Model No.	As per selected manufacturer and model	
1.04	CPU configuration	Hot standby / standalone	As per the Detailed Electronic Specification for each process area	
1.05	Digital Inputs	Model No.		
1.06	Digital Outputs	Model No.		
1.07	Analogue Inputs	Model No.		
1.08	Analogue Outputs	Model No.		
1.09	Spare I/O	%	30	
1.10	Ethernet ports	No.		
1.11	Serial ports	No.	If required by vendor packages	
1.12	Other ports	No.		
1.13	Programming software			
1.14	All engineering software included with PLC	Yes / No	Yes	
1.15	Conformally coated	Yes / No	Yes	
1.16	Datasheet included with tender	Yes / No	Yes	
2	REMOTE IO (If required)			
2.01	Manufacturer		As per selected PLC OEM	
2.02	Model		As per selected PLC OEM	
2.03	Ethernet ports	No.	min 4	
2.04	Digital Inputs	Model No.		
2.05	Digital Outputs	Model No.		
2.06	Analogue Inputs	Model No.		
2.07	Analogue Outputs	Model No.		
2.08	Conformally coated	Yes / No	Yes	
2.09	Datasheet included with tender	Yes / No	Yes	
3	PLC PANEL			
3.01	Terminal Block Manufacturer			
3.02	Terminal Block Range			
3.03	Gland Plates		Not painted	
3.04	Gland Range			
3.05	Power Supply Unit Manufacturer			

	DESCRIPTION	UNIT	SPECIFIED	OFFERED
3.06	Power Supply Unit Model			
3.07	Miniature Circuit Breaker Manufacturer			
3.08	Miniature Circuit Breaker Model			
3.09	Trunking Type		Slotted PVC	
3.10	Panel Light Required	Yes / No	Yes	
3.11	Socket Outlet Required	Yes / No	Yes	
3.12	Physical Spare Space Required	%	30	
4	HUMAN MACHINE INTERFACE (HMI)			
4.01	Manufacturer		Similar to PLC manufacturer	
4.02	Model			
4.03	Type		Industrial PC	
4.04	Screen Size	Inches	15"	
4.05	Screen Type			
4.06	Resolution	Pixels		
4.07	Touch Screen	Yes / No	Yes	
4.08	Type of Touch Screen	Capacitive/ Resistive		
4.09	Enclosure Rating	IP	67	
4.10	Position of Installation	Inside Panel / Flush Fronted / Front Access	Flush Fronted	
4.11	Software			
4.12	Datasheets included with tender	Yes / No	Yes	
5	UPS			
5.01	Manufacturer			
5.02	Model			
5.03	Place of manufacture			
5.04	Communication		Ethernet	
5.05	Battery Life	Years	min 10	
5.06	Battery Type		LiFePO4	
5.07	Battery Charger			
5.08	Datasheets included with tender	Yes / No	Yes	
6	MANAGED ETHERNET SWITCH			
6.01	Manufacturer			
6.02	Model			
6.03	Ethernet Ports	No.	min 4	
6.04	Fibre ports (SFP)	No.	min 4	
6.05	Fibre termination type		LC	
6.06	Datasheet included with tender	Yes / No	Yes	
7	UNMANAGED SWITCHES			
7.01	Manufacturer			
7.02	Type			
7.03	Model			
8	SOLENOID VALVE TERMINAL			
8.01	Manufacturer		Festo or equivalent	
8.02	Type			
8.03	Model			
8.04	Communication Protocol		Industrial Ethernet	

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DATA SHEET No. DS-II-0003: SUPERVISORY CONTROL AND DATA ACQUISITION SYSTEM

CLIENT N°.				PAGE
ZUTARI N°.				REV. T0
By	Ckd	APP.	Aut.	Date
AN	CdJ	EB		Mar-24

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Supplier:		Quantity:		
	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1	OPERATOR AND ENGINEERING COMPUTER			
1.01	Manufacturer			
1.02	Model			
1.03	CPU Type		Intel i9 or equivalent	
1.04	CPU Speed	GHz	min 4	
1.05	CPU Memory	MB	min 32000	
1.06	Hard Drive Storage	GB	min 3.2TB	
1.07	Operating System		Latest Microsoft Windows or equivalent	
1.08	Optical Storage		DVD-RW	
1.09	Network Card		Ethernet 10/100/1000	
1.10	Graphics Card Make		Nvidia or equivalent	
1.11	Graphics Card Model			
1.12	DirectX 11 Capable	Yes / No	Yes	
1.13	Shader Model 5	Yes / No	Yes	
1.14	Video memory	GB	8	
1.15	Graphics Card Ports		min 2	
1.16	Keyboard		Yes	
1.17	Mouse		Yes	
2	INDUSTRIAL OPERATOR TABLETS			
2.01	Manufacturer			
2.02	Model			
2.03	Type		Industrial Tablet	
2.04	Comply with Military Standard 810G Drop Test	Yes / No	Yes	
2.05	Screen Size	inch	min 10	
2.06	Ingress Protection		min 65	
2.07	CPU Type		Intel Atom, Qualcomm Snapdragon or equivalent	
2.08	CPU Speed	GHz	min 1.1	
2.09	Memory	GB	min 4	
2.10	Hard Drive Storage	GB	min 64GB	
2.11	Operating System		Windows, Android or equivalent	
2.12	Sim card	Yes / No	Yes	
2.13	WIFI	Yes / No	Yes	

	DESCRIPTION	UNIT	SPECIFIED	OFFERED
3	APPLICATION SERVER			
3.01	Manufacturer		Stratus or equivalent	
3.02	Model		FT Server 4920 or equivalent	
3.03	Fault Tolerant		Yes	
3.04	High Availability (Up Time)	%	min 99.99	
3.05	CPU Type		Intel Xeon or equivalent	
3.06	CPU Cores	No.	min 10 per CPU	
3.07	CPU Speed	GHz	min 2.4	
3.08	Memory (RAM)	GB	min 2 x 128	
3.09	Internal system hard drives	No.	2	
3.10	Internal system hard drive type		SAS HDD	
3.11	Internal system hard drive size	TB	1.2	
3.12	Internal system hard drive speed	RPM	10k	
3.13	Internal system hard drive data transfer rate	GB/s	min 12	
3.14	Expansion hard drives	No.	2	
3.15	Expansion hard drive type		SAS SSD	
3.16	Expansion hard drive size	GB	min 3.2	
3.17	Expansion hard drive speed	RPM	15K	
3.18	Expansion hard drive data transfer rate	GB/s	min 12	
3.19	Operating System		Latest Microsoft Windows, Linux Server or equivalent	
3.20	Networking		Ethernet 10Gb	
3.21	Graphics Card	Model No.		
3.22	Mounting Type		Rack mountable	
3.23	Service level agreement (SLA) up to end of Defects Liability	Yes / No	Yes	
3.24	Antivirus software required	Yes / No	Yes	
3.25	Intrusion detection software required	Yes / No	Yes	
3.26	Virtualisation Required	Yes / No	Yes	
4	DATA SERVER			
4.01	Manufacturer		Dell or equivalent	
4.02	CPU Type		Intel Xeon or equivalent	
4.03	CPU Cores	No.	min 8	
4.04	CPU Speed	GHz	min 3.2	
4.05	Memory	MB	min 32000	
4.06	Hard drives		Raid hot swappable	
4.07	Hard Drive Storage	TB	min 4	
4.08	Hard Drive Speed	RPM	min 10000	
4.09	Data transfer rate	GB/s	min 12 SAS	
4.10	Motherboard		Industrial motherboard, conformal coating	
4.11	Power supplies		Dual redundant	
4.12	Operating System		Latest Windows Server or equivalent	
4.13	Optical Storage		DVD-RW	
4.14	Network Card		Ethernet 10/100/1000	
4.15	Graphics Card		min 256MB, Dual output to drive 1 x 23"	
4.16	Keyboard		Yes - shared KVM	
4.17	Mouse		Yes - shared KVM	
4.18	Mounting Type		Rack mountable	
4.19	Service level agreement (SLA) up to end of Defects Liability	Yes / No	Yes	
4.20	Antivirus software required	Yes / No	Yes	
4.21	Virtualisation Required	Yes / No	Yes	
5	TIME SYNCHRONISATION			
5.01	GPS Clock synchronisation	Yes / No	Yes	

	DESCRIPTION	UNIT	SPECIFIED	OFFERED
6	VIDEO WALL DISPLAY SCREENS			
6.01	Video Wall Designer/Installer			
6.02	Video wall controller Manufacturer		VuWall or equivalent	
6.03	Video wall controller Model			
6.04	Number of panels		10 x 4k	
6.05	Number of Streams		min 25	
6.06	Display Make			
6.07	Display Model			
6.08	Type		4K LED	
6.09	Size	inch	min 50	
6.10	Resolution		min 4k	
6.11	Graphics ports	No.	10	
6.12	Rating	Hours per day	24	
6.13	Touch panel for Video Wall control	Yes / No	Yes	
6.14	Management software included	Yes / No	Yes	
7	OPERATOR DISPLAY SCREENS			
7.01	Manufacturer			
7.02	Model			
7.03	Type		4K LED , curved	
7.04	Size	inch	27	
7.05	Resolution		>=4k	
7.06	Graphics ports		HDMI	
8	PRINTER			
8.01	Manufacturer			
8.02	Model			
8.03	Type		Colour Laser	
8.04	Feeding Paper Size		A4	
9	UPS			
9.01	Manufacturer			
9.02	Model			
9.03	Place of manufacture			
9.04	Type		Industrial online double conversion with full static bypass	
9.05	Power	W	Load + 30%	
9.06	Backup Time	min	30	
9.07	Output Voltage	V	230V +5%	
9.08	Nominal Frequency	Hz	50	
9.09	Output Waveform		Pure sine wave	
9.10	Number of Phases	1 or 3	1	
9.11	Communication		Ethernet	
9.12	Battery Life	Years	min 10	
9.13	Battery Type		LiFePO4	
9.14	Battery Charger			
9.15	Rack mounted	Yes / No	Yes	
9.16	Datasheets included with tender	Yes / No	Yes	

	DESCRIPTION	UNIT	SPECIFIED	OFFERED
10	SUPERVISORY LAYER ETHERNET SWITCH			
10.01	Manufacturer			
10.02	Type		Level 3 Managed	
10.03	Model			
10.04	Ports	No.		
10.05	Fibre ports (SFP/GBICs)	No.		
10.06	Rack mounted	Yes/No	Yes	
10.07	Power Supply	VAC	230V	
10.08	Speed	Gbit	10	
10.09	PoE		PoE enabled	
10.10	Datasheet included with tender	Yes / No	Yes	
11	CONTROL LAYER ETHERNET SWITCH			
11.01	Manufacturer			
11.02	Type		Level 2 Managed	
11.03	Model			
11.04	Ports	No.		
11.05	Fibre ports (SFP/GBICs)	No.	4	
11.06	Rack mounted	Yes/No	Yes	
11.07	Power Supply	VAC	230V	
11.08	Speed	Mbit	1000	
11.09	PoE		PoE enabled	
11.10	Datasheet included with tender	Yes / No	Yes	
12	CONTROL ROOM FURNITURE			
12.01	Manufacturer		Time Base Consoles or equivalent	
12.02	Model		ControlTrac or equivalent	
12.03	Adjustable Height	Yes / No	Yes	
13	SERVER RACK CABINET			
13.01	Manufacturer			
13.02	Model			
13.03	Size	U		
13.04	Dimensions	(W x L) in mm		
13.05	Lockable	Yes/No	Yes	
13.06	Mounting type		Floor standing	
13.07	Power Distribution	Dedicated Multiplug / Hardwired	Dedicated Multiplug	
13.08	Spare Capacity	%	20.00	
13.09	Sketch/Drawing layout included with tender	Yes / No	Yes	
14	SCADA SERVER ADMIN COMPUTER			
14.01	Manufacturer			
14.02	Model			
14.03	Rack Mounted	Yes/No	Yes	
14.04	Withdrawable	Yes/No	Yes	
14.05	Touch Screen	Yes/No	Yes	
14.06	Rack mounted KVM switch for mouse and keyboard	Yes/No	Yes	

	DESCRIPTION	UNIT	SPECIFIED	OFFERED
15	VPN Router			
15.01	Manufacturer		Ewon or equivalent	
15.02	Model		Flexy or equivalent	
15.03	LAN Ports	No.	3	
15.04	WAN Ports	No.	1	
15.05	Licence Keys	No.	>10	
15.06	Support concurrent VPN connections	Yes/No	Yes >5	
15.07	Support all Internet connections (operator independent)	Yes/No	Yes	
15.08	Support dynamic, static and private IP addresses	Yes/No	Yes	
15.09	Built-In Firewall	Yes/No	Yes, NAT	
15.10	Power Supply Adapter Input	VAC	230V	
15.11	VPN throughput Speed	Mb/s	Up to 15Mb/s	
15.12	PoE		PoE enabled	
15.13	Built-in simcard slot and modem	Yes/No	Yes	
15.14	Data plan required	Yes/No	Yes	
15.15	Data plan duration		Up to end of defects liability period	
15.16	Public/ Fixed IP required	Yes/No	Yes	
16	EXTERNAL ANTENNA FOR REMOTE ACCESS DEVICE			
16.01	Manufacturer		Poynting or equivalent	
16.02	Model		Omni 280 or equivalent	
16.03	Cable Length	m	min 2	
17	SCADA SOFTWARE			
17.01	SCADA software		Inductive Automation Ignition or equivalent	
17.02	Number of Tags	No.	Unlimited	
17.03	Clients	No.	Unlimited	
17.04	Additional Modules			
17.05	Reporting	Yes / No	Yes	
17.06	Alarming Notification	Yes / No	Yes	
17.07	SMS notification	Yes / No	Yes	
17.08	Enterprise Administration	Yes / No	Yes	
17.09	Web Development Module	Yes / No	Yes	
17.10	MQTT Modules	Yes / No	Yes	
18	HISTORIAN			
18.01	Historian Software		Canary Labs or equivalent	
18.02	Number of Tags	No.	min 30 000	
19	MQTT BROKER			
19.01	MQTT Broker software			
19.02	Clustered	Yes / No	Yes	
19.03	Sparkplug B enabled	Yes / No	Yes	
19.04	Licensing	Open source / Enterprise	Enterprise	
20	DATA MODELLING AND BUSINESS INTELLIGENCE ANALYTICS SOFTWARE			
20.01	Data Modelling and Business Intelligence Analytics Software			
20.02	Number of Tags or license			
21	SUPPLEMENTARY DETAILS			

	DESCRIPTION	UNIT	SPECIFIED	OFFERED
Regardless of any information provided in this technical data sheet, the equipment to be provided will comply with the specified requirements				
Name (Print): _____ Signature: _____.				



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ZUTARI

DESIGN BUILD OF MECHANICAL AND
ELECTRICAL WORKS FOR THE
UPGRADING AND EXPANSION OF THE
MACASSAR WASTEWATER
TREATMENT WORKS

191Q/2023/24

DATA SHEET No. DS-II-0004: INSTRUMENTATION

CLIENT N°.	PAGE
ZUTARI N°.	REV. T0
By AN	Ckd CdJ
APP. EB	Aut.
Date Mar-24	

Instructions on Filling Out This Form

I - Potential Suppliers should fill out the Offered Column

II - The explanatory notes at the end of the Data Sheet are to be filled out by the Issuer and not by Suppliers.

Supplier:		Quantity:		
	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1	IO-LINK MASTER			
1.01	Manufacturer			
1.02	Sensor Model			
1.03	Transmitter Model			
1.04	Number of Class A ports	No.	min 8	
1.05	Communication Protocol		IO-Link	
1.06	Surge Protection Required	Yes / No	Yes	
1.07	Local Indication Required	Yes / No	Yes	
1.08	Protection Rating	IP	IP69K	
1.09	Additional datasheet from manufacturer included with tender	Yes / No	Yes	
2	ULTRASONIC LEVEL METER			
2.01	Manufacturer			
2.02	Sensor Model			
2.03	Transmitter Model			
2.04	Number of Relay outputs	No.	min 2	
2.05	Detection Range	m	Various	
2.06	Communication Protocol		IO-Link or 4-20 mA	
2.07	Surge Protection Required	Yes / No	Yes	
2.08	Local Indication Required	Yes / No	Yes	
2.09	IP Rating	IP	IP66	
2.10	Minimum accuracy	mm	3	
2.11	Additional datasheet from manufacturer included with tender	Yes / No	Yes	
2	ULTRASONIC OPEN CHANNEL FLOW METER			
2.01	Manufacturer			
2.12	Sensor Model			
2.13	Transmitter Model			
2.14	Number of Relay outputs	No.	min 4	
2.15	Detection Range	m	Various	
2.16	Communication Protocol		Industrial Ethernet	
2.17	Additional Communication Protocol		4-20 mA	
2.18	Surge Protection Required	Yes / No	Yes	
2.19	Local Indication Required	Yes / No	Yes	
2.20	IP Rating	IP	IP66	
2.21	Minimum accuracy	%	0.5	
2.22	Additional datasheet from manufacturer included with tender	Yes / No	Yes	

	DESCRIPTION	UNIT	SPECIFIED	OFFERED
3	SLUDGE BLANKET LEVEL METER			
3.01	Manufacturer			
3.02	Sensor Model			
3.03	Transmitter Model			
3.04	Detection Range	m	Various	
3.05	Communication Protocol		Ethernet	
3.06	Surge Protection Required	Yes / No	Yes	
3.07	Local Indication Required	Yes / No	Yes	
3.08	IP Rating	IP	IP65	
3.09	Minimum accuracy	%	2	
3.10	Additional datasheet from manufacturer included with tender	Yes / No	Yes	
4	ELECTROMAGNETIC FLOW METERS			
4.01	Manufacturer			
4.02	Model			
4.03	Flange Size	mm / DN	Same as Pipe Diameter	
4.04	Flow range	m ³ /hr	Various	
4.05	PN Rating		Same as Pipe pressure rating	
4.06	Number of Relay outputs	No.	min 2	
4.07	Communication Protocol		Industrial Ethernet	
4.08	Additional Protocol		4-20 mA	
4.09	Surge Protection Required	Yes / No	Yes	
4.10	Local Indication Required	Yes / No	Yes	
4.11	IP Rating	IP	IP65	
4.12	Minimum accuracy	%	0.5	
4.13	Additional datasheet from manufacturer included with tender	Yes / No	Yes	
5	ELECTROMAGNETIC FLOW METERS (EX)			
5.01	Manufacturer			
5.02	Model			
5.03	Flange Size	mm / DN	Same as Pipe Diameter	
5.04	Flow range	m ³ /hr	Various	
5.05	PN Rating		Same as Pipe pressure rating	
5.06	Number of Relay outputs	No.	min 2	
5.07	Communication Protocol		Industrial Ethernet	
5.08	Additional Protocol		4-20 mA	
5.09	Surge Protection Required	Yes / No	Yes	
5.10	Local Indication Required	Yes / No	Yes	
5.11	IP Rating	IP	IP65	
5.12	Minimum accuracy	%	0.5	
5.13	EX Rated	Yes / No	Yes	
5.14	EX Rating		As per section 14.10 of the Electronics Spec	
5.15	Additional datasheet from manufacturer included with tender	Yes / No	Yes	

	DESCRIPTION	UNIT	SPECIFIED	OFFERED
6	DISSOLVED OXYGEN PROBES			
6.01	Manufacturer			
6.02	Sensor Model			
6.03	Transmitter Model			
6.04	Number of Relay outputs	No.	min 2	
6.05	Detection Range	mg/l	Various	
6.06	Communication Protocol		Industrial Ethernet	
6.07	Surge Protection Required	Yes / No	Yes	
6.08	Local Indication Required	Yes / No	Yes	
6.09	IP Rating	IP	IP65	
6.10	Minimum accuracy	%	1	
6.11	Additional datasheet from manufacturer included with tender	Yes / No	Yes	
7	CHLORINE ANALYSER			
7.01	Manufacturer			
7.02	Sensor Model			
7.03	Transmitter Model			
7.04	Number of Relay outputs	No.	min 2	
7.05	Detection Range	mg/l	Various	
7.06	Communication Protocol		Industrial Ethernet	
7.07	Surge Protection Required	Yes / No	Yes	
7.08	Local Indication Required	Yes / No	Yes	
7.09	IP Rating	IP	IP65	
7.10	Minimum accuracy	mg/l	0.01	
7.11	Additional datasheet from manufacturer included with tender	Yes / No	Yes	
8	PRESSURE TRANSMITTERS			
8.01	Manufacturer			
8.02	Sensor Model			
8.03	Transmitter Model			
8.04	Detection Range	kPa	Various	
8.05	Number of Relay outputs	No.	min 2	
8.06	Communication Protocol		IO-Link or 4-20 mA	
8.07	Surge Protection Required	Yes / No	Yes	
8.08	Local Indication Required	Yes / No	Yes	
8.09	IP Rating	IP	IP65	
8.10	Minimum accuracy	%	0.5	
8.11	Additional datasheet from manufacturer included with tender	Yes / No	Yes	
9	PRESSURE TRANSMITTERS (EX)			
9.01	Manufacturer			
9.02	Sensor Model			
9.03	Transmitter Model			
9.04	Detection Range	kPa	Various	
9.05	Number of Relay outputs	No.	min 2	
9.06	Communication Protocol		4-20 mA	
9.07	Surge Protection Required	Yes / No	Yes	
9.08	Local Indication Required	Yes / No	Yes	
9.09	IP Rating	IP	IP65	
9.10	Minimum accuracy	%	0.5	
9.11	EX Rated	Yes / No	Yes	
9.12	EX Rating		As per section 14.10 of the Electronics Spec	
9.13	Additional datasheet from manufacturer included with tender	Yes / No	Yes	

	DESCRIPTION	UNIT	SPECIFIED	OFFERED
10	WEIGHT TRANSMITTERS			
10.01	Manufacturer			
10.02	Sensor Model			
10.03	Transmitter Model			
10.04	Detection Range	<i>Kg</i>	Various	
10.05	Number of Relay outputs	<i>No.</i>	min 2	
10.06	Communication Protocol		4-20 mA	
10.07	Surge Protection Required	<i>Yes / No</i>	Yes	
10.08	Local Indication Required	<i>Yes / No</i>	Yes	
10.09	IP Rating	<i>IP</i>	IP65	
10.10	Minimum accuracy	<i>%</i>	0.05	
10.11	Additional datasheet from manufacturer included with tender	<i>Yes / No</i>	Yes	
11	WEIGHT TRANSMITTERS (EX)			
11.01	Manufacturer			
11.02	Sensor Model			
11.03	Transmitter Model			
11.04	Detection Range	<i>Kg</i>	Various	
11.05	Number of Relay outputs	<i>No.</i>	min 2	
11.06	Communication Protocol		4-20 mA	
11.07	Surge Protection Required	<i>Yes / No</i>	Yes	
11.08	Local Indication Required	<i>Yes / No</i>	Yes	
11.09	IP Rating	<i>IP</i>	IP65	
11.10	Minimum accuracy	<i>%</i>	0.05	
11.11	EX Rated	<i>Yes / No</i>	Yes	
11.12	EX Rating		As per section 14.10 of the Electronics Spec	
11.13	Additional datasheet from manufacturer included with tender	<i>Yes / No</i>	Yes	
12	TURBIDITY METER			
12.01	Manufacturer			
12.02	Sensor Model			
12.03	Transmitter Model			
12.04	Detection Range	<i>NTU</i>	Various	
12.05	Number of Relay outputs	<i>No.</i>	min 2	
12.06	Communication Protocol		Industrial Ethernet	
12.07	Surge Protection Required	<i>Yes / No</i>	Yes	
12.08	Local Indication Required	<i>Yes / No</i>	Yes	
12.09	IP Rating	<i>IP</i>	IP65	
12.10	Minimum accuracy	<i>%</i>	2	
12.11	Additional datasheet from manufacturer included with tender	<i>Yes / No</i>	Yes	
13	TEMPERATURE TRANSMITTER			
13.01	Manufacturer			
13.02	Sensor Model			
13.03	Transmitter Model			
13.04	Detection Range	<i>Degrees °C</i>	Various	
13.05	Number of Relay outputs	<i>No.</i>	min 2	
13.06	Process Connection		As indicated on the P&ID	
13.07	Communication Protocol		IO-Link or 4-20 mA	
13.08	Surge Protection Required	<i>Yes / No</i>	Yes	
13.09	Local Indication Required	<i>Yes / No</i>	Yes	
13.10	IP Rating	<i>IP</i>	IP65	
13.11	Minimum accuracy	<i>%</i>	0.3	
13.12	Additional datasheet from manufacturer included with tender	<i>Yes / No</i>	Yes	

	DESCRIPTION	UNIT	SPECIFIED	OFFERED
14	TEMPERATURE TRANSMITTER (EX)			
14.01	Manufacturer			
14.02	Sensor Model			
14.03	Transmitter Model			
14.04	Detection Range	Degrees °C	Various	
14.05	Number of Relay outputs	No.	min 2	
14.06	Process Connection		As indicated on the P&ID	
14.07	Communication Protocol		4-20 mA	
14.08	Surge Protection Required	Yes / No	Yes	
14.09	Local Indication Required	Yes / No	Yes	
14.10	IP Rating	IP	IP65	
14.11	Minimum accuracy	%	0.3	
14.12	EX Rated	Yes / No	Yes	
14.13	EX Rating		As per section 14.10 of the Electronics Spec	
14.14	Additional datasheet from manufacturer included with tender	Yes / No	Yes	
15	TEMPERATURE INSTRUMENT (WINDINGS AND BEARINGS)			
15.01	Manufacturer			
15.02	Sensor Model			
15.03	Sensor Type		RTD/PT100	
15.04	Transmitter Model			
15.05	Detection Range	Degrees °C	Various	
15.06	Process Connection		As per equipment requirement	
15.07	Communication Protocol		4-20 mA	
15.08	Surge Protection Required	Yes / No	Yes	
15.09	Local Indication Required	Yes / No	Yes	
15.10	IP Rating	IP	IP65	
15.11	Minimum accuracy	%	0.3	
15.12	Additional datasheet from manufacturer included with tender	Yes / No	Yes	
16	RTD/PT100 TO IO-LINK CONVERTER (IF REQUIRED)			
16.01	Manufacturer			
16.02	Sensor Model			
16.03	Transmitter Model			
16.04	Number of Relay outputs			
16.05	Electrical Connection		M12	
16.06	Communication Protocol		RTD/PT100 to IO-Link	
16.07	Surge Protection	Yes/No		
16.08	Local Indication Required	Yes/No		
16.09	IP Rating	IP	IP67	
16.10	Electrical Connection Material Specification	Type	Stainless Steel 316L	
16.11	Additional datasheet from manufacturer included with tender	Yes / No	Yes	
17	pH TRANSMITTER			
17.01	Manufacturer			
17.02	Sensor Model			
17.03	Transmitter Model			
17.04	Detection Range		Various	
17.05	Number of Relay outputs	No.	min 2	
17.06	Communication Protocol		Industrial Ethernet	
17.07	Surge Protection Required	Yes / No	Yes	
17.08	Local Indication Required	Yes / No	Yes	
17.09	IP Rating	IP	IP65	
17.10	Minimum accuracy	%	0.05	
17.11	Additional datasheet from manufacturer included with tender	Yes / No	Yes	

	DESCRIPTION	UNIT	SPECIFIED	OFFERED
18	VIBRATION SENSORS			
18.01	Manufacturer			
18.02	Sensor Model			
18.03	Transmitter Model			
18.04	Type		Piezoelectric Accelerometer	
18.05	Detection Range	m/s	Various	
18.06	Process connection		As per Equipment Requirement	
18.07	Communication Protocol		IO-Link or 4-20 mA	
18.08	Surge Protection Required	Yes / No	Yes	
18.09	No. Axis		3 (x,y,z)	
18.10	IP Rating	IP	IP65	
18.11	Minimum accuracy	%	2	
18.12	Additional datasheet from manufacturer included with tender	Yes / No	Yes	
19	LEVEL SWITCHES			
19.01	Manufacturer			
19.02	Model			
19.03	Type		Point level	
19.04	Communication Protocol		IO-Link or Digital IO	
19.05	IP Rating	IP	IP65	
19.06	Additional datasheet from manufacturer included with tender	Yes / No	Yes	
20	PRESSURE SWITCHES			
20.01	Manufacturer			
20.02	Model			
20.03	Type			
20.04	Communication Protocol		IO-Link or Digital IO	
20.05	IP Rating	IP	IP65	
20.06	Additional datasheet from manufacturer included with tender	Yes / No	Yes	
21	PRESSURE SWITCHES (EX)			
21.01	Manufacturer			
21.02	Model			
21.03	Type			
21.04	Communication Protocol		IO-Link or Digital IO	
21.05	IP Rating	IP	IP65	
21.06	Additional datasheet from manufacturer included with tender	Yes / No	Yes	
22	FLOW SWITCHES			
22.01	Manufacturer			
22.02	Model			
22.03	Type			
22.04	Communication Protocol		IO-Link or Digital IO	
22.05	IP Rating	IP	IP65	
22.06	Additional datasheet from manufacturer included with tender	Yes / No	Yes	

	DESCRIPTION	UNIT	SPECIFIED	OFFERED
23	FLOW SWITCHES (EX)			
23.01	Manufacturer			
23.02	Model			
23.03	Type			
23.04	Communication Protocol		Digital IO	
23.05	IP Rating	IP	IP65	
23.06	EX Rated	Yes / No	Yes	
23.07	EX Rating		As per section 14.10 of the Electronics Spec	
23.08	Additional datasheet from manufacturer included with tender	Yes / No	Yes	
24	PROXIMITY SWITCHES			
24.01	Manufacturer			
24.02	Model			
24.03	Type		Inductive Proxy	
24.04	Communication Protocol		IO-Link or 4-20 mA	
24.05	IP Rating	B	IP65	
24.06	Additional datasheet from manufacturer included with tender	Yes / No	Yes	
25	PROXIMITY SWITCHES (EX)			
25.01	Manufacturer			
25.02	Model			
25.03	Type		Inductive Proxy	
25.04	Communication Protocol		IO-Link or 4-20 mA	
25.05	IP Rating	B	IP65	
25.06	EX Rated	Yes / No	Yes	
25.07	EX Rating		As per section 14.10 of the Electronics Spec	
25.08	Additional datasheet from manufacturer included with tender	Yes / No	Yes	
26	SURGE PROTECTION			
26.01	Instrument Power Supply Circuits - Manufacturer			
26.02	Instrument Power Supply Circuits - Model			
26.03	Instrument Signal Loop Circuits - Manufacturer			
26.04	Instrument Signal Loop Circuits - Model			
26.05	Instrument Transducer Loop Circuits - Manufacturer			
26.06	Instrument Transducer Loop Circuits - Model			
27	INSTRUMENT REMOTE JUNCTION BOXES			
27.01	Manufacturer			
27.02	Material of Construction:	1.6 mm Mild Steel / 2.0 mm Mild Steel / Electro Galvanized / Stainless Steel / 3CR12 / Fibre Glass	3CR12	
27.03	Epoxy Powder Coated	Yes / No	Yes	
27.04	Colour		B26 Electric Orange	
27.05	IP Rating (Indoor)	IP	IP65	
27.06	IP Rating (Outdoor)	IP	IP65	

	DESCRIPTION	UNIT	SPECIFIED	OFFERED
28	LOCAL CONTROL PANELS			
28.01	Manufacturer			
28.02	Material of Construction	1.6 mm Mild Steel / 2.0 mm Mild Steel / Electro Galvanized / Stainless Steel / 3CR12 / Fibre Glass	3CR12	
28.03	Epoxy Powder Coated	Yes / No	Yes	
28.04	Colour		B26 Electric Orange	
28.05	IP Rating (Indoor)	IP	IP65	
28.06	IP Rating (Outdoor)	IP	IP65	
29	CONDITION MONITORING SYSTEM			
29.01	Manufacturer		IFM or equivalent	
29.02	Sensor Model		VSE or equivalent	
29.03	Transmitter Model			
29.04	Number of instrument ports	No.	min 4	
29.05	Instrument interface		IO-Link or 4-20 mA	
29.06	Communication Protocol		Industrial Ethernet	
29.07	Surge Protection Required	Yes / No	Yes	
29.08	Local Indication Required	Yes / No	Yes	
29.09	Conformally Coated	Yes / No	Yes	
29.10	Management Software Required	Yes / No	Yes	
29.11	Additional datasheet from manufacturer included with tender	Yes / No	Yes	
30	WIRELESS ETHERNET INSTRUMENT RADIO			
30.01	Manufacturer		Ubiquiti or equivalent	
30.02	Radio Model		airMAX Rocket Prism or equivalent	
30.03	Antenna Model		ariMax Omni AMO-2G10 or equivalent	
30.04	Number of instrument ports	No.	min 1	
30.05	Communication Protocol		Industrial Ethernet	
30.06	Management Software Required	Yes / No	Yes	
30.07	Additional datasheet from manufacturer included with tender	Yes / No	Yes	
31	SUPPLEMENTARY DETAILS			
31.01	Extended warranty on instruments from OEM	Yes/No	Yes, 5 years	
Regardless of any information provided in this technical data sheet, the equipment to be provided will comply with the specified requirements				
Name (Print): _____ Signature: _____				



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DESIGN BUILD OF MECHANICAL AND
ELECTRICAL WORKS FOR THE
UPGRADING AND EXPANSION OF THE
MACASSAR WASTEWATER
TREATMENT WORKS

191Q/2023/24

DATA SHEET No. DS-II-0005: VR&AR

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ZUTARI N°.				REV. T0
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II - The explanatory notes at the end of the Data Sheet are to be filled out by the Issuer and not by Suppliers.

Supplier:		Quantity:		
	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1	VR STATION			
1.01	Manufacturer			
1.02	Model			
2	VR DESKTOP			
2.01	Manufacturer			
2.02	Model	Model no.		
2.03	CPU	Model range	Intel i9 or equivalent	
2.04	Speed	GHz	min 4	
2.05	Memory (RAM)	GB	min 64	
2.06	Hard Drive Storage	GB	min 2000	
2.07	Operating System		Microsoft Windows or equivalent	
2.08	Network Card	Type	Ethernet 10/100/1000	
2.09	Graphics Card Make	Brand	Nvidia or equivalent	
2.10	Graphics Card Model	Model range		
2.11	DirectX 11 Capable	Yes / No	Yes	
2.12	Shader Model 5	Yes / No	Yes	
2.13	Video memory	GB	8	
2.14	Graphics Card Ports	No.	2	
2.15	Keyboard	No.	1	
2.16	Mouse	No.	1	
3	VR HEADSET			
3.01	Manufacturer		HTC or equivalent	
3.02	Model		Vive Pro 2 or equivalent	
4	AR HEADSET			
4.01	Manufacturer		Apple or equivalent	
4.02	Model			
5	SUPPLEMENTARY DETAILS			

Regardless of any information provided in this technical data sheet, the equipment to be provided will comply with the specified requirements

Name (Print): _____ Signature: _____



CITY OF CAPE TOWN
ISIXEKO SASEKAPA
STAD KAAPSTAD

Making progress possible. Together.

ZUTARI

DESIGN BUILD OF MECHANICAL AND
ELECTRICAL WORKS FOR THE
UPGRADING AND EXPANSION OF THE
MACASSAR WASTEWATER
TREATMENT WORKS

191Q/2023/24

DATA SHEET No. DS-EP-0006: SUBSTATION AUTOMATION AND PROTECTION

CLIENT N°.				PAGE
ZUTARI N°.				REV. T0
By	Ckd	APP.	Aut.	Date
AN	CdJ	EB		Mar-24

Instructions on Filling Out This Form

I - Potential Suppliers should fill out the Offered Column

II - The explanatory notes at the end of the Data Sheet are to be filled out by the Issuer and not by Suppliers.

Supplier:		Quantity:		
	DESCRIPTION	UNIT	SPECIFIED	OFFERED
1	COMMS			
1.01	Communication		IEC 61850 (MMS for SCADA Monitoring, GOOSE Messaging for Protection)	
1.02	Time Synchronisation		Yes, Provided From The Network Time Protocol (NTP) Server on The LAN	
1.03	Plant Status Monitoring		Yes	
1.04	Protection IEO DC Supply		110 Vdc	
1.05	Bay Messaging and Displaying		Yes, Including Display Of Alarms	
1.06	Bay Control - MV and HV Circuit Breakers		Yes	
1.07	Bay Control - Local/Remote		Yes	
1.08	SCADA Control		Yes	
1.09	Bay Control - Protection Normal/On Test		Yes	
2	REAL-TIME AUTOMATION CONTROLLER (RTAC)			
2.01	Manufacturer			
2.02	Model			
2.03	Communication protocols		IEC 61850, MODBUS, DNP 3.0	
2.04	Mimic screen	Yes/No	Yes	
2.05	Digital Inputs	No.		
2.06	Digital Outputs	No.		
2.07	Analogue Inputs	No.		
2.08	Analogue Outputs	No.		
2.09	Spare I/O	%	30	
2.10	Ports			
2.11	All engineering software included with PLC	Yes / No	Yes	
3	REMOTE TERMINAL UNIT (RTU) / GATEWAY			
3.01	Manufacturer			
3.02	Model			
3.03	Communication protocols		IEC 61850, MODBUS, DNP 3.0	
4	SUBSTATION AUTOMATION PANEL			
4.01	Enclosure Rating	IP	54	
4.02	Enclosure Mounting	Floor Standing / wall mounted	Floor Standing	
4.03	Supply and Control Circuit Voltages	V	110V DC	
4.04	Glass door - viewing panel	Yes / No	Yes	

	DESCRIPTION	UNIT	SPECIFIED	OFFERED
4.05	Termination			
4.06	Glanding			
4.07	Power Supply Unit vendor preferences			
4.08	Uninterruptible Power Supply requirement	Yes / No	Yes	
4.09	Physical Spare space	%	40	
5	SERVER RACK CABINET			
5.01	Manufacturer			
5.02	Model			
5.03	Size	U		
5.04	Dimensions	(W x L) in mm		
5.05	Locakable	Yes/No	Yes	
5.06	Mounting type		Floor standing	
5.07	Power Distribution	Dedicated Multiplug / Hardwired	Dedicated Multiplug	
6	SCADA SERVER ADMIN COMPUTER			
6.01	Manufacturer			
6.02	Model			
6.03	Rack Mounted	Yes/No	Yes	
6.04	Withdrawable	Yes/No	Yes	
6.05	Touch Screen	Yes/No	Yes	
6.06	Rack mounted KVM switch for mouse and keyboard	Yes/No	Yes	
7	CONTROL SYSTEM POWER SUPPLY			
7.01	Local substation BTU supply	Yes / No	Yes	
7.02	Voltage	VDC	110	
8	TIME SYNCHRONISATION			
8.01	GPS Clock synchronisation	Yes / No	Yes	
8.02	NTP Clock synchronisation	Yes / No	Yes	
9	MANAGED NETWORK SWITCH			
9.01	Manufacturer			
9.02	Model			
9.03	Ethernet Ports	No.	min 4	
9.04	Fibre ports (SFP)	No.	min 4	
9.05	Fibre Termination type		LC	
9.06	Mounting type		Din rail	
9.07	Power Supply	VAC	230V	
9.08	Speed	Mbit	1000	
9.09	Datasheet included with tender	Yes / No	Yes	
10	UNMANAGED SWITCHES			
10.01	Manufacturer			
10.02	Type			
10.03	Model			
11	FIBRE PATCH PANEL			
11.01	Manufacturer			
11.02	Model			
11.03	Fibre Patch ports	No.	Min 24	

[illegible]

TENDER NO. 191Q/2023/24		 CITY OF CAPE TOWN ISIXEKO SASEKAPA STAD KAAPSTAD	
SCM – 510	Approved by Branch Manager: 23/01/2024	Version: 5	Pages 1 of 126

CONTRACT DOCUMENT

FOR THE

DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS

VOLUME 3: DRAFT CONTRACT

ISSUED BY: DIRECTOR: WATER AND SANITATION Water and Sanitation Head Office 8 Voortrekker Road (corner of Mike Pienaar Boulevard) Cape Town Bellville 7535	COMPILED BY: Zutari (Pty) Ltd 1 Century City Waterford Precinct Century City CAPE TOWN 7441	For official use. TENDER SERIAL No.: SIGNATURES OF CITY OFFICIALS AT TENDER OPENING 1. 2. 3.
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MARCH 2024

NAME OF TENDERING ENTITY	
EMAIL ADDRESS OF TENDERING ENTITY	
FAX NUMBER OF TENDERING ENTITY	
NATURE OF TENDER OFFER (please indicate below)	
Main Offer (see clause C.2.12)	
Alternative Offer (see clause C.2.12)	

Part C1: Agreements and Contract Data

	Pages
C1.2 Contract Data data provided by the Employer).....	603– 627
C1.3 Form of Performance Guarantee.....	628 – 631
C1.4 Form of Advance Payment Guarantee.....	632
C1.5 Occupational Health and Safety Agreement	636
C1.6 Protection of the Environment Declaration.....	637
C1.7 Insurance Broker’s Warranty	638
C1.8 Contract of Temporary Employment as Community Liaison Officer	639 – 640

CITY OF CAPE TOWN

DIRECTORATE: WATER AND SANITATION

CONTRACT NO. 191Q/2023/24

DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS

C1.2 Contract Data

GENERAL CONDITIONS OF CONTRACT

The following standardised General Conditions of Contract:

General Conditions which form part of the **Conditions of Contract for Plant and Design-Build for Electrical and Mechanical Works and for Building and Engineering Works Designed by the Contractor, First Edition 1999 (Yellow Book)** published by the International Federation of Consulting Engineers (FIDIC).

Copies of these Conditions of Contract (Yellow Book) may be obtained from the South African Institution of Civil Engineering (SAICE) (tel 011 805 5947) or Consulting Engineers South Africa (CESA) (tel 011 463 2022).

Copies of the Conditions of Contract (Yellow Book) are also available for inspection and scrutiny at the offices of the Employer.

The Annexes and Forms bound in the Conditions of Contract (Yellow Book) shall not apply to this Contract and shall be replaced with the documentation bound into this Contract Document.

The General Conditions make reference to the Appendix to Tender and Particular Conditions (contained in the Contract 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 General Conditions shall be read in conjunction with the variations, amendments and additions set out in the Appendix to Tender and Particular Conditions below. Each item of data given below is cross-referenced to the Clause or Sub-Clause in the General Conditions 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 sequence as stated in sub-clause 1.5 as amended in the Particular Conditions.

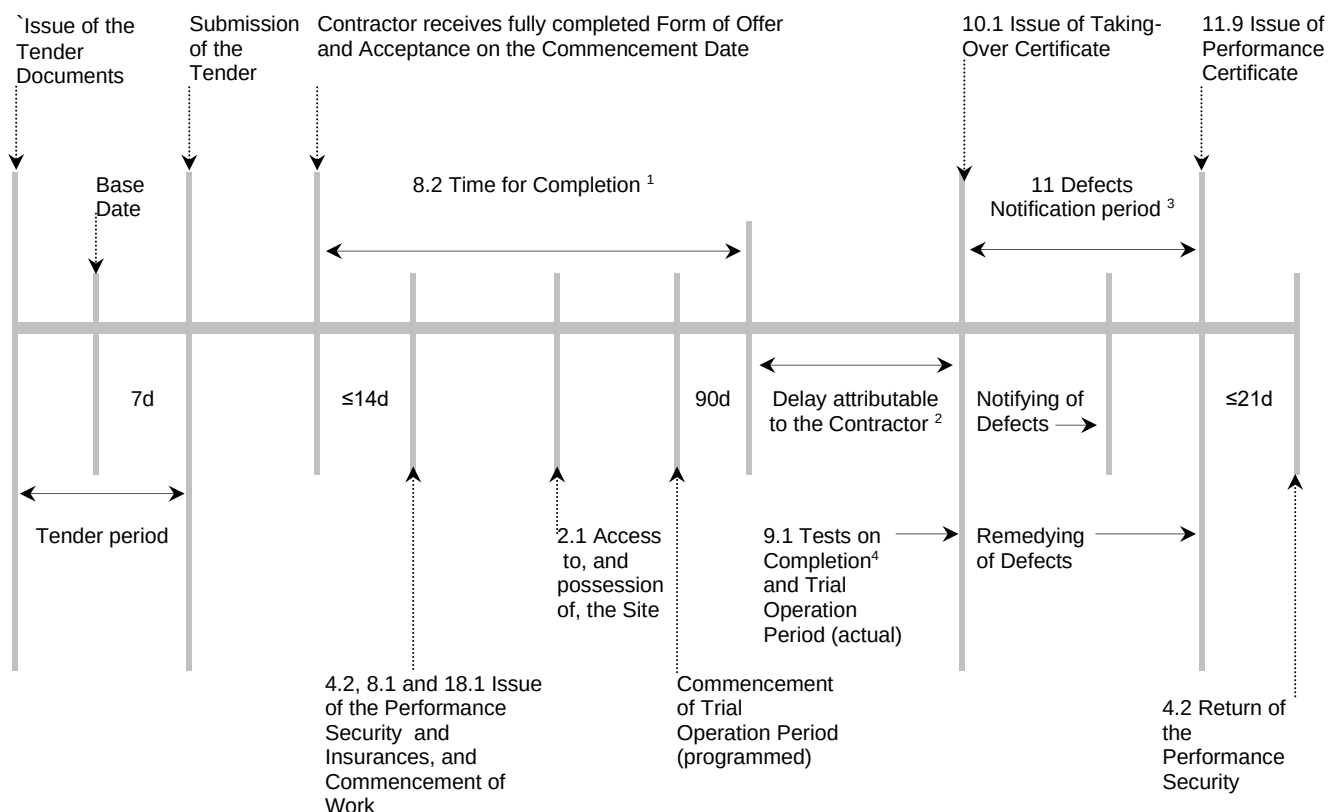
If an ambiguity or discrepancy is found in the documents, the Engineer shall issue any necessary clarification or instruction.

The Foreword to the Conditions of Contract (Yellow Book) concludes with the following:

"In order to clarify the sequence of Contract activities, reference may be made to the charts on the next two pages and to the Sub-Clauses listed below (some Sub-Clause numbers are also stated in the charts). The charts are illustrative and must not be taken into consideration in the interpretation of the Conditions of Contract.

1.1.3.1	&	13.7	Base Date
1.1.3.2	&	8.1	Commencement Date
1.1.6.6	&	4.2	Performance Security
1.1.4.7	&	14.3	Interim Payment Certificate
1.1.3.3	&	8.2	Time for Completion (as extended under 8.4)
1.1.3.4	&	9.1	Tests on Completion
1.1.3.5	&	10.1	Taking-Over Certificate
1.1.3.6	&	12.1	Tests after Completion (if any)
1.1.3.7	&	11.1	Defects Notification Period (as extended under 11.3)
1.1	&	11.9	Performance Certificate
1.1.4.4	&	14.13	Final Payment Certificate"

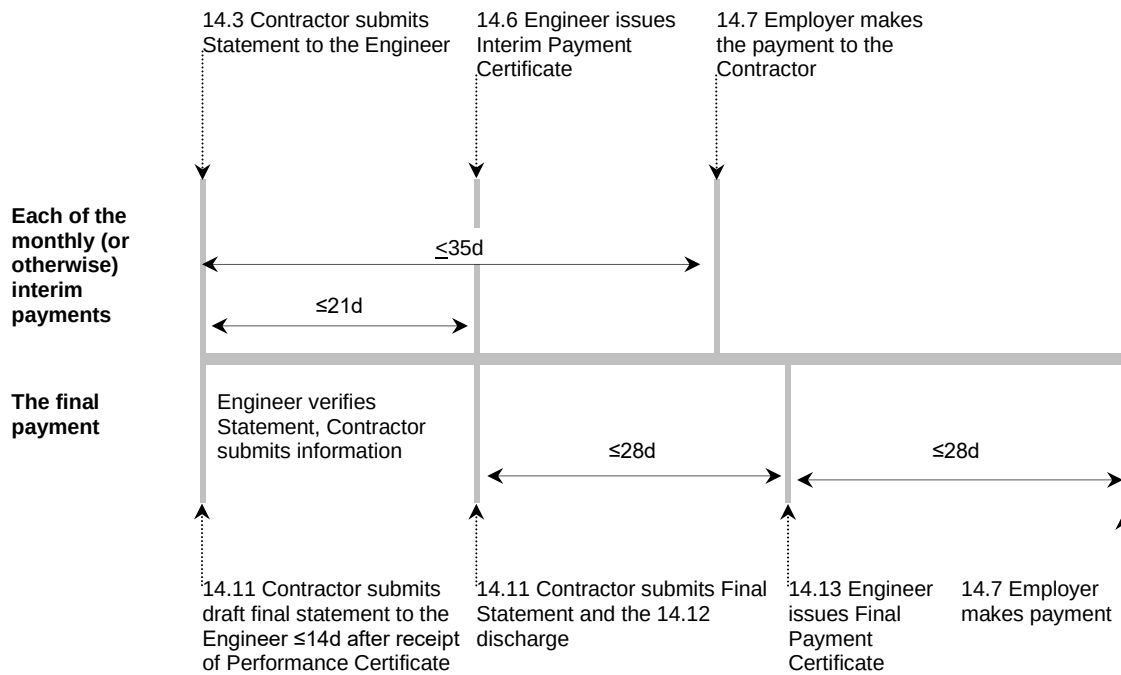
The charts referred to above are reproduced on the following two pages, amended and amplified where necessary to conform to the Particular Conditions for this Contract. The charts are illustrative and must not be taken into consideration in the interpretation of the Conditions of Contract.



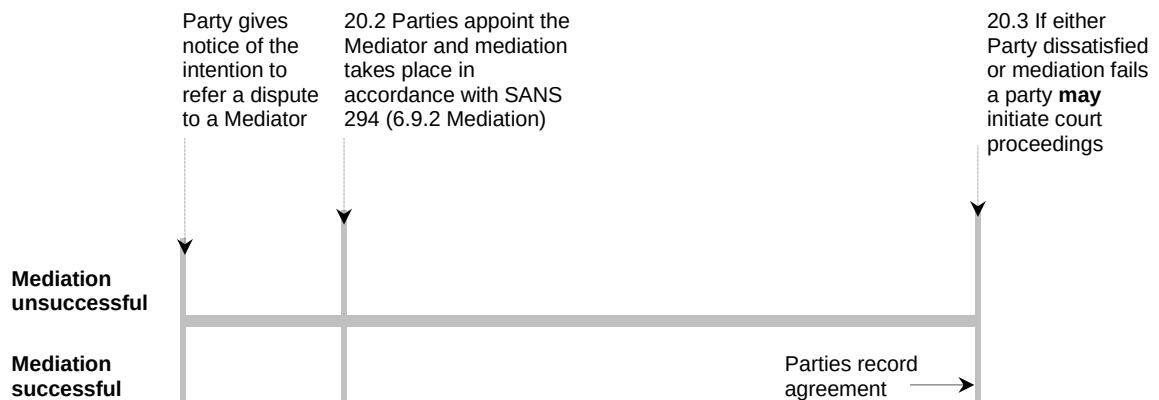
Typical sequence of Principal Events during Contracts for Plant and Design-Build

(Modified to suit this Contract)

1. The Time for Completion is stated (in the Appendix to Tender) as a number of days, to which is added any extensions of time under Sub-Clause 8.4.
2. In order to indicate the sequence of events, the above diagram is based upon the example of the Contractor failing to comply with Sub-Clause 8.2.
3. The Defects Notification Period is stated (in the Appendix to Tender) as a number of days, to which is added any extensions under Sub-Clause 11.3.
4. Depending on the type of Works, Tests after Completion may also be required, if provided for in the Contract.



Typical Sequence of Payment Events Envisaged in Clause 14
(Modified to suit this Contract)



Typical Sequence of Dispute Events Envisaged in Clause 20
(Modified to suit this Contract)

APPENDIX TO TENDER

Part 1 : Contract Data completed by the Employer

<u>Item</u>	<u>Sub-Clause</u>	<u>Entry</u>
Employer's name and address	1.1.2.2 & 1.3(b)	CITY OF CAPE TOWN, represented by the Director: WATER AND SANITATION CITY OF CAPE TOWN Water and Sanitation Head Office 8 Voortrekker Road (corner of Mike Pienaar Boulevard) Cape Town Bellville 7535 and/or such other person or persons duly authorised thereto by the Employer in writing; the Employer is referred to in this Contract Document by the terms "Employer", "City of Cape Town" or "Council" as the context provides.
Engineer's name and address	1.1.2.4 & 1.3(b)	ZUTARI (PTY) LTD 1 Century City Drive Waterford Precinct Century City CAPE TOWN 7441 or an official authorised thereto in writing by Employer
Time for Completion of the whole of the Works including the Trial Operation Period	1.1.3.3 & 8.2	1530 days which shall be inclusive of special non-working days
Defects Notification Period	1.1.3.7	365 days
Special non-working days.....	1.1.3.9.....	The special non-working days are: The SAFCEC recommended industry shutdown period in December and January. All statutory holidays. All gazetted public holidays falling outside the shutdown period.
Electronic transmission systems	1.3(a).....	e-mail or facsimile
Governing Law.....	1.4	Republic of South Africa
Ruling language	1.4	English
Language for communications	1.4	English
Time for access to, and possession of, the Site.....	2.1*	90 Days from the Commencement Date

APPENDIX TO TENDER (CONTD)

Item	Sub-Clause	Entry
Approval of Employer required for	3.1.....	Not Applicable
Amount of Performance Security	4.2.....	7.5% of the Accepted Contract Amount
Period for notifying unforeseeable errors, faults and defects in the Employer's Requirements	5.1.....	Within 21 days
Normal working hours.....	6.5.....	Between 07h00 and 17h00 week days, except locally recognised days of rest, SAFCEC recommended industry shutdown period in December and January and all gazetted public holidays.
Locally recognised days of rest.....	6.5.....	Saturdays and Sundays
Maximum amount of Delay penalties	8.7	The penalty for delay shall be: 1/20th of 1% of the of the Contract Award Amount per calendar day. The penalty for delay for sectional completion shall be as follows: 1. The penalty for delay for sectional completion of scheduled activities which does not impact the critical path of other construction Contracts (see Clause 3.1.9 of Part C3, Scope of Work) will be a "percentage" of 1/20 of 1% of the Contract Award Amount per calendar day. This "percentage" shall be the "Contract Award Amount of the Portion of Works subject to Sectional Completion" over "the Contract Award Amount excluding contingencies and contract price adjustment (i.e., escalation)". 2. The penalty for delay for sectional completion for scheduled activities which impacts the critical path of other construction Contracts (see Clause 3.1.9 of Part C3, Scope of Work) will result in full penalties being applied, i.e., 1/20 of 1% of the Contract Award Amount per calendar day
Trial Operation Period Duration.....	9.1	90 days
Adjustments for Changes in Cost	13.8.....	The Contract Price shall / be subject to Contract Price Adjustment. <u>Variations in Rates of Exchange, Customs Surcharge and Customs Duty</u>, which shall be for the Employer's account in accordance with Sub-Clause 13.8.2.2 in the Particular Conditions shall be payable. Furthermore, as a result of an award of a contract beyond the original tender validity period, the contract execution will be completed beyond a period of twelve (12) months from the expiry of the original tender validity period, then the contract may be subject to contract price adjustment for that period beyond such twelve (12) months. An

appropriate contract price adjustment formula will be determined by the Director: Supply Chain Management if such was not included in the bid documents

Similarly, if as a result of any extension of time granted the contract execution will be completed beyond a period of twelve (12) months from the expiry of the original tender validity period, then contract price adjustment may apply to that period beyond such twelve (12) months. An appropriate contract price adjustment formula will be determined by the Director: Supply Chain Management if such was not included in the bid documents.

Where applicable, in terms of the foregoing, the value of the certificates issued shall be adjusted in accordance with Sub-Clauses 13.8.1 and 13.8.2 in the Particular Conditions, but with the Base Date being the date 182 days after the tender closing date.

APPENDIX TO TENDER (CONTD)

Item	Sub-Clause	Entry
Total advance payment.....	14.2.....	0 % deposit
Percentage of retention	14.3(c)*	5% reducing to 2.5% upon the issue of a Taking-Over Certificate. The percentage of retention will be 10% of the interim certificates.
Limit of Retention Money.....	14.3(c)*	5% of Accepted Contract Amount
Plant and Materials Intended for the Works	14.5(b)	No payment for plant and materials upon shipment
Plant and materials for payment when delivered to the Site	14.5(c)	All plant and materials delivered to site will be subject to payment in terms of this clause
Minimum amount of Interim Payment Certificates.....	14.6	No minimum
Currency/currencies of payment.....	14.15	South African Rand, as named in that section of the Form of Offer and Acceptance called "Offer"
Periods for submission of insurance:		
(a) evidence of insurance	18.1*	14 days
(b) relevant policies	18.1	14 days
Maximum amount of deductibles for insurance of the Employer's risks	18.2(d)	R10 000,
Minimum amount of third party insurance	18.3	R20 000 000,00
Special Risks Coupon Policy.....	18.5	Required
The DAB shall be	20.2	One sole Member / adjudicator
Appointment (if not agreed) to be made by....	20.3	President of the South African Institution of Mechanical Engineers
Amicable Settlement will be conducted as....	20.5	Mediation
Appointment (if not agreed) to be made by....	20.5	President of the South African Institution of Mechanical Engineers
Litigation will be conducted in.....	20.6*	Applicable Court of Jurisdiction in Cape Town

* See Particular Conditions

APPENDIX TO TENDER (CONTD)

Part 2 : Contract Data completed by the Contractor

Item	Sub-Clause	Entry
Contractor's name and address	1.1.2.3 & 1.3(b)	
Contractor's Representative's name	4.3	

The Tenderer shall complete the above Part 2 of the Appendix to Tender.

SIGNED ON BEHALF OF TENDERER.....

PARTICULAR CONDITIONS

The Particular Conditions are:

1 General Provisions

Sub-Clause 1.1 Definitions

1.1.1 The Contract

1.1.1.1 is deleted and replaced by:

“Contract” means the Form of Offer and Acceptance, Contract Data, these General Conditions, the Employer's Requirements, the Drawings, the Schedules, and the further documents (if any) which are listed in the Form of Offer and Acceptance, and further includes drawings and documents or parts thereof which any of the aforesaid documents incorporate by reference.

1.1.1.2 is deleted and replaced by:

“Contract Agreement” means the document called “Form of Offer and Acceptance”.

1.1.1.3 is deleted and replaced by:

“Letter of Acceptance” means that section of the Form of Offer and Acceptance called “Acceptance”.

1.1.1.4 is deleted and replaced by:

“Letter of Tender” means that section of the Form of Offer and Acceptance called “Offer”.

1.1.1.5 is deleted and replaced by:

“Employer's Requirements” means the document titled “Part C3: Scope of Work”, as included in the Contract, and any additions and modifications to such document in accordance with the Contract. Such document specifies the purpose, scope, and/or design and/or other technical criteria, for the Works, and includes the Specifications.

1.1.1.6 is deleted and replaced by:

“Schedules” means the document(s) entitled schedules, completed by the Contractor and submitted with his tender offer, as included in the Contract. Such document(s) shall include the Returnable Schedules and the Schedules of Quantities, and may include data, lists and schedules of rates and/or prices.

1.1.1.7 is deleted and replaced by:

“Contractor's Proposal” means the information which the Contractor submitted with the Form of Offer and Acceptance, as included in the Contract. Such information shall include the information listed in Schedule 18 in Part T2.2 Returnable Schedules and may also include the Contractor's preliminary design.

1.1.1.8 is deleted and replaced by:

“Tender” means that section of the Form of Offer and Acceptance called “Offer” and all other documents which the Contractor submitted as Returnable Documents, as included in the Contract.

1.1.1.9 is deleted and replaced by:

“Appendix to Tender” means the completed section entitled appendix to tender included in the Contract Data.

Add the following Sub-Clause after Sub-Clause 1.1.1.10:

1.1.1.11

“Returnable Schedules” means the Schedules contained in Part T2.2 in the Tender Data and Part C2.1 in the Pricing Data, and **“Schedules of Quantities”** means the document entitled schedules of quantities contained in Part C2.2 in the Pricing Data.

1.1.2 Parties and Persons

1.1.2.3 is deleted and replaced by:

“Contractor” means the person(s) named as Contractor in that section of the Form of Offer called “Offer” accepted by the Employer and the legal successors in title to this person(s).

1.1.2.9 is deleted and replaced by:

“Mediator” means the person appointed under Sub-Clause 20.2 [*Mediation*] in the Contract Data.

1.1.3 Dates, Tests, Periods and Completion

1.1.3.1 is deleted and replaced by:

“Base Date” means the date 7 days prior to the closing date for the submission of the Tender.

1.1.3.2 is deleted and replaced by:

“Commencement Date” means the date the Contractor receives one fully completed original copy of the document

1.1.4 Money and Payments

1.1.4.1 is deleted and replaced by:

“Accepted Contract Amount” means the amount accepted in that section of the Form of Offer and Acceptance called “Acceptance” for the execution and completion of the Works and the remedying of any defects.

1.1.4.6 is deleted and replaced by:

“Foreign Currency” means a currency in which part (if any) of the Contract Price is payable, but not the Local Currency.

Add the following Sub-Clause after Sub-Clause 1.1.4.12:

1.1.4.13 **“Contract Price Adjustment”** means the adjustment to be included in the Contract Price for fluctuations in the Cost of Plant and Materials, Site Installation, General Items (comprising General Requirements and Conditions, Health and Safety, Environmental Management, Sundries, etc.), and Variations in Rates of Exchange, Customs Surcharge and Customs Duty, all as provided for in Sub-Clause 13.8 [*Adjustments for Changes in Cost*] in the Contract Data.

1.1.4.14 **“Reasonable Profit”** means an amount not exceeding 10% of the Cost of any item or activity

1.1.5 Works and Goods

1.1.5.6 is deleted and replaced by:

“Section” means a part of the Works specified in the Appendix to Tender as a Section (if any), or a part of the Works specified as a Section during the course of the Contract by the Employer (such Section may be an item of Plant).

1.1.6 Other Definitions

Add the following Sub-Clause after Sub-Clause 1.1.6.9:

1.1.6.10 **“Letter of Notification”** means the letter 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 Form of Offer and no rights shall accrue.

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

Sub-Clause 1.5 Priority of Documents

Deleted and replaced by:

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 Appendix to Tender within the Contract Data,
- (c) the Particular Conditions within the Contract Data,
- (d) these General Conditions,
- (e) the Employer's Requirements,
- (f) the Drawings, and
- (g) the Schedules.

If an ambiguity or discrepancy is found in the documents, the Engineer shall issue any necessary clarification or instruction.

Sub-Clause 1.6 Contract Agreement

Deleted and replaced by:

The Parties shall enter into a Contract Agreement after the Contractor is called upon to do so by the Employer. The Agreement shall be the fully completed Form of Offer and Acceptance contained in the Contract Document.

Sub-Clause 1.8 Care and Supply of Documents

Delete "six copies" in the second sentence of the first paragraph and replace with "three copies".

Sub-Clause 1.10 Employer's Use of Contractor's Documents

Deleted and replaced by:

Intellectual Property

The Contractor acknowledges that it shall not acquire any right, title or interest in or to the Intellectual Property of the Employer.

The Contractor hereby assigns to the Employer, all Intellectual Property created, developed or otherwise brought into existence by it for the purposes of the contract, unless the Parties expressly agree otherwise in writing.

The Contractor shall, and warrants that it shall:

- (a) not be entitled to use the Employer's Intellectual Property for any purpose other than as contemplated in this contract;
- (b) not modify, add to, change or alter the Employer's Intellectual Property, or any information or data related thereto, nor may the Contractor produce any product as a result of, including and/or arising from any such information, data and Intellectual Property, and in the event that it does produce any such product, the product shall be, and be deemed in law to be, owned by the Employer;
- (c) not apply for or obtain registration of any domain name, trademark or design which is similar to any Intellectual Property of the Employer;
- (d) comply with all reasonable directions or instructions given to it by the Employer in relation to the form and manner of use of the Employer Intellectual Property, including without limitation, any brand guidelines which the Employer may provide to the Contractor from time to time;
- (e) procure that its employees, directors, members and Contractors comply strictly with the provisions of clauses 1.10 (a) to 1.10 (c) above;

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

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

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

Sub-Clause 1.11 Contractor's Use of Employer's Documents

Deleted this Sub-Clause.

Sub-Clause 1.12 Confidential details

Insert the following after the first paragraph:

The Parties 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 other Party.

Sub-Clause 1.13 Compliance with Laws

Insert "deposits" after "taxes" in 1.13 b).

Add the following paragraph after 1.13 (b):

- (c) Where the Employer is required to apply to the Provincial Director of the Department of Labour for a construction work permit to perform the intended construction work. 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.

Sub-clause 1.14 General Provisions

The parties agree that this contract shall also be subject to the Employer's Supply Chain Management 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 CCT's website.

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

2 The Employer

Sub-Clause 2.1 Right of Access to the Site

Add the following after the first sentence of the first paragraph:

Access to, and possession of the Site shall not take place until 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 1.13 [Compliance with Laws].

Add the following paragraph after 2.1 (b):

Should the issuing of a construction work permit delay the Engineer's instruction to commence executing the Works and this in turn causes a delay to Practical Completion by more than 60 days, then the Contractor shall be entitled to make a claim in accordance with the contract. 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.

Sub-Clause 2.4 Employer's Financial Arrangements

Delete this Sub-Clause.

Sub-Clause 2.5 Employer's Claims

Insert "or by law" after "Contract" in the first sentence of the first paragraph.

3 The Engineer

Add the following at the end of the third paragraph:

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

The requirements for the Engineer to obtain the approval of the Employer before exercising a specified authority are:

- (a) Clause 3.2: The delegation of duties to others
- (b) Clause 4.24: The issuing of instructions for dealing with fossils and the like.
- (c) Clause 6.5 (b): Giving consent for work to be carried out on days of rest or outside normal working hours.
- (d) Clause 8.6: The approval of a revised programme and supporting report in order to expedite progress.
- (e) Clause 8.8: Instruction to suspend the works
- (f) Clause 13.1: All actions in terms of this clause that would result in the utilisation of the contingency allowance, increasing the contract value or awarding any additional time.
- (g) Clause 14.2: Agreeing to advance payment for deposits for items not listed in the Advance Payment Schedule.

Sub-Clause 3.4 Replacement of the Engineer

Deleted and replaced by:

The Employer shall have the right to replace the Engineer.

4 The Contractor

Sub-Clause 4.2 Performance Security

Delete the first sentence of the second paragraph and replace with:

The Contractor shall deliver the Performance Security to the Employer within 14 days from the Commencement Date.

Add the following at the end of the second paragraph:

The form of Performance Security 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**.

Sub-Clause 4.3 Contractor's Representative

Delete "prior to the Commencement Date" in the first sentence of the second paragraph and replace with "within 14 days from the Commencement Date".

Sub-Clause 4.4 Subcontractors

Delete "28 days' notice" in sub-paragraph (c) and replace with "14 days' notice".

Add the following clause:

- d) The Contractor shall supply the Employer with proof of all orders placed with sub-contractors upon request by the Engineer. Information is to be given on each sub-order sufficient to identify the material or equipment to which the sub-order relates and to notify the sub-contractor that the conditions of the Specification apply.

Sub-Clause 4.8 Safety Procedures

Add the following:

The Contractor's attention is also drawn to the Health and Safety Specification in the Employer's Requirements.

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, 85 of 1993 and the Construction Regulations, 2014 promulgated thereunder.

An agreement is included in the Contract Document (Part C1.5 in Agreements and 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.

Sub-Clause 4.10 Site Data

Add the following at the end of the first sentence:

"As contained in the Employer's Requirements, if applicable."

Sub-Clause 4.16 Transport of Goods

Delete "and" after sub-paragraph (b) and add the following to sub-paragraph(c):

In this regard the Contractor's attention is also drawn to Sub-Clause 18.2(f)(i) in the Particular Conditions; and

Add the following sub-paragraph:

- (d) the Contractor shall provide all lifting facilities unless specified otherwise in the Detailed Mechanical Specification in the Employer's Requirements.

Sub-Clause 4.17 Contractor's Equipment

Add the following:

The Contractor shall provide all necessary storage facilities on Site.

Sub-Clause 4.18 Protection of the Environment

Add the following:

The Contractor's attention is also drawn to the Environmental Management Specification in the Employer's Requirements.

Sub-Clause 4.21 Progress Reports

Delete "in six copies" in the first sentence and replace with "electronically and one hard copy".

Sub-Clause 4.22 Security of the Site

Add the following sub-paragraph:

- (c) The Contractor shall in connection with the Works provide and maintain at his own cost all lights, guards, fencing, watching and other appropriate security measures when and where necessary or required by the Engineer or by any competent statutory or other authority for the protection and security of the Works and the Contractor's Equipment, or for the safety and convenience of the public and for the protection of life and property.

Sub-Clause 4.23 Contractor's Operations on Site

Add the following:

The Contractor shall protect and cover up all works as may be required and take all other precautions necessary to avoid causing damage or soiling of new and existing plant, equipment, buildings and structures. This shall inter alia apply when activities such as abrasive blasting, painting, welding, grinding, sealing, lagging and so forth, must be performed on the Site. The Contractor shall, on completion, remove all covers and shall at his cost rectify all soiling and damage to finishes to the satisfaction of the Engineer.

6 Staff and Labour

Sub-Clause 6.10 Records of Contractor's Personnel and Equipment

Add the following:

The Contractor shall also submit the monthly returns as described in the Scope of Work, Part C3.5 Management, Clause 8

7 Plant, Materials and Workmanship

Sub-Clause 7.7 Ownership of Plant and Materials

Add the following after (b):

Notwithstanding points (a) and (b) above, the Contractor shall remain responsible for Plant and Materials that falls within the scope of the Contract. The Contractor shall protect the equipment against theft, damage, vandalism and unreasonable wear and tear whether the equipment is stored on-site, off-site or installed (not yet commissioned) at no additional cost to the client other than stipulated under General Requirements and Conditions until final commissioning and handover. Security is to be provided in terms of Section C3.4.9.2 (e) of the Contract Data. Insurance by the Contractor of this Plant and Material against these risks is also required to be included under Sub-Clause 18.2 (c).

8 Commencement, Delays and Suspension

Sub-Clause 8.1 Commencement of Work

Add the following at the end of the first paragraph:

Where the Contract Sum exceeds one hundred and thirty million Rand (R130,000,000.00), 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 in terms of Clause 1.13 [Compliance with Laws].

Delete the first paragraph.

Delete the words “the design and execution of the Works as soon as is reasonably practicable after” in the second paragraph and replace with “executing the Works within 14 days from”.

The Contractor will not be given access to, and possession of the Site, until the following documentation has been submitted and approved by the Engineer:

- (a) Health and Safety Plan (refer to Clause G8.3 in the Health and Safety Specification included in Volume 3A
- (b) Method Statements (refer to Clause H5.1 in the Environmental Management Specification in Volume Specification included in Volume 3A.
- (c) Proof of Registration / Letter of Good Standing with the Metal & Engineering Industries Bargaining Council (MEIBC)

Sub-Clause 8.3 Programme

Delete the first sentence of the first paragraph and replace with:

The Contractor shall submit a detailed time programme to the Engineer within 14 days from the Commencement Date.

Add the following after the first paragraph:

The Contractor shall incorporate any programming restrictions that may be specified in Sub-Clause 2.1 in the Particular Conditions into the programme.

Sub-Clause 8.4 Extension of Time for Completion

Add the following after par (e):

Regarding sub-paragraph (c), no extension of the Time for Completion 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 exceptionally adverse climatic conditions shall be deemed to exist, and an extension of the Time for Completion shall be granted in accordance with the provisions of this Sub-Clause.

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 adverse weather prevents or disrupts critical work.

January 3 days

February	3 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	3 days
December	3 days

Sub-Clause 8.7 Delay Damages

Wherever the phrase “Delay Damages” occur in the Contract it should be replaced with the phrase “Delay Penalties”.

Insert the following at the end of the second sentence in the first paragraph:

....or, in the event of termination by the Employer under Sub-Clause 15.2 [*Termination by Employer*], the actual date of termination.

Insert the following at the end of the second paragraph:

The Employer further has the right to deduct any other fines or penalties that become due under the Contract.

Sub-Clause 8.10 Payment for Plant and Materials in Event of Suspension

Replace sub-paragraph (b) with the following:

(b) the Contractor has provided an advance payment guarantee in accordance with Sub-Clause 14.2 in the Particular Conditions.

9 Tests on Completion

Sub-Clause 9.1 Contractor’s Obligations

Delete “21 days” in the first sentence of the second paragraph and replace with “14 days”.

10 Employer’s Taking Over

Sub-Clause 10.1 Taking Over of the Works and Sections

Delete 28 days in the 3rd and final paragraph and replace with 14 days

11 Defects Liability

Sub-Clause 11.3 Extension of Defects Notification Period

Delete the first paragraph and replace with:

The Employer shall be entitled subject to Sub-Clause 2.5 [*Employer’s Claims*] to an extension of the relevant Defects Notification Period for the Works or a Section if and to the extent that the Works or Section (as the case may be, and after taking-over) cannot be used for the purposes for which they are intended by reason of a defect or damage. However, a Defects Notification Period shall not be extended by more than five years.

13 Variations and Adjustments

Sub-Clause 13.3 Variation Procedure

Delete “and the Schedule of Payments” in the last paragraph.

Sub-Clause 13.5 Provisional Sums

Add the following to the last paragraph:

The number of quotations shall be three (3). Quotations shall include full technical descriptions as well as a breakdown of prices.

Sub-Clause 13.7 Adjustments for Changes in Legislation

Add the following to the first paragraph:

Any increase or decrease in the amount of Value Added Tax inserted in the Schedules of Quantities due to a change in the percentage rates applicable shall be the subject of adjustment under this Sub-Clause.

Sub-Clause 13.8 Adjustments for Changes in Cost

Deleted and replaced by:

13.8.1 General

The Accepted Contract Amount shall be deemed to have included amounts to cover the contingency of all other rises and falls in costs not covered by the provisions of this or other Clauses.

If provision has been made in the Appendix to Tender for prices to be subject to adjustment, such adjustments claimed by the Contractor shall be made in accordance with the Sub-Clauses referred to therein.

The following general provisions shall apply in all cases:

- (a) The Base Date shall be as defined in Sub-Clause 1.1.3.1 in the Particular Conditions.
- (b) Adjustments for changes in cost shall be calculated as if the Works are executed within the time for completion and no additional costs due to any work being executed outside the time for completion shall be payable unless the Engineer allows an extension of time in accordance with Sub-Clause 8.4 [*Extension of Time for Completion*] and Sub-Clause 8.4 in the Particular Conditions.
- (c) Claims for adjustments for changes in cost shall be supported by such documentary evidence that may be required by the Engineer. Failure to render this information may result in the rejection of claims for price adjustment.
- (d) The value of imported Plant and Materials shall be as defined in the sub-clause below.
- (e) No claims for adjustments for changes in cost will be accepted which are submitted later than 28 days after the date of issue of the Taking-Over Certificate.

13.8.2 Plant and Materials Manufactured in South Africa

13.8.2.1 Permissible Adjustments

Adjustment to the Contract Price for the design, manufacture, painting, testing, supply, delivery, offloading and storage of Plant and Materials manufactured in the Republic of South Africa, shall be allowed **only** for variations in the cost of labour and material based on the indices published by the Steel and Engineering Industries Federation of South Africa (SEIFSA) using the method described in Sub-Clause 13.8.2.1.2.

The following SEIFSA tables shall be regarded as relevant to Mechanical and Electrical Works in this Contract:

Table C3	Index of actual labour cost
Table G	Statistics SA - production price index, Mechanical and Electrical Engineering Materials, as applicable
Table E -	EX Merchant Steel Price Index, Hot Rolled Sheets
Table Q -	(A) Index of stainless steel flat products (excluding imports), Hot rolled steel
Table Q -	1 (A) Corrosion resisting steel 3CR12, Hot rolled plate
Table N	Ruling price of certain electrical cable manufacturing materials, Copper rod 7,90 mm

13.8.2.2

Method of Price Adjustment

Adjustment of the total values inserted in the Schedules of Quantities for the design, manufacture, painting, testing, supply, delivery, offloading and storage of Plant and Materials manufactured in the Republic of South Africa shall be based on the following:

- (a) The estimated proportions (represented by the coefficients “b”, “c”, “d” and “e” in the formulae in sub-paragraph (b) below) of the total values shall be adjusted on the basis of the increase or decrease between the indices in the relevant tables at the Base Date and these indices at a date 42 days prior to the valuation date, for each month in which the Plant and Materials are contractually delivered to Site, by multiplying the monthly values certified by the relevant Adjustment Factor in the formulae in sub-paragraph (b) below.
- (b) the applicable formulae are:

Mechanical Plant and Materials

$$A = a + b \frac{L_n}{L_o} + c \frac{M_n}{M_o} + d \frac{S_n}{S_o} + e \frac{SS_n}{SS_o} - 1$$

where	A	=	Adjustment Factor rounded off to the sixth decimal place
	a	=	0.10 Fixed coefficient (non-adjustable portion)
	b	=	0.15)
	c	=	0.35) Coefficients (sum of these coefficients shall be 0,90)
	d	=	0.25)
	e	=	0.15)
	L _n	=	Current labour index in Table C3
	L _o	=	Base labour index in Table C3
	M _n	=	Current mechanical engineering materials index in Table G
	M _o	=	Base mechanical engineering materials index in Table G
	S _n	=	Current steel price index in Table E-EX
	S _o	=	Base steel price index in Table E-EX
	SS _n	=	Current stainless steel index type 316 in Table Q-(A)
	SS _o	=	Base stainless steel index type 316 in Table Q-(A)

(COMPILER NOTE: specify stainless steel type if not 316)

“Current” indices are those applicable 42 days prior to date of claim, as stated in sub-paragraph (a) above

“Base” indices are those applicable at Base Date, as stated in sub-paragraph (a) above

Electrical Plant and Materials

$$A = a + b \frac{L_n}{L_o} + c \frac{E_n}{E_o} + d \frac{CR_n}{CR_o} + e \frac{C_n}{C_o} - 1$$

where	A	=	Adjustment Factor rounded off to the sixth decimal place
	a	=	0.10 Fixed coefficient (non-adjustable portion)
	b	=	0.10)
	c	=	0.30) Coefficients (sum of these coefficients shall be 0,90)
	d	=	0.20)
	e	=	0.30)
	L _n	=	Current labour index in Table C3
	L _o	=	Base labour index in Table C3
	E _n	=	Current electrical engineering materials index in Table G
	E _o	=	Base electrical engineering materials index in Table G
	CR _n	=	Current 3CR12 steel index in Table Q -1 (A)
	CR _o	=	Base 3CR12 steel index in Table Q -1 (A)
	C _n	=	Current copper rod index in Table N
	C _o	=	Base copper rod index in Table N

“Current” indices are those applicable 42 days prior to date of claim, as stated in sub-paragraph (a) above

“Base” indices are those applicable at Base Date, as stated in sub-paragraph (a) above

- (c) The value of any Plant and Materials imported from outside South Africa inserted on the schedule titled "**Price Basis for Imported Plant and Material**" and subject to Sub-Clause 13.8.2.2 (a) shall be deducted from the total values to be adjusted by the SEIFSA Index adjustment. Any Plant and Materials not inserted in Schedule 23 shall be deemed to be manufactured in South Africa for the purposes of Contract Price Adjustment.

13.8.2.3 Site Installation and General Items

For the purpose of this Sub-Clause, General Items (defined below) are included with Site Installation for the sake of convenience, and which otherwise have no relationship with each other.

General Items shall comprise General Requirements and Conditions, Health and Safety, Environmental Management, Sundries, and any other items so described or implied in the Schedules of Quantities to be adjusted under this Sub-Clause.

Adjustment of the total values inserted in the Schedules of Quantities for Site Installation and General Items, shall be based on the following:

- (a) No Contract Price Adjustment shall be applied to the total values in respect of providing the Performance Security (Demand Guarantee under URDG 758) and Insurances.
- (b) The estimated proportion (represented by the 0.90 coefficient in the formula in sub-paragraph (c) below) of the total values shall be adjusted on the basis of the increase or decrease between SEIFSA **Table C3(A)** Index of actual labour cost (field force) where subsistence allowance is paid, at the Base Date and this index at the valuation date, for each month in which the work is contractually executed, by multiplying the monthly values certified by the Adjustment Factor in the formula in sub-paragraph (c) below.
- (c) the applicable formula is:

Site Installation and General Items

$$A = 0.10 + 0.90 \frac{L_n}{L_o} - 1$$

where

A	=	Adjustment Factor rounded off to the sixth decimal place
0.10	=	Fixed coefficient (non-adjustable portion)
0.90	=	Coefficient
L_n	=	Current labour index in Table C3(A)
L_o	=	Base labour index in Table C3(A)

"Current" index is that applicable at the valuation date, as stated in sub-paragraph (b) above

"Base" index is that applicable at Base Date, as stated in sub-paragraph (b) above

13.8.3 Plant and Materials Imported from Outside South Africa

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

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

13.8.3.1.2 Adjustment for variations in customs surcharge and customs duty

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

13.8.3.1.3 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.

14 Contract Price and Payment

Sub-Clause 14.1 The Contract Price

Delete sub-paragraph (d) and replace with:

- (d) Price data in any Schedule, will be used for calculating the value of completed works for the purpose of interim payments or for determining the value of changes, omissions and additions for variation instructions when in the opinion of the Engineer such prices are applicable.

Add the following at the end of the Sub-clause:

- (e) Except as otherwise stated in the Contract all parts of the Works are to be measured and the value agreed or determined, in accordance with Sub-Clause 3.5. Measurement shall be made of the net actual quantities of those parts, notwithstanding local practice.

Whenever the Engineer requires any part of the Works to be measured, reasonable notice shall be given to the Contractor's Representative, who shall:

- (i) promptly either attend or send another qualified representative to assist the Engineer in making the measurement, and
- (ii) supply any particulars requested by the Engineer.

If the Contractor fails to attend or send a representative, the measurement made by (or on behalf of) the Engineer shall be accepted as accurate.

- (f) Except as otherwise stated in the Contract, wherever any Permanent Works are to be measured by records, they shall be prepared by the Engineer. The Contractor shall, as and when requested, attend to examine and agree the records with the Engineer, and shall sign the same when agreed. If the Contractor does not attend to examine and agree, these records shall be accepted as accurate.

If the Contractor examines and disagrees the records, and/or does not sign them as agreed, then the Contractor shall notify the Engineer of the respects in which the records are asserted to be inaccurate. After receiving this notice, the Engineer shall review the records and either confirm or vary them. If the Contractor does not so notify the Engineer within 14 days after being requested to examine the records, they shall be accepted as accurate.

- (g) All measurements of quantity, length and mass for the purpose of payment shall be to the nearest standard unit for which rates are given in the Schedules of Quantities or have been agreed by the Engineer and shall be taken from the actual work on Site.
- (h) Surplus or waste material will not be taken over or paid for by the Employer except where at the time when it was reasonable for the material to be provided or manufacture to be put in hand it was not possible to determine the quantity of material required. The route lengths determined by the Contractor in accordance with the specification shall be used for the purposes of manufacture in place of the estimated route lengths and any surplus after completion arising therefrom will not be taken over or paid for by the Employer unless the Employer so decides.

Sub-Clause 14.2 Advance Payment

Deleted and replaced by:

Subject to sub-paragraphs (a) and (e) of Sub-Clause 14.3 in the Particular Conditions, and the Advance Payment Schedule, the Employer shall make an advance payment for Plant and Materials stored at places other than the Site, or in respect of which a deposit with order is required, only once the Contractor has submitted an advance payment guarantee in accordance with this Sub-Clause, the authenticity of which has been verified by the City's Treasury Department.

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

The Engineer shall issue an Interim Payment Certificate for, or including, advance payment after receiving a Statement under Sub-Clause 14.3 [*Application for Interim Payment Certificates*] and after the Employer has received a guarantee in an amount equal to the advance payment requested. This guarantee shall be issued by a financial institution approved by the Employer, as listed in the Annexure in Part C1.3 of the Contract Data, and shall be in the form of and shall contain the precise wording of the document included in Part C1.4: **Form of Advance Payment Guarantee** and shall come into force, be administered and expire in terms thereof.

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

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

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

Sub-Clause 14.3 Application for Interim Payment Certificates

Delete "in six copies" in the first line of the first paragraph.

Sub-Clause 14.5 Plant and Materials Intended for the Works

Add to (c)(ii):

or are ready to be delivered to site and the Engineer has instructed the Contractor to store the Plant and Materials until the site can accommodate their delivery, and are properly stored at the Contractor's or the sub-Contractor's Works, are protected against loss, damage or deterioration, and appear to be in accordance with the Contract and for which an advance payment guarantee has been provided in accordance with Sub-Clause 14.2 in the Particular Conditions. The advance payment guarantee shall be valid until the Plant and Materials are properly stored on Site and protected against loss, damage or deterioration.

Sub-Clause 14.6 Issue of Interim Payment Certificates

Delete "within 28 days" in the second sentence of the first paragraph and replace with "within 21 days".

Sub-Clause 14.7 Payment

Delete sub-paragraphs (a) to (c) and replace with:

- (a) the amount certified in each Interim Payment Certificate within 35 days after the Engineer receives the Statement and supporting documents; and
- (b) the amount certified in the Final Payment Certificate within 28 days after the Employer receives this Payment Certificate.

Add the following paragraph:

Notwithstanding the above, the Engineer shall be empowered to withhold the delivery of a payment certificate until the Contractor has complied with his obligations to submit the monthly returns in terms of Sub-Clause 6.10 in the Particular Conditions and as described in the Employer's Requirements.

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

Sub-Clause 14.9 Payment of Retention Money

Delete the last paragraph and replace with:

The relevant contract value for each Section shall be determined by the Engineer, based on the Schedules of Quantities and any variations and adjustments thereto.

Sub-Clause 14.10 Statement at Completion

Delete "Within 84 days" in the first paragraph and replace with "Within 28 days,".

Delete "six copies of" in the first paragraph.

Sub-Clause 14.11 Application for Final Payment Certificate

Delete "Within 56 days" in the first paragraph and replace with "Within 14 days".

Delete "six copies of" in the first paragraph.

Add the following new Sub-Clause after Sub-Clause 14.5:

Sub-Clause 14.16 Tax Invoices

Section 20(1) of the Value Added Tax Act, 89 of 1991 requires that a supplier (person supplying goods or services) who is registered as a VAT vendor issue to the recipient a tax invoice within 21 days of the date of a supply whether requested or not.

The Contractor shall provide a tax invoice (VAT invoice) which shall be included with each Payment Certificate and a Final Payment Certificate delivered to the Employer by the Engineer in terms of Sub-Clause 14.6 [Issue of Interim Payment Certificates] and Sub-Clause 14.6 in the Particular Conditions, and Sub-Clause 14.13 [Issue of Final

Payment Certificate], respectively. Failure by the Contractor to provide a tax invoice (VAT invoice) timeously may delay delivery of the payment certificate by the Engineer and no interest shall accrue.

Tax invoices may only be dated on or after the date of the relevant Payment Certificate as issued by the Engineer.

15 Termination by Employer

Add the following additional Sub-Clause after Sub-Clause (f)

- (g) who was a Sole Proprietor, or a sole member of a Close Corporation dies

Insert the following after paragraph three:

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

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

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

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

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

16 Suspension and Termination by Contractor

Sub-Clause 16.1 Contractor's Entitlement to Suspend Work

Delete "Sub-Clause 2.4 [*Employer's Financial Arrangements*] or" in the first paragraph.

Sub-Clause 16.2 Termination by Contractor

Delete the content of sub-paragraph (a)

17 Risk and Responsibility

Sub-Clause 17.3 Employer's Risks

Add the following after sub-clause (h):

- (i) defects in the materials supplied by the Employer for incorporation in the Works,
- (j) the confiscation, commandeering, nationalisation, requisition or destruction of or damage to property by an order of government, or any public or local authority, and
- (k) the amounts by which the replacement value of free issue materials exceeds the values as specified in the tender document by the Employer.

18 Insurance

Sub-Clause 18.1 General Requirements for Insurances

Add the following at the end of the first paragraph:

Save as otherwise provided in the Contract, nothing herein contained shall oblige the Insuring Party to effect any insurance which is not generally obtainable from a registered insurer in South Africa.

Add the following at the end of the second last paragraph:

The Insuring Party shall be liable for the payment of all deductibles.

Add the following at the end of Sub-Clause (a) before the comma:

“or an insurance broker’s warranty worded precisely as given in Part C1.7 Insurance Broker’s Warranty”.

Sub-Clause 18.2 Insurance for Works and Contractor’s Equipment

Add the following at the end of the first paragraph:

In addition to and in terms of the same conditions as the rest of this clause, the Insuring Party shall further provide special risks / supplementary insurance issued by the South African Special Risks Insurance Association (SASRIA) in respect of civil commotion, riot and strike in the same value as the works insurance.

Delete “Sub-Clause 18.2 [(e) (i) and (ii)] ”.

Sub-clause 18.3 Insurance against Injury to Persons and Damage to Property

Add the following at the end of the first paragraph:

In addition to and in terms of the same conditions as the rest of this clause, the Insuring Party shall provide Motor Vehicle Liability Insurance comprising (as a minimum) “Balance of Third Party” Risks including Passenger Liability Indemnity.

Sub-Clause 18.4 Insurance of Contractor’s Personnel

Add the following at the end of the first paragraph:

This insurance shall be in terms of the provisions of the Compensation for Occupational Injuries and Diseases Act, 130 of 1993.

20 Claims, Disputes and Arbitration

Sub-Clause 20.5 Amicable Settlement

Add the following after the first paragraph:

Any amicable settlement conducted in terms of this clause will be done by mediation in accordance with rules determined by the mediator. Where the parties fail to agree on a mediator, the mediator shall be appointed by the entity or official named in the Appendix to Tender.

Mediation shall be conducted without legal representation with the costs being borne equally by the parties.

The parties shall record any agreement reached in writing and thereafter they shall be bound by such agreement.

The mediator shall be authorized to end the mediation process whenever, in his opinion, further efforts at mediation would not contribute to a resolution of the dispute between the parties.

If the mediation fails, then either party may require that the dispute be settled by litigation.

Delete all references to “Arbitration” in the conditions and replace it with “Litigation”

Delete Sub-Clause 20.6 and replace with the following:

Sub-Clause 20.6 Litigation

Any unresolved dispute shall be finally determined by court proceedings in the Court as stated in the Appendix to Tender.

ADVANCE PAYMENT SCHEDULE	
This Advance Payment Schedule is to be read in conjunction with Sub-Clauses 14.2 and 14.3 (sub-paragraphs (a) and (e)) in the Particular Conditions. The purpose of this schedule is to itemise specific Plant and Materials not yet brought on to the Site for building into the Permanent Works and for which the Employer is prepared to make advance payments to the Contractor, subject to the conditions below. The items of Plant and Materials which have been identified by the Employer as being suitable for advance payment in terms of the Contract are listed in the table below. Should an item or items be added to the list at tender stage by a tenderer, such item(s) will not be binding on the Employer.	
Plant and Materials which have been manufactured and are stored at places other than the Site:	Plant and Materials yet to be manufactured and for which a deposit with order is required from the Contractor by a manufacturer/supplier, and which may be stored at places other than the Site after manufacture:
Steel bridges for settling tanks	Screw pumps and mechanical screens at inlet works.
Electrical distribution boards	FBDA Blowers.
Alternator sets	UV disinfection equipment and UV upstream mechanical screens.
Variable frequency drives (VFDs)	Primary sludge screen presses.
	Dewatering equipment (linear screens and belt presses).
	CHP engines and gas scrubbing equipment.
	Boilers, heat exchangers and heat recovery units.
	Sludge pumps and recirculation equipment.
Conditions: 1) The Contractor can only rely on advance payment being permitted by the Employer in respect of the Plant and Materials listed in the table above, and in respect of condition 5) below. The Employer may, however, permit advance payment for other Plant and Materials in exceptional circumstances and at its sole discretion, during the course of the Contract, and upon reasonable request from the Contractor. 2) Advance payment for the purposes of deposits will only be provided up to a limit of 50% of the value of any one item being claimed. 3) The Contractor shall provide the Employer with documentary evidence of the terms and conditions for which a deposit with order is required by a manufacturer/supplier, together with the advance payment guarantee. 4) The Contractor will also be permitted to obtain advance payment for the balance of the value of the Plant and Materials in respect of which he has paid a deposit, for an item which after manufacture is stored at a place other than the Site. The Contractor shall, in respect of such payment, provide an advance payment guarantee, either for such balance or, if the advance payment guarantee in respect of the deposit is to be returned by the Employer upon request, for the whole value of the item. 5) In the event of suspension in terms of Sub-Clause 8.10 in the General and Particular Conditions, as referred to in sub-paragraph (a) in Sub-Clause 14.3 in the Particular Conditions, the Employer shall also permit advance payment for Plant and Materials which have not been delivered to Site, subject also to the terms of Sub-Clause 14.2 in the Particular Conditions.	

CITY OF CAPE TOWN

DIRECTORATE: WATER AND SANITATION

CONTRACT NO. 191Q/2023/24

DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE
MACASSAR WASTEWATER TREATMENT WORKS

C1.3 Form of Performance Guarantee

PERFORMANCE GUARANTEE

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

GUARANTOR DETAILS AND DEFINITIONS

"Guarantor" means:

"Physical address:

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

"Contractor" means:

"Engineer" means:

"Works" means: **CONTRACT NO. 191Q/2023/24: DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS
FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS**

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

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

"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 Engineer of the Performance Certificate.

CONTRACT DETAILS

Engineer issues: Interim Payment Certificates, Final Payment Certificate and the Performance Certificate as defined in the Contract.

PERFORMANCE GUARANTEE

1. The Guarantor's liability shall be limited to the amount of the Guaranteed Sum.
2. The Guarantor's period of liability shall be from and including the date of issue of this Performance Guarantee and up to and including the Expiry Date or the date of payment in full of the Guaranteed Sum, whichever occurs first. The Engineer and/or the Employer shall advise the Guarantor in writing of the date on which the Performance Certificate 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 Engineer in an Interim or Final Payment Certificate has not been made in terms of the Contract and failing such payment within seven (7) calendar days, the Employer intends to call upon the Guarantor to make payment in terms of 4.2;
 - 4.2 A first written demand issued by the Employer to the Guarantor at the Guarantor's physical address with a copy to the Contractor stating that a period of seven (7) calendar days has elapsed since the first written demand in terms of 4.1 and the sum certified has still not been paid;
 - 4.3 A copy of the aforesaid payment certificate which entitles the Employer to receive payment in terms of the Contract of the sum certified in 4.
5. Subject to the Guarantor's maximum liability referred to in 1, the Guarantor undertakes to pay to the Employer the Guaranteed 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.
- 9.9. The Employer shall have the absolute right to arrange his affairs with the Contractor in any manner which the Employer may deem fit and the Guarantor shall not have the right to claim his release from this Performance Guarantee on account of any conduct alleged to be prejudicial to the Guarantor.
10. The Guarantor chooses the physical address as stated above for the service of all notices for all purposes in connection herewith.
11. This Performance Guarantee is neither negotiable nor transferable and shall expire in terms of 2, whereafter no claims will be considered by the Guarantor. The original of this Guarantee shall be returned to the Guarantor after it has expired.
12. This Performance Guarantee, with the required demand notices in terms of 4 or 5, shall be regarded as a liquid document for the purposes of obtaining a court order.

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

Signed at

Date

Guarantor's signatory (1)

Capacity

Guarantor's signatory (2)

Capacity

Witness signatory (1)

Witness signatory (2)

ANNEXURE

CONTRACT GUARANTEES POLICY APPROVED INSTITUTIONS

The following financial institutions are currently (as at 28 February 2023) approved for issue of contract guarantees to the City:

National Banks:

ABSA Bank Limited
FirstRand Bank Limited
Investec Bank Limited
Nedbank Limited
Standard Bank of South Africa Limited

International Banks (with branches in South Africa):

Barclays Bank PLC
Citibank NA
Credit Agricole Corporate and Investment Bank
HSBC Bank PLC
JP Morgan Chase Bank
Societe Generale
Standard Chartered Bank

Insurance Companies:

American International Group Inc (AIG)
Bryte Insurance Company Limited
Coface SA
Compass Insurance Company Limited
Credit Guarantee Insurance Corporation of Africa Limited
Guardrisk Insurance Company Limited
Hollard Insurance Company Limited
Infiniti Insurance Limited
Lombard Insurance Company Limited
Mutual and Federal Risk Financing Limited
New National Assurance Company Limited
PSG Konsult Ltd (previously Absa Insurance)
Regent Insurance Company Limited
Renasa Insurance Company Limited
Santam Limited

CITY OF CAPE TOWN

DIRECTORATE: WATER AND SANITATION

CONTRACT NO. 191Q/2023/24

DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE
MACASSAR WASTEWATER TREATMENT WORKS

C1.4 Form of Advance Payment Guarantee

ADVANCE PAYMENT GUARANTEE

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

GUARANTOR DETAILS AND DEFINITIONS

"Guarantor" means:

"Physical address:

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

"Contractor" means:

"Engineer" means:

"Works" means: **CONTRACT NO. 191Q/2023/24: DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR
THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS**

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

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

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

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

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

Amount in words:

"Expiry Date" means: The date of the payment certificate wherein the Plant and Materials have been certified by the
Engineer as having been built into the Permanent Works.

CONTRACT DETAILS

Engineer issues: Interim Payment Certificates and Final Payment Certificate.

ADVANCE PAYMENT GUARANTEE

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

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

Signed at
Date
Guarantor's signatory (1)
Capacity
Guarantor's signatory (2)
Capacity
Witness signatory (1)
Witness signatory (2)

Schedule of Plant and Materials

For use with Advance Payment Guarantees on contracts using the General Conditions of Contract for Plant and Design-Build for Electrical and Mechanical Works and for Building and Engineering Works Designed by the Contractor, First Edition, 1999 (Yellow Book) published by the International Federation of Consulting Engineers (FIDIC).

Employer The City of Cape Town, WATER AND SANITATION

Contractor

Works **CONTRACT NO. 191Q/2023/24: DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR 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:

Schedule 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 theday of.....20.....

.....
for the Contractor

.....
As witness

.....
Approved by Engineer

CITY OF CAPE TOWN

DIRECTORATE: WATER AND SANITATION

CONTRACT NO. 191Q/2023/24

DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS

C1.5 Occupational Health and Safety Agreement

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

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

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

I, , representing

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

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

COID ACT Registration Number:

OR Compensation Insurer: Policy No.:

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

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

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

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

Signed aton the.....day of.....20....

Witness

Mandatory

Signed at on the.....day of.....20

Witness

for and on behalf of
City of Cape Town

CITY OF CAPE TOWN

DIRECTORATE: WATER AND SANITATION

CONTRACT NO. 191Q/2023/24

DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS

C1.6 Protection of the Environment Declaration

PROTECTION OF THE ENVIRONMENT DECLARATION

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

CONTRACT NO.: 191Q/2023/24

CONTRACT TITLE: **DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR 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 Schedules 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 Engineer 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 Engineer, 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 Engineer shall, with respect to any fine imposed, provide me/ us with a written statement giving details of the offence, the facts on which the Engineer has based his assessment and the terms of the Contract (by reference to the specific clause) which has been contravened.

Signed Date.....
CONTRACTOR

CITY OF CAPE TOWN

DIRECTORATE: WATER AND SANITATION

CONTRACT NO. 191Q/2023/24

DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF
THE MACASSAR WASTEWATER TREATMENT WORKS

C1.7 Insurance Broker's Warranty

Pro Forma



Letterhead of Contractor's Insurance Broker

Date _____

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

Dear Sir

CONTRACT NO.: **191Q/2023/24**

CONTRACT TITLE: **DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE
UPGRADING AND EXPANSION OF THE MACASSAR 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 CITY OF CAPE TOWN 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: _____

CITY OF CAPE TOWN

DIRECTORATE: WATER AND SANITATION

CONTRACT NO. 191Q/2023/24

DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS

C1.8 Contract of Temporary Employment as Community Liaison Officer

Construction Contract No.: 191Q/2023/24

PROJECT: DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS

AGREEMENT made between the CONTRACTOR
and the Community Liaison Officer....., 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 R 462 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 behaviour;
 - (ii) insubordination to Team Leader, Supervisors or Management;
 - (iii) abuse of intoxicating substances;
 - (iv) wilful 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

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C2.1 Pricing Assumptions.....	642 – 644

CITY OF CAPE TOWN

DIRECTORATE: WATER AND SANITATION

CONTRACT NO. 191Q/2023/24

DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS

C2.1 Pricing Assumptions

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

1. Pricing of Mechanical and Electrical Works shall be conducted in the following manner:

a. Design and Drawings

With reference to clause 5 [Design] of the General Conditions of Contract, the Contractor shall carry out and be responsible for the design of the Works and the tenderer shall include, under the respective payment items for Design and Drawings for the detail design and submission of associated General Arrangement (GA), Process and Instrumentation Diagrams (P&IDs), workshop drawings and equipment data packs for the respective equipment and/or system.

The Engineer's design included in the tender shall be seen as conceptual in nature for tendering purposes and hence detailed designs shall be required for all equipment and/or systems included in the tender in accordance with the Employer's Requirements.

b. Manufacture, supply and delivery to Site

The prices quoted for the manufacture and supply of plant and equipment shall make provision for:

- Supply of all materials, labour and plant required for manufacturing purposes;
- Application of any/all factory-applied corrosion protection;
- Execution of any/all factory-acceptance testing;
- Loading, handling, shipping, transport, delivery to and off-loading at the Site;
- Double handling in cases where immediate installation is not possible.
- All relevant fixing hardware (i.e. nuts, bolts, washers, gaskets etc.)

Unless otherwise specified, the attendance of any factory-acceptance tests outside the border of South Africa by the Engineer and Employer shall not be required.

c. Installation

The prices quoted for erection and/or installation shall make provision for:

- Supply of all rigging and associated equipment for the handling, alignment and fixing in final position;
- Repair of damaged corrosion protection;
- Painting as per specified colour coding;
- Supply and installation of first charge consumable i.e. oil, grease etc.;
- Guaranteeing for the period of the defects notification period
- Full servicing, including replacement of all consumables, at the end of the defects notification period.

If the supply of the first charge chemicals (ferric chloride, poly electrolyte etc.) is required a separate payment item shall be provided.

d. Testing and Commissioning

The prices quoted for the testing and commissioning of equipment and/or systems shall make provision for the supply of all required testing apparatus, drafting of functional design specifications and testing plans, attendance on Site of any/all commissioning experts and specialists, operating, mechanical and electrical testing, adjusting, optimizing in order to commence with the Trial Operation Period (if applicable) or handing over in proper working condition.

e. Trial Operation Period

Unless otherwise specified, a Trial Operation Period shall be applicable to the Contract and adequate allowance shall be made in terms of costs, resources and programming. The requirements of the Trial Operation Period shall be included under Project Specification.

f. Scope

The Employer reserves the right to sub-divide the contract or omit certain portions thereof. Prices quoted under a specific Section or Schedule shall be deemed to apply to that Section or section of work

only.

2. Descriptions in the Schedules of Quantities are abbreviated and comply generally with those in the Standardised Specifications. The applicable clause of each Standardised Specification, read together with the relevant clauses of the Scope of Work, set out what ancillary or associated activities are included in the rates for the operations specified. Should any requirements of the measurement and payment clause of the applicable Standardised Specification, or the Scope of Work, conflict with the terms of the Schedule, the requirements of the Standardised Specification or Scope of Work, as applicable, shall prevail.
3. The measurement and payment clauses in a specification in which further information regarding the scheduled items is given, are referenced under "chief reference" in the Schedules of Quantities. The referenced clauses are not necessarily the only sources of information in respect of scheduled items. Further information and specifications may be found elsewhere in the contract documents.
4. Unless otherwise stated, items are measured net in accordance with the drawings, and no allowance is made for waste.
5. The quantities set out in the Schedules of Quantities are the estimated quantities of the Contract Works, but the Contractor will be required to undertake whatever quantities may be directed by the Employer's Agent from time to time. The Contract Price for the completed contract shall be computed from the actual quantities of work done, valued at the relevant unit rates and prices.
6. The prices and rates to be inserted in the Schedule of Quantities are to be the full inclusive prices for the work described under the several items. Such prices and rates shall cover all costs and expenses that may be required in and for the execution of the work described, and shall cover the cost of all general risks, liabilities, and obligations set forth or implied in the documents on which the tender is based, as well as overhead charges and profit. Reasonable 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. A price or rate should be entered against each item in the Schedules of Quantities, whether the quantities are stated or not. **An item against which no rate is/are entered, or if anything other than a rate or a nil rate (for example, a zero, a dash or the word "included" or abbreviations thereof) is entered against an item, it will also be regarded as a nil rate having been entered against that item, i.e. that there is no charge for that item.** The Tenderer may be requested to clarify nil rates, or items regarded as having nil rates; and the Employer may also perform a risk analysis with regard to the reasonableness of such rates.
8. Except where rates only are required, insert all amounts to be included in the total tendered price in the "Amount" column and show the corresponding total tendered price.
9. Items have been provided where any further items considered necessary by the Tenderer can be priced. The Tenderer must provide full details of what has been allowed for with his Tender under these items.
10. The units of measurement described in the Schedule of Quantities are metric units. Abbreviations which may be used in these Schedule of Quantities are as follows:

No.	=	number
Item/Sum	=	lump sum
Prov	=	Provisional sum
PC sum	=	prime cost sum
%	=	per cent
Days	=	"Day" as defined in the Conditions of Contract
hrs	=	Hours
m	=	metre
cubicm	=	cubic metre
sqmm	=	square millimeter
m3-month	=	cubic metre per month

Prime Cost Sum

- a) Description of Item to which Prime Cost Sum Applies Unit : PC Sum
- b) Charge Required by Contractor on Sub-item (a) above Unit : %

The Contractor shall be reimbursed under sub-item(s) (a) in substitution of the respective Prime Cost Sums included in the Contract, the actual price(s) paid or payable by him in respect of the goods, materials or services

supplied by others, but excluding any charges for the Contractor's labour, profit, carriage, establishment or other charges related to such goods, services or materials.

The Contractor shall be paid under sub-item (b), the respective percentage, as stated by the Contractor in its Tender, of the amount certified by the Engineer for payment under the related sub-item (a). The percentages tendered by the Contractor for each respective sub-item (b) included in the Bill of Quantities shall be deemed to in full and final compensation to the Contractor in respect of any charge by the Contractor for labour, carriage profit, establishment and for any other charges related to the goods, services or materials supplied under the related sub-item (a).

If the Contractor shall have omitted within its Tender to insert a tendered percentage under sub-item (b), or tendered a zero percentage, the Contractor's tendered rate for sub-item (b) shall be deemed to be zero and the Contractor shall not be entitled to any payment under sub-item (b).

11. Where fractions of a cent occur in calculations of prices and amounts, they shall be rounded up/down to the nearest whole cent.
12. The Tenderer is referred to C.2.24 in Part T1.2 Tender Data regarding the pricing of Deviations and/or Qualifications.

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

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

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

13. Tenderers are referred to Clause 8 Measurement and Payment in the Environmental Management (EM) Specification in Part C3.5 in the Scope of Work for the basic principles of measurement and pricing of the EM Specification.
14. All descriptions or clauses where trade names or proprietary products are specified, are deemed to include the phrase "or equal approved"
15. Tenderers are referred to Sub-Clause 13.8 in the Appendix to Tender in Part C1.2 Contract Data regarding contract price adjustment.
16. Design of the Works, Contractor's Documents (including "as built" drawings and Manual), and design for the manufacture of materials and equipment, must be priced and will be paid for as follows:
 - a) An item is provided in the Schedules of Quantities (Schedule No. P&Gs, General Requirements and Conditions) for Design of the Works and submission of Contractor's Documents – this item includes *inter alia* the Contractor's obligations under Clause 2 in Part C3.2 Engineering, up to Sub-Clause 2.3.
 - b) Items are provided in the Schedules of Quantities (Schedule No. M34, Sundries) for Providing "as built" drawings, and draft and final copies of the Installation, Operation and Maintenance Manuals – these items cover the Contractor's obligations under Clause 2 in Part C3.2 Engineering, Sub-Clauses 2.4 and 2.5.
 - c) Items of materials and equipment are provided in the Schedules of Quantities under headings containing the words "design, manufacture, painting, testing, supply, delivery, offloading and storage" – "design" in these items will usually only be paid upon supply of the materials and equipment, but may be paid for separately at the discretion of the Engineer.

Part C3: Scope of Work

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Status

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

1. Scope of Work (Parts C3.1, C3.2, C3.3, C3.4 and C3.5)
2. Particular Specifications
3. Standard Specification for Mechanical Works, Standard Specification for LV and Electrical, Standard Specification for MV Electrical Works, SANS Standardised Specifications (if applicable)
4. Drawings
5. Bills of Quantities

DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS

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
- 3.1.6 DESCRIPTION OF SITE AND CONDITIONS
- 3.1.7 SITE ACCESS
- 3.1.8 SCHEDULE OF CIVIL-MECHANICAL INTERFACES (BATTERY LIMITS)
- 3.1.9 WORK TO BE CARRIED OUT BY OTHERS (UNDER SEPARATE CONTRACTS)
- 3.1.10 PROCESS CONTROL: ASSISTANCE, MAINTENANCE AND TRAINING PERIOD

3.1.1 EMPLOYER'S OBJECTIVES

The existing Macassar wastewater treatment works (WWTW) consists of an activated sludge process and comprises of an inlet works, two carousel ditch activated sludge reactors, six circular settling tanks, a chlorine disinfection facility (gas), maturation ponds, a sludge dewatering facility and a dewatered sludge silo. The existing works also includes effluent re-use infrastructure comprising a filter building and a final effluent pump station. The WWTW is designed to treat an average dry weather flow (ADWF) of 48Ml/day. The effluent is disinfected with chlorine prior to discharge into the sensitive Eerste River. A portion of treated effluent is also recycled for both off-site and on-site use. The waste activated sludge is dewatered, stored in silos and finally disposed of off-site.

Due to rapid urbanisation and a sustained population growth in the False Bay region, a shortfall in treatment capacity is experienced at the Macassar WWTW. The Macassar WWTW experiences a number of operational problems. Both of these factors have led to the Macassar WWTW not being able to treat wastewater adequately, this has resulted in the poor effluent quality discharged into the Eerste River, which meets the Macassar beach (approximately 1.5km from the discharge point in the Eerste River). The mechanical and electrical infrastructure throughout the works is generally poor and dilapidated, with a significant portion having reached their life expectancy. The aeration capacity at the works is a limitation and the de-rated treatment capacity is 21.6Ml/day (ADWF). These issues in conjunction have made it difficult to meet the required effluent standards set out in the Water Use License (WULA) issued by the Department of Water and Sanitation (DWS).

The Macassar WWTW and Gordon's Bay WWTW catchment area has seen an unprecedented amount of development over the last 10 years and has been identified for future developments within 2015 City of Cape Town Sewer Master Plan. These developments will increase the wastewater flows received at the Macassar WWTW which is currently at capacity. There is subsequently a need to upgrade the Macassar WWTW to cater for this future capacity whilst addressing the current operational problems experienced at the Works.

The objective of the Employer (City of Cape Town) is to upgrade and expand the existing Macassar WWTW to provide adequate treatment capacity for a 20-year design horizon and will cater for flows up until the end of calendar year 2048. The upgrade and capacity extension of the Macassar WWTW will seek to increase the capacity of the existing Macassar WWTW to 80 Ml/day (ADWF).

The Works described in this Contract Document covers the Mechanical and Electrical Installation for the upgrade and extension of the Macassar WWTW.

3.1.2 OVERVIEW OF THE WORKS

This Contract Document comprises the Mechanical and Electrical Installation for the Upgrade and Extension of the Macassar WWTW. The upgrade and extension will remove capacity limitations on the

existing process, reduce energy demand, optimise operation and maintenance and prevent further pollution of the Eerste River. The Works comprises of a new inlet works with an emergency tank for excess flows (modifications to the existing reactor) and a primary sludge screening facility, primary settling tanks, new reactor modules (which caters for biological nutrient removal and fine bubble diffused aeration), secondary settling tanks, UV and chlorine disinfection, refurbishment to maturation ponds, gravity thickeners, anaerobic digesters, gas holding tanks, CHP building, dewatering building, sludge storage silos, blower building, treated storage effluent pump station with filter room, buildings (process operation, workshop and storeroom, guard house, weigh bridge, electrical), associated pump stations, as well as associated pipework and general civil engineering services (roads, stormwater, reticulation networks, fencing, etc.).

The Works will be phased into two (2) phases, namely Phase 1 and 2. This will allow for the new mechanical and electrical equipment to be installed first whilst the existing equipment at the Works remains operational. The flow will then be diverted through the new installations whilst the existing equipment is decommissioned, wherever applicable.

Should the total constructions costs exceed the Employers available budget, the Employer reserves the right to delay or omit the works, or parts thereof.

3.1.3 EXTENT OF THE WORKS

The Works to be carried out by the contractor under this Contract comprises mainly of the following:

- Design
- Manufacture
- Supply
- Delivery
- Installation and Construction
- Testing
- Commissioning and Trial Operation Period
- Training the Employer's staff in Operation and Maintenance
- Upholding during the Defects Notification Period.

The Works shall be designed to function safely and effectively in conjunction with the infrastructure provided by others for this project. Where components of the Works are incorporated into structures provided by others, these components shall be designed accordingly.

The Scope of this Contract will be as follows:

The Mechanical works comprises the installation of the following:

a) Inlet Works:

- Two Archimedes screw pump stations with greasing pumps
- Isolation wall mounted sluice gates (Actuated)
- Ventilation systems for each screw pump station room
- Four (4) mechanical front rake screens and four (4) perforated belt screens
- Four (4) hand-raked bar screens
- Four (4) washer compactors, water launders and skip dollies to house skips containing the removed screenings
- Channel mounted sluice gates with and without actuators

- Three (3) grit classifiers
 - Provision of mechanical equipment for six (6) vortex degritters including all associated piping, equipment, valves and a skip dolly to house skips containing the removed grit.
 - Odour Control
- b) Primary Settling Tanks (PSTs):
- Provision of rotating bridges and sludge valves of four (4) PSTs
 - Odour control
- c) Six-way PST Flow Splitter:
- Actuated sluice gates
- d) Three-way Reactor Distribution Flume Channels:
- Actuated sluice gates
- e) Biological Reactors:
- Anaerobic and anoxic mixers
 - Titling weirs
 - Internal recycle pump stations and valves
 - Chemical phosphorus removal dosing equipment
- f) Emergency Tank:
- Weirs
 - Mixers
- g) Secondary Settling Tanks (SSTs):
- Provision of rotating bridges and sludge valves of twelve (12) SSTs
- h) Four-way SST Distribution Flume Channels:
- Actuated sluice gates
- i) Six-way SST Flow Splitters:
- Actuated sluice gates
- j) Effluent Conveyance Channels:
- Sluice gates with and without actuators
- k) Disinfection:
- Three (3) step screens
 - Six (6) banks of UV units with automatic wipers
 - Sluice gates with and without actuators
 - Two (2) washer compactors and a skip dolly to house skips containing the removed screenings
- l) Primary Sludge Screening Facility:

- Primary sludge pumps
 - Two (2) strain presses
 - Sluice gates with and without actuators
 - Flow measurement device
 - Two (2) hydrocyclones, including all associated piping, equipment, valves, etc.
 - Odour control
- m) Main Sludge Transfer Pump Station:
- Gravity thickener feed pumps
 - Digester feed pumps
 - WAS pumps
 - Pumping associated equipment
 - Odour control
- n) Gravity Thickeners:
- Bridge motors and rotating equipment for two (2) gravity thickeners
 - Odour control
- o) Anaerobic Digesters:
- Digester mixing pumps for two (2) anaerobic digesters
 - Sludge recirculation pumps for two (2) anaerobic digesters
- p) Gas Holding Tanks
- Flaring and gas cleaning equipment
- q) Waste Activated Sludge (WAS) Tanks:
- Mixers for four (4) WAS holding tanks
 - Sludge recirculation pumps
- r) Primary Sludge (PS) Holding Tanks
- Mixers for two (2) PS holding tanks
 - Sludge recirculation pumps
 - Odour control
- s) Scum Pump Station
- Scum pumps and associated equipment
- t) Dewatering Building:
- WAS sludge feed pumps
 - PS sludge feed pumps
 - Ten (10) linear screens

- Fourteen (14) belt presses
 - Make-up and dosing equipment
 - Associated equipment required for pumping and treatment of sludge
 - Odour control
- u) Sludge Cake Silos:
- Live bottom screws
 - Screw conveyors
 - Sludge cake pumps
- v) Return Activated Sludge (RAS) Pump Station:
- Pumps
 - Actuated sluice gates
- w) Blower Building:
- Fine bubble diffused aeration (FDBA) blowers
 - Compressors
 - Associated equipment required for aeration
- x) Boiler House Facility:
- Heat exchangers
 - Dual fuel boilers
 - Hot water recirculation pumps
 - Water softening equipment
- y) Chlorination Building:
- Gas cylinders
 - Water pumps
 - Associated chlorination equipment
- z) Service Water (Washwater) Pump Station
- Pumps and associated equipment
 - Valves
- aa) Treated Sewage Effluent (TSE) Infrastructure:
- Pumps and associated equipment
 - Automatic self-cleaning filters
- bb) Combined Heat and Power (CHP)
- Biogas Engines

- Gas Scrubbing Equipment (H₂S removal, Particulate filtration, moisture removal, siloxane removal etc.)
- Heat Recovery Unit
- Heat Exchanger Units

cc) General:

- Provision of lifting equipment
- Provision of spares as specified in the Contract
- Maintenance of Works

The Electrical works comprises of the following:

- a) Liaison with the Employer's MV department to coordinate the shutdown, decommissioning of equipment, removal and transportation of the existing MV network infrastructure and to accommodate and coordinate the electrical works described in this specification.
- b) Liaison with the supply authority (Eskom) to coordinate the electrical works described in this specification.
- c) Liaison with all parties required to apply and obtain wayleaves and permits.
- d) Modification and extension of existing 11 kV cable ring main cables
- e) Decommissioning and removal of the existing electrical equipment (including cable supports) above ground
- f) 2 off 11.5/11.5kV 7500kVA isolation transformers
- g) 12 off 11.5kV/420V distribution transformers
- h) 1 off 11.5kV/420V 315kVA Auxiliary transformer
- i) New Macassar WWTW Main Intake 11kV Switchboard and metering
- j) 2 off 11kV collector switchboards for centralised diesel generators and biogas (CHP) facilities
- k) 9 off 400V/11.5kV step-up transformers
- l) 6 off 4-way secondary switchgear units
- m) 2 off NECRTs
- n) MV Cables, including trenching and cable supports where required
- o) Centralized generator plant, with bulk fuel tank system and 400V/11.5kV step-up transformers
- p) Earthing and bonding
- q) Lightning Protection
- r) Protection and power quality logging and studies
- s) 18 Motor Control Centres
- t) Power Factor Correction and Harmonic Filtering (LV)
- u) Protection and power quality logging and studies
- v) Diesel generators and outdoor diesel fuel tanks
- w) LV cables

- x) Cable supports
- y) Area lighting
- z) Factory testing, site testing and commissioning of the electrical installation
- aa) Certificate(s) of compliance
- bb) As-built drawings
- cc) Operation and maintenance manuals
- dd) Training
- ee) Spares

The Control and Instrumentation works comprises of the following:

- a) Programmable Logic Controller (PLC), Human Machine Interface (HMI), and Remote Input/Output (RIO) based control system for the:
 - Inlet works.
 - Bioreactor
 - Primary settling
 - Secondary settling
 - Blowers
 - Dewatering, including primary sludge and waste activated sludge handling.
 - Ultraviolet disinfection
 - Service water
 - TSE
- b) Ethernet device layer networks for each main PLC and process area
- c) A new site-wide fibre optic backbone for supervisory and control layer dual redundant ring networks, including splicing, testing, and trenching where required.
- d) Sub-ring control layer network for the dewatering area
- e) An on-site LoRaWAN network of sensors, gateways, and servers to collect data from remote plant areas.
- f) Master SCADA system for the complete scheme at the process operation building control room and client operator station at the dewatering area.
- g) Historian and reporting
- h) Engineering PC and software for system configuration, maintenance, and updates of PLC, SCADA, and networks
- i) Discrete and analogue field instrumentation, flow meters and analysing stations, including installation material, and mounting brackets.
- j) Instrumentation, IO-Link and data cabling, cable racking and supports.
- k) Detailed design of the complete process control system network and all related components
- l) Factory acceptance testing of PLC panels, local control panels, instrument junction boxes, transmitter boxes, and instrument terminal boxes.
- m) Detailed functional design specification
- n) Programming of the PLC, remote IO, networks, SCADA, and HMIs for a complete and functional system
- o) Configuration and calibration of field instruments

- p) Configuration and integration of the system level SCADA, historian, LoRaWAN software servers and reporting
- q) Site acceptance testing and commissioning.
- r) Critical spares
- s) As-built drawings and documentation
- t) Operation and maintenance manuals
- u) Training of the client's staff on the operation and maintenance of the new electronic equipment and software to keep the plant running optimally.
- v) Certificates of completion
- w) Any other items of hardware, software documentation or other required to provide a fully functional process control and monitoring system meeting the functional requirement as described further on in the specification and control system drawings.

3.1.4 LOCATION OF THE WORKS

The Macassar WWTW is located on ERF 1205, between Khayelitsha and Strand, along the False Bay coastline. The site is bound to the South by the sea and the Macassar beach complex lies to the Southwest. On the East, the site is bound by the Eerste River, with industries beyond the river. There is no development to the West of the site, and it is an open vegetated dune landscape. The nearest residential development is the Macassar township, a distance of some 0.6 km from the works and over the years has encroached towards the WWTW but not crossing the Macassar Road.

The site is approximately 62.1 hectares in extent. A site locality plan which also shows the extent of the Macassar WWTW has been included in Volume 1

3.1.5 TEMPORARY WORKS

The Contractor shall be responsible for designing and providing any temporary works required, which shall be approved by a professional engineer or engineering technologist.

Such works and the positioning thereof are to be approved by the Engineer before erection and operation on site.

Such temporary works shall be removed upon completion of the Works and the site of such temporary works re-instated to a pristine condition acceptable to the environmental requirements and to the Engineer.

3.1.6 DESCRIPTION OF SITE AND CONDITIONS

The site is an existing works, which is to remain operational at all times unless when planned outages and diversions are to take place and temporary measures have been put in place.

The following site conditions shall be taken into consideration:

- | | |
|-------------------------------|----------------|
| ▪ Altitude above sea level | 6-8m mean |
| ▪ Operating Voltage | 400V - 3 Phase |
| ▪ Electrical Supply Frequency | 50 Hz |
| ▪ Maximum Temperature | 40°C |
| ▪ Minimum Temperature | 5 °C |
| ▪ Maximum Relative Humidity | 95% |
| ▪ Corrosion Conditions | Very Severe |
| ▪ Lightning | Moderate |

- Rainfall Winter
- Flooding Means to prevent flooding is required

3.1.7 SITE ACCESS

The location of the Macassar WWTW is described under Section 3.1.4.

The operation of construction vehicles on existing roads or streets shall be limited to traffic with an axle load not exceeding that allowed by the Road Traffic Ordinance of the authority concerned, or any amendment thereof. The access road to the site shall be through Tie Road via Macassar Road.

The Contractor must note that no additional payment will be made for the construction of temporary access roads to the construction sites, borrow-areas or to the spoil sites-

The Contractor shall clear any spillage caused by his activities on or near any roads, by whatever means necessary, within 24 hours after such spillage has occurred. No additional payment will be made for the clearance of spillage and all related costs will be deemed to be covered under the relevant items.

3.1.8 SCHEDULE OF CIVIL-MECHANICAL INTERFACES (BATTERY LIMITS)

The table below summarises the interfaces between the mechanical and civil contractors scope of supply. Although every effort has been made to identify all the mechanical and civil contractor interfaces this list cannot be treated as comprehensive. If there is any doubt the Employer's Agent shall have the final say.

The duties and responsibilities of each party is listed for each battery limit type. The table is to be used as a guide for both parties for tendering purposes and the details of each are to be finalised during construction and in conjunction with the drawings.

For the purposes of this document, four types of battery limits are defined:

Type 01	Civil contractor supplies and installs puddle pipes and or equipment penetrating a concrete structure, ground, wall, etc. and casts in place. Civil contractor to provide box outs. After the puddle pipe is installed, it is the contractor's responsibility who is continuing with the installation from or to the puddle pipe, to install the gaskets, bolts, couplings and any fittings necessary to make the connection. The Civil contractor shall assume $\pm 40\text{mm}$ tolerance for alignment and distance unless specified otherwise by the Mechanical contractor in advance. If no tolerance is specified, the Mechanical contractor shall accommodate the tolerance allowed by the Civil contractor. If deemed necessary, the Mechanical contractor may check the installation prior to casting by the Civil contractor to ensure suitability and shall collaborate with the Civil contractor. It shall be the responsibility of the Mechanical contractor to specify a termination other than specified on the drawings, at no additional cost to the Civil contractor, if required by the Mechanical contractor.
Type 02	Mechanical contractor supplies and installs the puddle pipe or equipment penetrating the concrete structure, ground, wall, etc. and is responsible for casting / grouting. Civil contractor to provide box out. After the puddle pipe is installed, it is the contractor's responsibility who is continuing with the installation from or to the puddle pipe, to install the gaskets, bolts, couplings and any fittings necessary to make the connection. It shall be the responsibility of the Mechanical contractor to specify a termination other than indicated on the drawings at no additional cost to the Civil contractor, if required.
Type 03	Mechanical contractor supplies and installs the puddle pipe or equipment penetrating the concrete structure, ground, wall, etc. and is it cast / grouted by Civil contractor. Civil contractor to provide box out. After the puddle pipe is installed, it is the contractor's responsibility who is continuing with the installation from or to the puddle pipe, to install the gaskets, bolts, couplings and any fittings necessary to make the connection. It shall be the responsibility of the Mechanical contractor to specify a termination other than indicated on the drawings at no additional cost to the Civil contractor, if required.
Type 04	This battery limit refers to all sluice gates and wall mounted gates. The Mechanical and Electrical contractor shall provide details of recesses and openings and check dimensions prior to installation.

The Civil contractor shall form recesses / openings as required within the structures.
The Civil contractor shall assume $\pm 40\text{mm}$ tolerance for alignment and distance unless specified otherwise by the Mechanical and Electrical contractor in advance.
The Mechanical and Electrical contractor shall install, secure gates and grout in place.

Battery Limit Number - Type	Process Area	Description
BL01-04	For the Entire Works	All Channel and Wall mounted Sluice Gates for the entire plant.
BL02-02	Inlet Works	Archimedean Screw Pumpstation Lower Bearing
BL03-02	For the Entire Works	Ventilation Fans and Louvres
BL04-01	For the Entire Works	Service Water Supply
BL05-02	For the Entire Works	All weirs
BL06-02	Inlet Works	Vortex Degritters Mixer/Paddle
BL07-02	Inlet Works	Vortex Degritter Sparge Manifolds
BL08-02	Inlet Works	Vortex Degritter Air Supply
BL09-01	Inlet Works	Vortex Degritter Grit Outlet
BL10-03	For the Entire Works	Skip Dolly site wide
BL11-02	For the Entire Works	Drainage to Inlet Works
BL12-02	For the Entire Works	Mixers Installed for Entire works
BL13-01	PST	Sludge Inlet Pipework
BL14-01	PST	Sludge Withdrawal upstream De-sludge Valve.
BL15-01	PST	Sludge Withdrawal Downstream De-sludge Valve.
BL16-02	Blower building	Discharge and Vent pipework
BL17-02	Bioreactor	Recycle Pumps
BL18-02	WAS Flowmeter Chamber	Upstream Flow meter
BL19-02	WAS Flowmeter Chamber	Downstream Flow meter
BL20-01	SST	Sludge Inlet Pipework
BL21-01	SST	Scum withdrawal puddle pipe
BL22-01	SST	Sludge Withdrawal upstream De-sludge Valve.
BL23-01	SST	Sludge Withdrawal Downstream De-sludge Valve.
BL24-02	Screens/UV units	UV Banks and Screens
BL25-01	For Entire Works	Potable Water Supply
BL26-01	For Entire Works	Suction Pipework For All pumps site wide
BL27-01	For Entire Works	Discharge Pipework For All pumps site wide
BL28-02	Chlorine building	Scrubber inlet pipe
BL29-01	Gravity Thickener	Feed pipe
BL30-01	Gravity Thickener	Upstream of Isolation valve of Gravity Thickener
BL31-01	Gravity Thickener	Downstream of Isolation valve of Gravity Thickener
BL32-01	Holding Tanks	Holding Tanks/Digestors Nozzles
BL33-01	Holding Tanks	Upstream of Holding tanks Flow Meter/Valves
BL34-01	Holding Tanks	Upstream of Holding tanks Flow Meter/Valves
BL35-01	Holding Tanks	Holding Tanks/Digestors Relief valves
BL36-01	Digestors	Upstream isolation Valve upstream of digestors
BL37-01	Digestors	Upstream isolation Valve upstream of digestors
BL38-01	Digestors	Pressure Instrumentation of digestors.
BL39-01	Digestors	Temperature Instrumentation of digestors.
BL40-01	Digestors/Heat Exchangers	Downstream of Heat Exchangers
BL41-02	Dewatering building	Odour control pipework
BL42-01	Dewatering building	Silos
BL43-01	Gas Holding Tanks	Upstream Gas Holding tanks
BL44-01	Gas Holding Tanks	Downstream Gas Holding tanks

3.1.9 WORK TO BE CARRIED OUT BY OTHERS (UNDER SEPARATE CONTRACTS)

The following works will be carried out under separate contracts by others:

Upgrade and Extension of the Macassar Wastewater Treatment Works: Civil Works.

3.1.10 PROCESS CONTROL: ASSISTANCE, MAINTENANCE AND TRAINING PERIOD

CONTENTS

- 3.1.10.1 PROCESS CONTROL: ASSISTANCE, MAINTENANCE AND TRAINING (FULL TIME)
- 3.1.10.2 MAINTENANCE INSPECTIONS AFTER DEFECTS NOTIFICATION PERIOD (PART TIME)
- 3.1.10.3 PERFORMANCE AND PENALTIES

3.1.10.1 PROCESS CONTROL: ASSISTANCE, MAINTENANCE AND TRAINING (FULL TIME)

3.1.10.1.1 Assistance, Maintenance and Training

The twelve (12) months “Process Control Training, Maintenance and Assistance” period shall commence on completion of the 90 days trial and operation period for the construct works and shall end one year thereafter, or on the expiration of the Defects Notification period, whichever occurs last. The Contractor shall make use of the first month of this period to familiarise himself with the operation of the plant prior to offering any official training to the Works Personnel. Although the Works Personnel shall receive some form of “training” during this period (first month after the 90 days trial and operation period), this however will not be regarded as official training. The Official Training shall commence one month after completion of the 90 day trial and operation period and shall end on the expiration of the Defects Notification period.

The Contractor’s staff shall be based full time on site during this period during the hours of 07:30 and 16:00 (five days a week). The Contractor shall have a call-out system to respond to events that happen outside of working hours.

3.1.10.1.2 Contractor and Contractor’s Personnel

The Contractor’s staff for this scope shall as a minimum requirement include for the following:

- The Contractor shall have 10 years verifiable experience operating and maintaining similar size WWTW (35 Ml/d or more with Activated Sludge Treatment Process).
- A Class V Process Controller (DWS classification) with at least 10 years verifiable operation, maintenance and management experience for a WWTW of 35 Ml/d or more (with Activated Sludge Treatment Process).
- A Class V Process Controller (DWS classification) with at least 10 years verifiable operation, maintenance and management experience for a WWTW of 35 Ml/d or more (with Activated Sludge Treatment Process).
- The repairs and maintenance on the site shall be supervised by a Millwright and Electrician with 10 years experience or a fitter with 10 years experience.

3.1.10.1.3 Process Assistance of the Works (Full Time)

Process assistance of the Works shall mean all units, components, equipment and materials, and their relations to each other, employed to enable reliable and effective wastewater treatment for the process units documented below.

The Contractor shall provide process assistance to the operators and process controllers employed on the Works by the Municipality, specifically the day staff employed during the hours of 07:30 and 16:00 (five days a week). The Municipality shall occasionally rotate the day and night shift staff, to ensure suitable training of all the required personnel.

This service shall be provided in accordance with the prescriptions in this specification, the relevant operation and maintenance manuals, manuals supplied by the equipment suppliers as well as applicable approved industry standards. Operation duties shall generally refer to all tasks and actions required to operate the following process units (in its entirety):

- Inlet Works: Screening and degritting (includes screw pump stations)
- Primary settling tanks
- Biological reactor including sludge wasting, recycle pumps, mixers and fine bubble diffused aeration including blowers.
- Secondary setting tanks
- UV disinfection with screening upstream
- Chlorination
- RAS/WAS pump station
- Various pump stations including the service water and TSE pump station
- Primary sludge screening
- Anaerobic digestion and associated equipment
- Gas holding tanks
- CHP facility
- Sludge holding tanks
- Dewatering Building
- Silos
- MCC's
- SCADA

Other duties to be performed and executed by the Contractor shall include, but shall not be limited to the items listed below:

- a) Maintain safety conditions on site
- b) Log and report spills, pollution events, power failures, equipment fault (mechanical, electrical or electronic) extraordinary process phenomena, etc. Check auto-reset of power to mechanical equipment
- c) Calibrate and set flow measuring to ensure specified hydraulic loading rates on downstream process units
- d) Develop a feel for effective treatment by means of visual indicators of good/bad plant performance: Colour, odour, foam, algae growth, aeration patterns, effluent clarity and quality, bubbles, floating material, solids accumulation, flow patterns, turbulence, etc.
- e) Record operating hours and kW-hours of all mechanical equipment
- f) Check operation of all valves and sluice gates
- g) Ensure that all mechanical, electrical and electronic equipment is operated and performing in accordance with the specifications.

The Contractor shall prepare a Works Journal which he shall use to record the process operations and reporting of the plant. The purpose of the journal is to record the works' performance and provide a valuable reporting tool to demonstrate the performance of the plant and problems experienced.

3.1.10.1.4 Maintenance of the Works (Full Time)

Maintenance of the Works shall mean all units, components, equipment and materials, and their relations to each other, employed to enable reliable and effective wastewater treatment for the process units documented below.

The Contractor shall conduct routine preventative and repair maintenance inspections with the Works Personnel, and when required, carry out the necessary maintenance services when and as required. The Contractor will also be required to carry out breakdown maintenance. During equipment malfunction, or breakdown, the Contractor will use the necessary means to diagnose the problem and provide for the necessary corrective maintenance to repair the equipment. The contractor shall provide all the necessary equipment and tools required for any maintenance services. This service shall be provided in accordance with the prescriptions in this specification and the relevant operation and maintenance manuals, as well as manuals supplied by the equipment suppliers. Maintenance duties shall apply to the following process units (in its entirety):

- Inlet Works: Screening and degritting (includes screw pump stations)
- Primary settling tanks
- Biological reactor including sludge wasting, recycle pumps, mixers and fine bubble diffused aeration including blowers.
- Secondary setting tanks
- UV disinfection with screening upstream
- Chlorination
- RAS/WAS pump station
- Various pump stations including the service water and TSE pump station
- Primary sludge screening
- Anaerobic digestion and associated equipment
- Gas holding tanks
- CHP facility
- Sludge holding tanks
- Dewatering Building
- Silos
- MCC's
- SCADA

Other duties to be performed and executed by the Contractor shall include, but shall not be limited to the items listed below:

- a) Log all routine preventative and repair maintenance inspections, and routine maintenance services
- b) Log all maintenance calls for faulty equipment, detailing the diagnosis and corrective maintenance service requirements
- c) Calibrate and set flow measuring equipment to ensure accurate flow data.

All damaged or defective equipment must be reported to the Wastewater Treatment Works Supervisor immediately and must be repaired or replaced as soon as possible.

The Contractor shall prepare a Works Journal which he shall use to record all routine maintenance inspections, routine maintenance services, maintenance call-outs for equipment malfunction or failure, and corrective maintenance services. The purpose of the journal is to provide a valuable reporting tool to demonstrate the performance of the plant and identify problem areas.

As part of the Maintenance Contract, the following items will be for the Employer's cost:

- Consumables required for any maintenance works, which shall be provided by the Employer
- Spares and replacements shall be provided by the Employer.

The aforementioned excludes defect materials of failed equipment covered by the Contract as part of the defects liability period.

If the Employer should require the Contractor to supply and deliver any consumables, and or spares, then the Contractor will be formally instructed by the Employer or Engineer. If spares are provided by the Contractor, then the Contractor will be reimbursed by the Employer on a cost basis plus the Contractor's mark-up as quoted in the Bill of Quantities.

3.1.10.1.5 Process and Maintenance Training of Works

The Official Training of works personnel shall commence one month after completion of the 90 days trial and operation period and shall end on the expiration of the Defects Notification period. The Contractor shall make use of the first month of the "Process assistance and Maintenance" period to familiarise himself with the operation of the plant prior to offering any official training to the Works Personnel. Although the Works Personnel shall receive some form of "training" during this period, this however will not be regarded as official training.

The Contractor shall be responsible for providing relevant training to at least twelve (12) operating personnel (minimum) and four (4) maintenance personnel (minimum) provided by the Employer or as the Employer requires. The Works personnel shall be a combination of the Employer's day staff and night staff. The Contractor shall develop and facilitate all training sessions at specified intervals to revive and supplement the initial training. A suitably qualified and experienced trainer shall present all training sessions.

3.1.10.1.5.1 Basic Method Statement

The Contractor shall be responsible for conducting a complete investigation of the groups that have to be trained in order to compile a proper training plan. The investigation shall cover at least the following aspects:

- a) Assess likelihood of conformance to task-specific requirements (*status quo*) of capabilities
- b) Identify minimum pre-qualification criteria in terms of existing knowledge and skill levels in relation to reaching target requirements
- c) Evaluate personnel in terms of pre-qualification criteria and tasks to be performed (skills profile)
- d) Identify training needs

- e) Develop appropriate and accredited training courses and material in terms of task-specific activities and identified training needs and compile the training syllabus per installation.

The Contractor shall identify a suitably qualified trainer to assist in the above investigation and finalise the compilation of a training plan and syllabus. The Contractor shall submit a complete training plan and syllabus for approval by the Employer and Engineer. Once the training plan and syllabus have been approved, the Contractor shall liaise with the Engineer to establish dates and appropriate venues where the Trainees shall be able to demonstrate effectiveness of training activities.

Further regular training sessions shall be scheduled according to the effectiveness of initial maintenance and operating activities.

The Engineer will examine the trainees officially with each demonstration session and shall take record of all activities and of trainees' acquired skills at the completion of each session, according to the Training plan and syllabus.

The number of demonstration sessions shall depend on the competency level attained by the trainees and may be linked to training plan and schedule prepared by the Contractor.

The Contractor shall arrange the issuing of certificates of trainees' acquired skills on the satisfactory completion of the training programme.

3.1.10.1.5.2 Training of Operations Personnel

The Contractor's training shall include training of the Employer's operators and process controllers on a continuous basis to acquaint them with operating of installations (especially mechanical, electrical and electronic systems). The training sessions shall comprise lectures and on-site (hands-on) demonstrations. The Contractor shall train at least twelve (12) minimum of the Employer's operations personnel.

The content of training courses for operators shall include the essential features of operating the installation as well as the relevant Operation and Maintenance Manuals.

The following aspects, but not limited to, are expected to be included in the Contractor's Training Syllabus:

- a) Health and environmental risks when handling and disposing of wastewater sludge
- b) The dangers and consequences of not following personal hygienic practice and wearing personal protective equipment
- c) Operating procedures in terms of the optimal functioning and safe operation, and daily checks at the following process units:
 - Inlet Works: Screening and degritting (includes screw pump stations)
 - Primary settling tanks
 - Biological reactor including sludge wasting, recycle pumps, mixers and fine bubble diffused aeration including blowers.
 - Secondary setting tanks
 - UV disinfection with screening upstream
 - Chlorination
 - RAS/WAS pump station
 - Various pump stations including the service water and TSE pump station
 - Primary sludge screening

- Anaerobic digestion and associated equipment
 - Gas holding tanks
 - CHP facility
 - Sludge holding tanks
 - Dewatering Building
 - Silos
 - MCC's
 - SCADA
- d) Monitoring, operation and control of the Works using the Scada system
- e) Simple methods of measuring flows using various flow measuring devices are explained
- f) Operating procedures for the activated sludge processes are explained in terms of the optimal functioning and safe operation of the plant
- g) The importance of controlling sludge age, dissolved oxygen and sludge wasting explained in the context of operation within the design parameters
- h) Method of recording wastewater sludge volumes and masses
- i) Procedures to remove blockages from the equipment are identified and explained in terms of safety and optimal functioning of the plant
- j) Procedures to identify breakdowns are explained, including recording and reporting for corrective action.

3.1.10.1.5.3 Training of Maintenance Personnel

The Contractor shall ensure that his own employees are adequately trained for the type of work required by this Contract. In addition, he shall train at least a minimum of four (4) of the Employer's maintenance personnel, with regards to maintenance of an installation. Training shall focus on routine and preventative maintenance aspects. The works personnel shall include technical staff with mechanical and electrical qualifications.

The training of maintenance personnel shall include the following aspects:

- a) Awareness of safety, health and personal hygiene in terms of the requirements of the Occupational Health and Safety Act, 1993 (Act 85 of 1993)
- b) Functioning of the installation, including all its systems, services, parts of buildings and infrastructure
- c) All specific tasks related to routine preventative and repair maintenance at the following process units:
 - Inlet Works: Screening and degritting (includes screw pump stations)
 - Primary settling tanks
 - Biological reactor including sludge wasting, recycle pumps, mixers and fine bubble diffused aeration including blowers.

- Secondary settling tanks
 - UV disinfection with screening upstream
 - Chlorination
 - RAS/WAS pump station
 - Various pump stations including the service water and TSE pump station
 - Primary sludge screening
 - Anaerobic digestion and associated equipment
 - Gas holding tanks
 - CHP facility
 - Sludge holding tanks
 - Dewatering Building
 - Silos
 - MCC's
 - SCADA
- d) Interpretation and understanding of Operating and Maintenance Manuals with specific reference to requirements in cases of corrective and breakdown maintenance
- e) Repair/ reconditioning and installation/construction of equipment and materials forming part of an installation.

3.1.10.2 MAINTENANCE INSPECTIONS AFTER DEFECTS NOTIFICATION PERIOD (PART TIME)

3.1.10.2.1 Maintenance Inspections Period

The six (6) months "Maintenance Inspections" period shall commence 12 months after the trial and operation period and shall continue for six (6) months. The frequency of the maintenance inspections shall be as follows:

- For the first two months: Weekly inspections
- Month 3 and 4: Bi weekly inspections
- Month 5 and 6: Monthly inspections

The Contractor's staff shall be based part time on site during this period, and make themselves available for inspections between the hours of 07:30 and 16:00.

3.1.10.2.2 Maintenance Inspections of the Works (Part Time)

Maintenance of the Works shall mean all units, components, equipment and materials, and their relations to each other, employed to enable reliable and effective wastewater treatment for the process units documented below.

The Contractor shall conduct routine preventative and repair maintenance inspections in conjunction with the Works personnel. The Works personnel shall carry out the necessary maintenance services when and as required, under the supervision of the Contractor. During equipment malfunction, or breakdown, the

Contractor will assist the Works Personnel to diagnose the problem, and further assist with the necessary corrective maintenance to repair the equipment. The contractor shall provide all the necessary equipment and tools required for any maintenance services. This service shall be provided in accordance with the prescriptions in this specification and the relevant operation and maintenance manuals. Maintenance inspection shall apply to the following process units (in its entirety):

- Inlet Works: Screening and degritting (includes screw pump stations)
- Primary settling tanks
- Biological reactor including sludge wasting, recycle pumps, mixers and fine bubble diffused aeration including blowers.
- Secondary setting tanks
- UV disinfection with screening upstream
- Chlorination
- RAS/WAS pump station
- Various pump stations including the service water and TSE pump station
- Primary sludge screening
- Anaerobic digestion and associated equipment
- Gas holding tanks
- CHP facility
- Sludge holding tanks
- Dewatering Building
- Silos
- MCC's
- SCADA

Other duties to be performed and executed by the Contractor shall include, but shall not be limited to the items listed below:

- a) Log all routine preventative and repair maintenance inspections, and assistance in routine maintenance services
- b) Log all maintenance calls for faulty equipment, detailing the diagnosis and corrective maintenance services

The Contractor shall prepare a Works Journal which he shall use to record all routine maintenance inspections, assistance in routine maintenance services, maintenance call-outs for equipment malfunction or failure, and assistance in corrective maintenance services. This journal shall also be used to document and record the skills and capacity of the Works personnel to execute maintenance services. The purpose of the journal is to provide a valuable reporting tool to demonstrate the performance of the plant and identify problem areas, and to further provide feedback on the capacity and capabilities of the Works Personnel in carrying out maintenance services.

As part of the Maintenance Contract, the following items will be for the Employer's cost:

- Consumables required for any maintenance works, which shall be provided by the Employer
- Spares and replacements shall be provided by the Employer.

3.1.10.3 PERFORMANCE AND PENALTIES

3.1.10.3.1 Performance Measurement

The contractor's performance shall be measured based in the following:

- Planned, predictive and reactive maintenance.
- Risk management and emergency repairs.
- Duration of downtime

3.1.10.3.2 Penalties

- Penalties will be instituted for non-compliance with performance indicators.
- Events which could be controllable by the Contractor will result in penalties being imposed.
- Events uncontrollable by the Contractor will be evaluated and penalties will be imposed at discretion of the Municipality.
- The onus remains on the Contractor to substantiate that the events were not controllable and the Contractor to submit details of events within a prescribed time or the argument will not be considered.

3.1.10.3.3 Performance and Penalty Criteria

Performance and Penalty criteria based on downtime are as follows:

Required action	Maximum allowable time	Payment reduction (<i>applicable to full time and part time period</i>)
Respond and diagnose	12 hours	R 500 / hour
Fault repair	72 hours	R 750 / hour

DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS

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
- 3.2.5 DESIGN PROCEDURES

3.2.1 DESIGN SERVICES AND ACTIVITY MATRIX

The design responsibilities are as follows:

DESIGN PROCESS	RESPONSIBILITY
Concept	Employer responsible
Engineering and layout to tender stage	Employer responsible
Civil design of permanent Works as reflected in the Contract Documents unless otherwise stated	Employer responsible
Temporary works	Contractor responsible for the design of the temporary Works and their compatibility with the permanent Works
As built drawings	Contractor shall supply all details necessary to assist the Engineer in the compilation of the as-built civil drawings and the Contractor shall supply as built drawings for all equipment provided.
Detailed design of the mechanical and electrical work	Contractor responsible for designing the Works in accordance with the Employer's requirements and tender drawings
Control philosophy/functional design	Contractor responsible for designing the Works in accordance with the Employer's requirements

3.2.2 EMPLOYER'S DESIGN

Not applicable to this tender.

3.2.3 DESIGN BRIEF

Where the Contractor is to supply the design of designated parts of the Permanent Works or Temporary Works, he shall supply full working drawings supported by a Professional Engineer's design certificate.

The Contractor's shall be responsible for the design of the mechanical and electrical work. The Contractor's design shall be based on the Employer's requirements and the tender drawings, the existing and future structures and any existing equipment installations and the Contractor shall ensure that the design can be satisfactorily accommodated.

The Contractor shall accommodate actual dimensions and details measured on Site. Any inconsistencies, including any conflict between the Engineer's drawings and the actual dimensions measured on site, shall immediately be drawn to the attention of the Engineer, in writing.

a) OHS Act

The Contractor is responsible for ensuring that the design of the equipment provided, and the installation of this equipment comply with the Occupational health and Safety Act, Act 85 of 1993 and the 2014 Construction regulations, and the regulations promulgated thereunder. Installations which do not comply shall be corrected by the Contractor at no cost to the Employer.

b) General Safety Requirements

Safety of design is an overriding consideration. Installations which do not comply with the OHS Act shall be corrected by the Contractor at no cost to the Employer.

Equipment which is potentially dangerous shall be designed in accordance with a relevant South African or international Standard which deals with the hazard.

Hazards shall be avoided or guarded to the approval of the Engineer. Nip points shall be guarded. Sharp corners shall be rounded off. Items such as operating handles, supports and protrusions shall be kept clear of access ways or shall be marked clearly.

The Contractor shall cover all unsafe gaps and openings left in structures after installation of the equipment.

Each motor driven device shall be provided with an emergency stop station in an appropriate position.

Trip wires shall be provided along the accessible side/s of moving conveyor belts, chains, etc., irrespective of operating speed and in addition to any guards provided. These shall stop the driving motor when pulled.

c) General Requirements

Design shall ensure safety, robust construction, reliability, durability, prevention of avoidable corrosion, neatness, protection of the environment as well as ease of maintenance and operation.

The Contractor's design shall, as applicable, be based on:

- The full range of duties which can be reasonably anticipated
- The maximum pressure or vacuum which can be produced under all conditions including blocked or closed inlet and outlet circuits
- Conservative service and safety factors based on approved standards or laid down in the printed specifications of reputable and approved manufacturers
- Twenty four hour per day operation (unless specified otherwise)
- A minimum life of 100 000 hours before major part replacement
- Prevention of serious damage from normal operational problems such as blockages, blinding, jamming, seizure, malfunction and, as far as practical, mal-operation
- The power and torque transmitted by the driver system under full load and stalled conditions.
- Machines with non-overloading characteristics shall be selected wherever possible; e.g.: motors shall be sized so that they cannot be overloaded by the driven machine.

d) Hazardous Locations

Equipment which is to be installed in areas with hazardous area location zoning for gasses or for dusts in terms of SANS 10108, shall comply with the requirements of that Standard.

e) Fail Safe Operations and Protections

Where damage can occur from normal operational or other foreseeable problems, plant, equipment and systems shall be designed to be fail safe (i.e. shall have built in redundant elements) or shall be fail to safe (i.e. shall return to a safe condition where no further damage can be done in the event of a failure, malfunction, mal-operation, overload and, as far as practical, misuse). All reasonable and economically justifiable protections to prevent or limit damage to plant and equipment, particularly in high risk situations, shall be incorporated.

Protections shall:

- Be directed at the source of the problem, limit forces to safe levels and act quickly enough to prevent damage (electrical thermal type overloads are inadequate)
- Stop, or prevent from starting, all equipment at risk
- Activate an alarm with a labelled indicator on the control panel, HMI or SCADA mimic whenever a protection operates
- Operate reliably after long inactive periods exposed to corrosive and dirty conditions.

Contractors shall highlight equipment limitations which can be exceeded during operation and cannot be guarded against.

f) Moving Parts

The following general requirements apply to machines and to all equipment with moving parts such as headstocks, extension spindles, swivelling davits, heavy duty hinges, pivots and the like:

- Rotating or swivelling shafts, pins and the like, shall be adequately supported, guided and restrained by lubricated or self-lubricating bearings, collars and/or bushes
- Swivelling joints on linkages and the like shall be of the "universal" or fork and rod type with bearings or bushes fitted to the eyes or forks
- Abrasion resistant materials and slow speed operation shall be used for abrasive applications. (Wastewater and all sludge shall be regarded as abrasive.)
- Susceptibility to fatigue failure shall be minimized by proper design and manufacturing procedures. Sharp changes in section and badly contoured welding shall be avoided especially in components subject to fluctuating stress
- The locking of nuts and pins in position shall be done to the approval of the Engineer
- Wearing parts shall be designed for ease of removal and replacement.

g) Arrangement and Mounting

The design shall take the following requirements into consideration:

- Lifting eyes, lugs, hooks, etc., shall be provided on heavy or large items to facilitate handling
- Castings and fabrications shall have machined pads for seating and shall be mounted on either soleplates or baseplates as appropriate
- Where accurate alignment is required, positioning pins and/or jacking screws shall be provided
- The needs of operation and maintenance including neatness, access, working space, safety, cleaning, adjustment, handling, assembly, alignment, disassembly, removal, etc., shall be accommodated.
- With plant and equipment to be mounted on or against concrete or brick structures built by others, provision shall be made for adjustment in the mechanical design. Any special accuracy requirements must be specified on the Contractor's Documents.

h) Prevention of Corrosion

The Contractor shall review all designs in order to achieve acceptable corrosion protection. Any details which might have a negative effect on the corrosion protection and the future application of coatings are to be brought to the Engineer's attention for a ruling prior to commencement of work.

All items shall be designed to minimise corrosion in the environment in which they will be exposed. Particular emphasis shall be placed on accessibility for surface preparation and the application of coatings. The detailed requirements for corrosion protection are dealt with elsewhere in this document.

Mastics, sealants, insertion rubber or suitable gasket material shall be used to seal unavoidable crevices such as bolted connections.

The design shall ensure that all surfaces to be coated shall be accessible for fettling, blast cleaning, painting and for maintenance of these surfaces. Stainless steel surfaces shall be accessible for pickling and

passivation. The use of back-to-back angles, partially open box sections or inaccessible stiffeners shall be avoided. Inaccessible surfaces which cannot be avoided shall be welded closed.

Particular attention shall be paid to the fabrication and inspection requirements for internal weld surfaces in pipework.

All applications associated with wastewater shall be regarded as corrosive and materials of construction shall be selected to suit.

3.2.4 DRAWINGS

The following drawings are applicable to the Contract and are issued with this tender document and will form part of the Contract Documents as Volume 4.

TENDER DRAWING REGISTER	
Drawing Number	Drawing Description
A. GENERAL DRAWINGS	
1001780-0000-DRG-CC-0000	Drawing Index
1001780-0000-DRG-CC-0001	Existing Site Layout
1001780-0000-DRG-CC-0002	New Site Layout (Sheet 1 of 2)
1001780-0000-DRG-CC-0003	New Site Layout (Sheet 2 of 2)
1001780-0000-DRG-CC-0004	Phasing of Works
1001780-0000-DRG-CC-0005	No-Go Zone Areas
1001780-0000-DRG-CC-0006	Existing Services and Survey Layout (Sheet 1 of 2)
1001780-0000-DRG-CC-0007	Existing Services and Survey Layout (Sheet 2 of 2)
1001780-0000-DRG-CC-0009	Site Demolition Plan and Diversion Works
1001780-0000-DRG-CC-0013	Service Water Network Layout
1001780-0000-DRG-CC-0014	Potable Water Network Layout
1001780-0000-DRG-CC-0015	On-Site Sewerage System
1001780-0000-DRG-CC-0016	Hydraulic Profile Diagram - Liquid Stream (Sheet 1 of 3)
1001780-0000-DRG-CC-0017	Hydraulic Profile Diagram - Liquid Stream (Sheet 2 of 3)
1001780-0000-DRG-CC-0018	Hydraulic Profile Diagram - Liquid Stream (Sheet 3 of 3)
1001780-0000-DRG-CC-0019	Hydraulic Profile Diagram - Sludge Stream (Sheet 1 of 2)
1001780-0000-DRG-CC-0020	Hydraulic Profile Diagram - Sludge Stream (Sheet 2 of 2)
1001780-0000-DRG-CC-0022	Sleeve Layout (Sheet 1 of 4)
1001780-0000-DRG-CC-0023	Sleeve Layout (Sheet 2 of 4)
1001780-0000-DRG-CC-0024	Sleeve Layout (Sheet 3 of 4)
1001780-0000-DRG-CC-0025	Sleeve Layout (Sheet 4 of 4)
1001780-0000-DRG-CC-0026	Walkway Paving Layout
1001780-0000-DRG-CC-0027	Sitewide Subsoil Drainage Layout
B. STANDARD DETAILS	
1001780-0000-DRG-CC-0205	Standard Details: Typical Floor Details (Sheet 1 of 3)
1001780-0000-DRG-CC-0206	Standard Details: Typical Floor Details (Sheet 2 of 3)
1001780-0000-DRG-CC-0207	Standard Details: Typical Floor Details (Sheet 3 of 3)
1001780-0000-DRG-CC-0220	Standard Details: Washwater and Treated Effluent Network: Details
1001780-0000-DRG-CC-0221	Standard Details: Potable Water Network: Details
1001780-0000-DRG-CC-0232	Standard Details: Typical Duct Manhole & Draw Pit Details
1001780-0000-DRG-CC-0244	Nameboard

C. CONCRETE STRUCTURES	
1001780-0000-DRG-CC-0300	Inlet Works: 3D Views
1001780-0000-DRG-CC-0301	Inlet Works: General Arrangement
1001780-0000-DRG-CC-0302	Inlet Works: Foundation Layout and Details (Sheet 1 of 2)
1001780-0000-DRG-CC-0303	Inlet Works: Foundation Layout and Details (Sheet 2 of 2)
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1001780-0000-DRG-CC-0715	UV, SST and Flow Balancing Tank Electrical Building: Sections & Details (Sheet 2 of 3)
1001780-0000-DRG-CC-0716	UV, SST and Flow Balancing Tank Electrical Building: Sections & Details (Sheet 3 of 3)
1001780-0000-DRG-CC-0717	UV, SST and Flow Balancing Tank Electrical Building: Elevations
1001780-0000-DRG-CC-0720	TSE & Filter Building: 3D Views
1001780-0000-DRG-CC-0721	TSE & Filter Building: Foundation Layout
1001780-0000-DRG-CC-0722	TSE & Filter Building: Plan View @LVL 6.600m
1001780-0000-DRG-CC-0723	TSE & Filter Building: Ground Floor Layout
1001780-0000-DRG-CC-0724	TSE & Filter Building: General Arrangement
1001780-0000-DRG-CC-0725	TSE & Filter Building: Joint Layout
1001780-0000-DRG-CC-0726	TSE & Filter Building: Roof Layout
1001780-0000-DRG-CC-0727	TSE & Filter Building: Sections & Details (Sheet 1 of 3)
1001780-0000-DRG-CC-0728	TSE & Filter Building: Sections & Details (Sheet 2 of 3)
1001780-0000-DRG-CC-0729	TSE & Filter Building: Sections & Details (Sheet 3 of 3)
1001780-0000-DRG-CC-0730	TSE & Filter Building: Elevations
1001780-0000-DRG-CC-0734	Service Water Electrical Building: 3D Views
1001780-0000-DRG-CC-0735	Service Water Electrical Building: Foundation Layout
1001780-0000-DRG-CC-0736	Service Water Electrical Building: Ground Floor Layout
1001780-0000-DRG-CC-0737	Service Water Electrical Building: Joint Layout
1001780-0000-DRG-CC-0738	Service Water Electrical Building: Roof Layout
1001780-0000-DRG-CC-0739	Service Water Electrical Building: Sections & Details (Sheet 1 of 3)
1001780-0000-DRG-CC-0740	Service Water Electrical Building: Sections & Details (Sheet 2 of 3)
1001780-0000-DRG-CC-0741	Service Water Electrical Building: Sections & Details (Sheet 3 of 3)

1001780-0000-DRG-CC-0742	Service Water Electrical Building: Elevations
1001780-0000-DRG-CC-0745	Weighbridge Building: 3D Views
1001780-0000-DRG-CC-0746	Weighbridge Building: Foundation and General Arrangement Layout
1001780-0000-DRG-CC-0747	Weighbridge Building: Joint and Roof Layout
1001780-0000-DRG-CC-0748	Weighbridge Building: Sections & Details (Sheet 1 of 2)
1001780-0000-DRG-CC-0749	Weighbridge Building: Sections & Details (Sheet 2 of 2)
1001780-0000-DRG-CC-0750	Weighbridge Building: Elevations
1001780-0000-DRG-CC-0754	Guard House Hut: 3D Views
1001780-0000-DRG-CC-0755	Guard House Hut: Foundation and General Layout
1001780-0000-DRG-CC-0756	Guard House Hut: Roof Layout
1001780-0000-DRG-CC-0757	Guard House Hut: Joint Layout
1001780-0000-DRG-CC-0758	Guard House Hut: Sections & Details (Sheet 1 of 2)
1001780-0000-DRG-CC-0759	Guard House Hut: Sections & Details (Sheet 2 of 2)
1001780-0000-DRG-CC-0760	Guard House Hut: Elevations
1001780-0000-DRG-CC-0764	Process Ops Building: Foundation Layout
1001780-0000-DRG-CC-0765	Process Ops Building: Ground Floor Layout
1001780-0000-DRG-CC-0766	Process Ops Building: First Floor Layout
1001780-0000-DRG-CC-0767	Process Ops Building: Lower Roof Layout
1001780-0000-DRG-CC-0768	Process Ops Building: Upper Roof Layout
1001780-0000-DRG-CC-0769	Process Ops Building: Global Sections
1001780-0000-DRG-CC-0770	Process Ops Building: 3D Views
1001780-0000-DRG-CC-0771	Process Ops Building: RC Stairs
1001780-0000-DRG-CC-0772	Process Ops Building: First Floor Loading Diagram
1001780-0000-DRG-CC-0773	Process Ops Building: Roof Loading Diagram
1001780-0000-DRG-CC-0779	Workshop and Stores Building: Foundation Layout
1001780-0000-DRG-CC-0780	Workshop and Stores Building: Ground Floor Layout
1001780-0000-DRG-CC-0781	Workshop and Stores Building: First Floor Layout
1001780-0000-DRG-CC-0782	Workshop and Stores Building: RC Roof Layout
1001780-0000-DRG-CC-0783	Workshop and Stores Building: Structural Steel Roof Layout
1001780-0000-DRG-CC-0784	Workshop and Stores Building: Global Sections
1001780-0000-DRG-CC-0785	Workshop and Stores Building: 3D Views
1001780-0000-DRG-CC-0786	Workshop and Stores Building: RC Stairs
1001780-0000-DRG-CC-0787	Workshop and Stores Building: First Floor Loading Diagram
1001780-0000-DRG-CC-0788	Workshop and Stores Building: Roof Loading Diagram
1001780-0000-DRG-CC-0793	Guardhouse: Foundation Layout
1001780-0000-DRG-CC-0794	Guardhouse: Ground Floor Layout
1001780-0000-DRG-CC-0795	Guardhouse: RC Roof Layout
1001780-0000-DRG-CC-0796	Guardhouse: Overall Main Roof Layout
1001780-0000-DRG-CC-0797	Guardhouse: Overall Main Roof Sections & Details
1001780-0000-DRG-CC-0798	Guardhouse: 3D Views
1001780-0000-DRG-CC-0799	Guardhouse: Roof Loading Diagram
E. PROCESS PIPELINES	
1001780-0000-DRG-CC-0800	Process Pipework Layout
1001780-0000-DRG-CC-0801	Process Pipework: Longsection: (RS03)
1001780-0000-DRG-CC-0802	Process Pipework: Longsection: (RS04)
1001780-0000-DRG-CC-0803	Process Pipework: Longsection: (RS05)

1001780-0000-DRG-CC-0804	Process Pipework: Longsection: (RS06)
1001780-0000-DRG-CC-0805	Process Pipework: Longsection: (RS07)
1001780-0000-DRG-CC-0806	Process Pipework: Longsection: (RS08)
1001780-0000-DRG-CC-0807	Process Pipework: Longsection: (RS09)
1001780-0000-DRG-CC-0808	Process Pipework: Longsection: (RS10)
1001780-0000-DRG-CC-0809	Process Pipework: Longsection: (RS11)
1001780-0000-DRG-CC-0810	Process Pipework: Longsection: (RS12)
1001780-0000-DRG-CC-0811	Process Pipework: Longsection: (RS13)
1001780-0000-DRG-CC-0812	Process Pipework: Longsection: (RS14)
1001780-0000-DRG-CC-0813	Process Pipework: Longsection: (RS15)
1001780-0000-DRG-CC-0814	Process Pipework: Longsection: (RS16)
1001780-0000-DRG-CC-0815	Process Pipework: Longsection: (RS17)
1001780-0000-DRG-CC-0816	Process Pipework: Longsection: (RS18)
1001780-0000-DRG-CC-0817	Process Pipework: Longsection: (ML01)
1001780-0000-DRG-CC-0818	Process Pipework: Longsection: (ML02)
1001780-0000-DRG-CC-0819	Process Pipework: Longsection: (ML03)
1001780-0000-DRG-CC-0820	Process Pipework: Longsection: (ML04)
1001780-0000-DRG-CC-0821	Process Pipework: Longsection: (ML05)
1001780-0000-DRG-CC-0822	Process Pipework: Longsection: (ML06)
1001780-0000-DRG-CC-0823	Process Pipework: Longsection: (ML07)
1001780-0000-DRG-CC-0824	Process Pipework: Longsection: (ML08)
1001780-0000-DRG-CC-0825	Process Pipework: Longsection: (ML09)
1001780-0000-DRG-CC-0826	Process Pipework: Longsection: (ML10)
1001780-0000-DRG-CC-0827	Process Pipework: Longsection: (ML11)
1001780-0000-DRG-CC-0828	Process Pipework: Longsection: (ML12)
1001780-0000-DRG-CC-0829	Process Pipework: Longsection: (ML13)
1001780-0000-DRG-CC-0830	Process Pipework: Longsection: (ML14)
1001780-0000-DRG-CC-0831	Process Pipework: Longsection: (ML15)
1001780-0000-DRG-CC-0832	Process Pipework: Longsection: (ML16)
1001780-0000-DRG-CC-0833	Process Pipework: Longsection: (TE01)
1001780-0000-DRG-CC-0834	Process Pipework: Longsection: (RS01)
1001780-0000-DRG-CC-0835	Process Pipework: Longsection: (TE03)
1001780-0000-DRG-CC-0836	Process Pipework: Longsection: (TE04)
1001780-0000-DRG-CC-0837	Process Pipework: Longsection: (TE05 and TE06)
1001780-0000-DRG-CC-0838	Process Pipework: Longsection: (RS02)
1001780-0000-DRG-CC-0839	Process Pipework: Longsection: (TE07)
1001780-0000-DRG-CC-0840	Process Pipework: Longsection: (TE08 and TE09)
1001780-0000-DRG-CC-0841	Process Pipework: Longsection: (TE02)
1001780-0000-DRG-CC-0842	Process Pipework: Longsection: (TE10)
1001780-0000-DRG-CC-0843	Process Pipework: Longsection: (TE11)
1001780-0000-DRG-CC-0844	Process Pipework: Longsection: (TE12)
1001780-0000-DRG-CC-0845	Process Pipework: Longsection: (TE13)
1001780-0000-DRG-CC-0846	Process Pipework: Longsection: (TE14)
1001780-0000-DRG-CC-0847	Process Pipework: Longsection: (TE15)
1001780-0000-DRG-CC-0848	Process Pipework: Longsection: (TE16)
1001780-0000-DRG-CC-0849	Process Pipework: Longsection: (TE17)
1001780-0000-DRG-CC-0850	Process Pipework: Longsection: (TE18)
1001780-0000-DRG-CC-0851	Process Pipework: Longsection: (TE19)

1001780-0000-DRG-CC-0852	Process Pipework: Longsection: (TE20)
1001780-0000-DRG-CC-0853	Process Pipework: Longsection: (TE21)
1001780-0000-DRG-CC-0854	Process Pipework: Longsection: (TE22)
1001780-0000-DRG-CC-0855	Process Pipework: Longsection: (IB01)
1001780-0000-DRG-CC-0856	Process Pipework: Longsection: (IB02)
1001780-0000-DRG-CC-0857	Process Pipework: Longsection: (IB03)
1001780-0000-DRG-CC-0858	Process Pipework: Longsection: (IB04)
1001780-0000-DRG-CC-0859	Process Pipework: Longsection: (IB05)
1001780-0000-DRG-CC-0860	Process Pipework: Longsection: (IB06)
1001780-0000-DRG-CC-0861	Process Pipework: Longsection: (IB07)
1001780-0000-DRG-CC-0862	Process Pipework: Longsection: (IB08)
1001780-0000-DRG-CC-0863	Process Pipework: Longsection: (IB09)
1001780-0000-DRG-CC-0864	Process Pipework: Longsection: (IB10)
1001780-0000-DRG-CC-0865	Process Pipework: Longsection: (IB11)
1001780-0000-DRG-CC-0866	Process Pipework: Longsection: (IB12)
1001780-0000-DRG-CC-0867	Process Pipework: Longsection: (IB13)
1001780-0000-DRG-CC-0868	Process Pipework: Longsection: (IB14)
1001780-0000-DRG-CC-0869	Process Pipework: Longsection: (IB15)
1001780-0000-DRG-CC-0870	Process Pipework: Longsection: (TE00)
1001780-0000-DRG-CC-0871	Process Pipework: Longsection: (DS01)
1001780-0000-DRG-CC-0872	Process Pipework: Longsection: (DS02)
1001780-0000-DRG-CC-0873	Process Pipework: Longsection: (DS03)
1001780-0000-DRG-CC-0874	Process Pipework: Longsection: (DS04)
1001780-0000-DRG-CC-0875	Process Pipework: Longsection: (DS05)
1001780-0000-DRG-CC-0876	Process Pipework: Longsection: (DS06)
1001780-0000-DRG-CC-0877	Process Pipework: Longsection: (DS07)
1001780-0000-DRG-CC-0878	Process Pipework: Longsection: (DS08)
1001780-0000-DRG-CC-0879	Process Pipework: Longsection: (PS01)
1001780-0000-DRG-CC-0880	Process Pipework: Longsection: (PS02)
1001780-0000-DRG-CC-0881	Process Pipework: Longsection: (PS03)
1001780-0000-DRG-CC-0882	Process Pipework: Longsection: (PS04)
1001780-0000-DRG-CC-0883	Process Pipework: Longsection: (PS05)
1001780-0000-DRG-CC-0884	Process Pipework: Longsection: (PS06)
1001780-0000-DRG-CC-0885	Process Pipework: Longsection: (PS07)
1001780-0000-DRG-CC-0886	Process Pipework: Longsection: (PS08)
1001780-0000-DRG-CC-0887	Process Pipework: Longsection: (SS01)
1001780-0000-DRG-CC-0888	Process Pipework: Longsection: (SS02)
1001780-0000-DRG-CC-0889	Process Pipework: Longsection: (SS03)
1001780-0000-DRG-CC-0890	Process Pipework: Longsection: (SS04)
1001780-0000-DRG-CC-0891	Process Pipework: Longsection: (SS05)
1001780-0000-DRG-CC-0892	Process Pipework: Longsection: (SS06)
1001780-0000-DRG-CC-0893	Process Pipework: Longsection: (SS07)
1001780-0000-DRG-CC-0894	Process Pipework: Longsection: (SS08)
1001780-0000-DRG-CC-0895	Process Pipework: Longsection: (SS09)
1001780-0000-DRG-CC-0896	Process Pipework: Longsection: (SS10)
1001780-0000-DRG-CC-0897	Process Pipework: Longsection: (SS16)
1001780-0000-DRG-CC-0898	Process Pipework: Longsection: (SS17)
1001780-0000-DRG-CC-0899	Process Pipework: Longsection: (SS18)

1001780-0000-DRG-CC-0900	Process Pipework: Longsection: (SS19)
1001780-0000-DRG-CC-0901	Process Pipework: Longsection: (TS01)
1001780-0000-DRG-CC-0902	Process Pipework: Longsection: (TS02)
1001780-0000-DRG-CC-0903	Process Pipework: Longsection: (TS03)
1001780-0000-DRG-CC-0904	Process Pipework: Longsection: (TS04)
1001780-0000-DRG-CC-0905	Process Pipework: Longsection: (TS05)
1001780-0000-DRG-CC-0906	Process Pipework: Longsection: (TS06)
1001780-0000-DRG-CC-0907	Process Pipework: Longsection: (TS07)
1001780-0000-DRG-CC-0908	Process Pipework: Longsection: (TS08)
1001780-0000-DRG-CC-0909	Process Pipework: Longsection: (TS09)
1001780-0000-DRG-CC-0910	Process Pipework: Longsection: (TS10)
1001780-0000-DRG-CC-0911	Process Pipework: Longsection: (WS01)
1001780-0000-DRG-CC-0912	Process Pipework: Longsection: (WS02)
1001780-0000-DRG-CC-0913	Process Pipework: Longsection: (WS03)
1001780-0000-DRG-CC-0914	Process Pipework: Longsection: (WS04)
1001780-0000-DRG-CC-0915	Process Pipework: Longsection: (WS05)
1001780-0000-DRG-CC-0916	Process Pipework: Longsection: (WS06)
1001780-0000-DRG-CC-0917	Process Pipework: Longsection: (WS07)
1001780-0000-DRG-CC-0918	Process Pipework: Longsection: (WS08)
1001780-0000-DRG-CC-0919	Process Pipework: Longsection: (WS09)
1001780-0000-DRG-CC-0920	Process Pipework: Longsection: (WS10)
1001780-0000-DRG-CC-0921	Process Pipework: Longsection: (WS11)
1001780-0000-DRG-CC-0922	Process Pipework: Longsection: (WS12)
1001780-0000-DRG-CC-0923	Process Pipework: Longsection: (WS13)
1001780-0000-DRG-CC-0924	Process Pipework: Longsection: (WS14)
1001780-0000-DRG-CC-0925	Process Pipework: Longsection: (WS15)
1001780-0000-DRG-CC-0926	Process Pipework: Longsection: (WS16)
1001780-0000-DRG-CC-0927	Process Pipework: Longsection: (WS17)
1001780-0000-DRG-CC-0928	Process Pipework: Longsection: (WS18)
1001780-0000-DRG-CC-0929	Process Pipework: Longsection: (WS19)
1001780-0000-DRG-CC-0930	Process Pipework: Longsection: (WS20)
1001780-0000-DRG-CC-0931	Process Pipework: Longsection: (WS21)
1001780-0000-DRG-CC-0932	Process Pipework: Longsection: (WS22)
1001780-0000-DRG-CC-0933	Process Pipework: Longsection: (SC01)
1001780-0000-DRG-CC-0934	Process Pipework: Longsection: (SC02)
1001780-0000-DRG-CC-0935	Process Pipework: Longsection: (SC03)
1001780-0000-DRG-CC-0936	Process Pipework: Longsection: (SC04)
1001780-0000-DRG-CC-0937	Process Pipework: Longsection: (SC05)
1001780-0000-DRG-CC-0938	Process Pipework: Longsection: (SC06)
1001780-0000-DRG-CC-0939	Process Pipework: Longsection: (SC07)
1001780-0000-DRG-CC-0940	Process Pipework: Longsection: (SC08)
1001780-0000-DRG-CC-0941	Process Pipework: Longsection: (SC09)
1001780-0000-DRG-CC-0942	Process Pipework: Longsection: (SC10)
1001780-0000-DRG-CC-0943	Process Pipework: Longsection: (SC11)
1001780-0000-DRG-CC-0944	Process Pipework: Longsection: (SC12)
1001780-0000-DRG-CC-0945	Process Pipework: Longsection: (SC13)
1001780-0000-DRG-CC-0946	Process Pipework: Longsection: (SC14)
1001780-0000-DRG-CC-0947	Process Pipework: Longsection: (SC15)

1001780-0000-DRG-CC-0948	Process Pipework: Longsection: (SC16)
1001780-0000-DRG-CC-0949	Process Pipework: Longsection: (SC17)
1001780-0000-DRG-CC-0950	Process Pipework: Longsection: (SC18)
1001780-0000-DRG-CC-0951	Process Pipework: Longsection: (SC19)
1001780-0000-DRG-CC-0952	Process Pipework: Longsection: (SC20)
1001780-0000-DRG-CC-0953	Process Pipework: Longsection: (SC21)
1001780-0000-DRG-CC-0954	Process Pipework: Longsection: (SC22)
1001780-0000-DRG-CC-0955	Process Pipework: Longsection: (SC23)
1001780-0000-DRG-CC-0956	Process Pipework: Longsection: (SC24)
1001780-0000-DRG-CC-0957	Process Pipework: Longsection: (SC25)
1001780-0000-DRG-CC-0958	Process Pipework: Longsection: (SC26)
1001780-0000-DRG-CC-0959	Process Pipework: Longsection: (SR01)
1001780-0000-DRG-CC-0960	Process Pipework: Longsection: (SR02)
1001780-0000-DRG-CC-0961	Process Pipework: Longsection: (SR03)
1001780-0000-DRG-CC-0962	Process Pipework: Longsection: (SR04)
1001780-0000-DRG-CC-0963	Process Pipework: Longsection: (SR05)
1001780-0000-DRG-CC-0964	Process Pipework: Longsection: (SR06)
1001780-0000-DRG-CC-0965	Process Pipework: Longsection: (SR07)
1001780-0000-DRG-CC-0966	Process Pipework: Longsection: (SR08)
1001780-0000-DRG-CC-0967	Process Pipework: Longsection: (SR09)
J. ARCHITECTURAL DRAWINGS	
1001780-0000-DRG-AA-0001	Process Operations Building: Ground Storey Plan
1001780-0000-DRG-AA-0002	Process Operations Building: First Storey Plan
1001780-0000-DRG-AA-0003	Process Operations Building: Roof Plan
1001780-0000-DRG-AA-0004	Process Operations Building: Elevations
1001780-0000-DRG-AA-0005	Process Operations Building: Sections - 1 Of 2
1001780-0000-DRG-AA-0007	Process Operations Building: Ground Storey - Reflected Ceiling Plan
1001780-0000-DRG-AA-0008	Process Operations Building: First Storey - Reflected Ceiling Plan
1001780-0000-DRG-AA-0009	Process Operations Building: 3d Axonometric Views
1001780-0000-DRG-AA-0101	Workshop And Stores Building: Ground Storey Plan
1001780-0000-DRG-AA-0102	Workshop And Stores Building: First Storey Plan
1001780-0000-DRG-AA-0103	Workshop And Stores Building: Roof Plan
1001780-0000-DRG-AA-0104	Workshop And Stores Building: Elevations
1001780-0000-DRG-AA-0105	Workshop And Stores Building: Sections
1001780-0000-DRG-AA-0106	Workshop And Stores Building: Ground Storey - Reflected Ceiling Plan
1001780-0000-DRG-AA-0107	Workshop And Stores Building: First Storey - Reflected Ceiling Plan
1001780-0000-DRG-AA-0108	Workshop And Stores Building: Axo Views

3.2.5 DESIGN PROCEDURES

3.2.5.1 General Requirements

The Contractor's Documents shall comply with the following general requirements:

- A register of all the Contractor's documents shall be provided with each submission
- Drawings shall be prepared in accordance with the latest issue of SANS 10111. An equivalent international code of engineering drawing practice will also be acceptable

- General Arrangement drawings shall be to A1 size
- Drawings shall be to scale, with both the scale and the drawing being large enough to clearly show all relevant components of the plant and equipment
- In addition to the usual plan and two side elevations, sufficient additional sections shall be included to clearly show the arrangement of all plant and equipment
- Item lists shall be provided on the drawing or on a separate parts list
- Item descriptions shall include the material of construction, quantity and full identification information, including, as applicable, brand name, manufacturer's reference number, model number, size, rating, source, duty, quantity, etc.

3.2.5.2 Required Submissions within 14 days

The Contractor shall submit the following for acceptance within 14 working days from the Commencement Date:

- Programme for The Works in Gantt chart format
- Health and Safety Plan for approval by the Client's appointed Health and Safety Responsible Person
- Copies of insurance policies in respect of the Works, Special Risks and Liability Insurance and evidence of payment of current premiums
- Valid Performance Security.

3.2.5.3 Required Submissions in-line with programme

The Contractor shall submit the following for acceptance within 42 days from the Commencement Date:

- Contractor's document register
- Model element breakdown
- Process flow and instrumentation diagram, indicating items of equipment with final lab
- Draft Information model (see Information Modelling in Clause 3.2.5.11)
- Dimensioned layout drawings (preferably A0 size but no smaller than A1) of the installation showing the proposed layout and design of all plant and equipment (including lifting equipment) as well as any required building modifications. Sufficient sections and elevations must be shown so that the relative arrangement of all equipment is clear
- Motor and Instrumentation list
- Data sheets giving performance, sizing, physical and general technical data for all components of the installation
- Dimensioned arrangement drawings of all equipment requirements in respect of the building and civil structures
- Civil requirements for the new plinths
- Civil requirements for electrical and generator rooms
- RMU and transformer plinth requirements
- Loadings requirements which the lifting gear (including crawl beams, gantries, etc.) will place on other structures
- Drawings of pipe support details
- Technical data sheets for all coatings proposed
- Electrical single line diagrams
- Control system architecture
- FDS contents list
- Control philosophy
- Contents list for the Operation and Maintenance Manual
- Quality Control Plans for equipment
- Dimensioned drawings of equipment
- HVAC design
- Diesel powered generator sets design and drawings
- CHP design and drawings
- Load flow analysis
- Short circuit analysis
- Power factor analysis
- Harmonic analysis
- ETAP model

- MV Single line drawings
- MV protection drawings and protection philosophy
- MV panel general arrangement drawings
- MV schematics
- MV, LV and C&I Cable schedules
- MV and LV cable route and support system drawings
- MV switching philosophy
- Eskom self-build documents
- Single line diagrams per system
- MCC general arrangement drawings
- Ground Resistivity Survey and report
- Earthing designs, earthing SLD and earthings schematics
- PLC and IO Panel general arrangement drawings
- MCC schematics, door layouts
- Circuit breaker settings
- RMU schematics
- RMU general arrangement drawings
- RMU data sheet
- MV, LV and C&I Cable block diagrams
- Detailed control architecture drawing
- Loop diagrams
- Hook-up drawings and mounting bracket details
- C&I and data cable route drawings and support system drawings
- Junction box design
- Junction box general arrangements
- UPS and PSU load calculations and data sheets
- Control system functional design specification
- Telemetry design documentation
- WiFi propagation study
- Control Room and server room layout

3.2.5.4 Required Submissions before Commissioning of the Works

Prior to commencement of the commissioning tests, the Contractor shall submit:

- Routine and type test reports for all electrical equipment and motors
- Pre-commissioning test results
- As-built information model
- Commissioning plan indicating the commissioning activities that will take place, including a proposed programme for these activities.
- Operator training plan
- Draft Operation and Maintenance Manual

3.2.5.5 Required Submissions before and after Trial Operation Period

Prior to commencement of the Trial Operation Period, the Contractor shall submit:

- Comprehensive report containing detailed schedules and documentation to record all commissioning tests undertaken and the results of these, demonstrating that the Works have passed the commissioning tests. The data and reports shall be provided from the reporting system with annotation and comments on events to prove that the plant passed the commissioning tests.
- Training logs and weekly reports detailing the plant performance, problems and equipment failures during the Trial Operation Period (TOP). The TOP reports and data shall be provided from the reporting system with annotation and comments on events to prove that the plant operated defect free and according to the Employer's Requirements.
- An overall report at the end of the TOP

3.2.5.6 Before Taking-Over Certificate

Before the Taking-Over Certificate is issued, the Contractor shall provide three copies of the approved version of the Operation and Maintenance Manual and shall also provide, on electronic data storage, all drawings

supplied in terms of the Required Submissions within 42 and 70 days above, corrected where necessary to be "as built". The drawings shall be configured for AutoCAD, or equivalent. The Manual shall comply with the specifications for O&M manuals as detailed in the Specifications.

3.2.5.7 Contents of Control System Functional Design Document

The Contractor shall submit a Control System and Data Architecture FDS (Functional Design Specification). The specification shall cover the following content:

Item No	Description of Content
1	General
1.1	Contents List
1.2	Introduction
1.3	Drawing List (referring to P&IDs)
1.4	Tag naming convention
2	Control Philosophy
2.1	Plant should be broken down into its various functional units (inlet works screening, bioreactor, chlorination etc.). For each functional area the following shall be provided:
2.2	Control Modes Description
2.3	Motor List
2.4	Instrumentation List
2.5	Instrumentation Signals
2.6	Output signal during instrument error
2.7	Valve list and Failsafe positions of valves
2.8	Interlocks
2.9	Safety Interlocks
3	Process Interlocks
3.1	Startup/Shutdown Procedures (including for back-up power supply if applicable)
3.2	Duty Selection and Changeover
3.3	Startup/Shutdown Procedures (including for <u>back-up power</u> supply if applicable)
3.4	Setpoints
3.5	Trended variables
3.6	Variables for Reporting and Logging
3.7	SCADA/HMI display
3.8	Alarm list and priority categorisation
4	Data Architecture
4.1	Architecture drawing
4.2	Unified Namespace Configuration and Implementation
4.3	MQTT topics
4.4	Sparkplug B payload
4.5	Broker Software and Configuration
4.6	Communication and link to enterprise broker
4	Control Network Architecture
4.1	Description of Control Network

4.2	Hardware specifications
4.3	Software specifications
5	Programmable Controllers
5.1	Configuration
5.2	Hardware
5.3	Networks
5.4	IO list
5.5	Protocols
5.6	Functional blocks design and description
6	SCADA/HMI
6.1	SCADA Configuration
6.2	Tags List with Tag count
7	SCADA/HMI Mimics
7.1	Plant Overview
7.2	Navigation Bar
7.3	Sub Plant overviews (if applicable)
7.4	Functional Unit Overview
7.5	System Page
7.6	Comms Network (based on network architecture)
7.7	Electrical Distribution and Generation Network
7.8	Instrument Overview Screen
7.9	Symbol colours
8	Process Unit/Drive/Instrumentation/valves faceplates
8.1	Process sequence pages
8.2	Alarms Page
8.3	PID Control Loops and Set point pages
8.4	Trending
9	Alarm Management
9.1	Alarm Philosophy
10	Historian
10.1	Configuration
11	Datawarehouse
11.1	Extract Transform Load Procedures
11.2	Data model
11.3	Data Maintenance Scheduling (e.g. storing, archiving of data and log file)
12	Reporting
12.1	Metric KPI list
12.2	Realtime visualisation
12.3	Business intelligence visualisation
12.4	Report and Dashboard Design (see Electronic Specs for dashboard list)
13	Security
13.1	Cybersecurity design (VPN, reverse proxy, TLS, SSL)
13.2	Authentication Access Control

3.2.5.8 Approvals and Inspections

(a) Method Statements

The Contractor shall be required to prepare method statements subject to the approval of the Engineer and Client for the installation of equipment on any structures, or prior to the pre-commissioning or commissioning of any equipment.

(b) Approvals before Manufacturing and Inspections

All drawings which are to be submitted in terms of the Contract shall be approved in principle by the Engineer before any manufacturing or inspection of manufactured or supplied items commences. All items and equipment for incorporation into the works shall be approved by the Engineer prior to placements of orders. Refer to Clause 5 of the Conditions of Contract for further information in this regard.

(c) Quality Control Plans

Quality Control Plans (QCP's) of all manufactured items shall be submitted to the Engineer for approval prior to the start of any manufacturing. The Engineer shall review these QCP's and identify any hold points which he deems necessary for the specific item of equipment. The necessary hold points identified by the Engineer shall be taken into consideration and failure to adhere to any hold points shall constitute a failure of approval and any costs incurred in this regard shall be borne by the Contractor.

(d) Inspections

Inspections will be done in accordance with sub-clauses 7.3 and 7.4 of the Conditions of Contract. The Contractor shall arrange timeously with the Engineer for any inspections, at least 5 working days in advance. The inspections carried out by the Engineer shall not absolve the Contractor from his responsibilities with regards to the correctness of any of the Works.

(e) Workshop Facilities

The Contractor shall set up a workshop facility for technical support and repairs, within 90 days of the final award of the Contract. The Engineer shall inspect this facility and ensure that it is in accordance with Returnable Schedule 14.

3.2.5.9 HAZOP Study

The Contractor shall conduct a HAZOP study when the P&IDs and Control Philosophy documents have been finalised.

The Contractor shall employ a suitably experienced and independent consultant approved by the Engineer to lead the study in accordance with generally accepted industry practice. The consultant shall provide a report detailing the findings of the study. The study shall be undertaken at a suitable location once the Contractor's Process and Instrumentation Diagrams and Control Philosophy have been approved by the Engineer for this purpose.

The Contractor's P&IDs shall be modified by the Contractor to reflect the decisions reached.

The Contractor's project manager, the mechanical engineering designer and the electrical engineering designer shall be present for the full duration of the study. Representatives of the Employer responsible for planning, design, maintenance, and operation will also be present.

3.2.5.10 Hazardous Area Classification Study

The Contractor shall appoint a specialist (competent person in risk assessments) to undertake a hazardous area classification study for the Works.

The hazardous area study shall identify all hazardous locations and classify them in accordance with SANS 10108 (and the relevant health and safety standards – e.g., the South African Health and Safety Act 1993 (Act No. 85 of 1993), Electrical Machinery Regulations, Pressure Equipment Regulations, etc.).

The following areas are anticipated to be classified as hazardous locations:

- Diesel generator rooms, fuel storage and management areas
- Biogas (CHP) plant, including generators (engines), biogas storage, biogas handling, biogas conditioning
- Anaerobic digesters and digested sludge storage tanks
- Chlorine plant
- Boiler house
- Primary sludge storage and pumping.

All mechanical, electrical and electronic equipment shall be rated accordingly to match the hazardous areas. Equipment shall be priced for accordingly at tender stage.

3.2.5.11 Information Modelling

The Contractor shall develop an information model of the mechanical and electrical design that shall include a 3D model with metadata, P&IDs, drawings, equipment and instrumentation lists and other information elements that shall be updated during construction to an as-built information model.

A preliminary model element breakdown (MEB) will be given to the Contractor at the start of construction. This MEB will form the basis for the design of the M&E. The MEB will be based on the Uniclass Classification. The Contractor shall review this MEB during his design process and update according to his design.

As part of the MEB the Contractor shall develop the information requirements for the MEB which shall include but not limited to the following information:

Item	Information Required
Motors, Actuated Valves, Manual Valves, Instrumentation, Manual Gauges	Uniclass code Tagname Description Make Model Rating (if applicable) Service Interval Run hours
Pipework	Uniclass code Tagname Description Material Diameter PN Rating

The updated MEB and information requirements shall be submitted to the Engineer for approval before modelling may start.

Once the MEB is approved all the elements in the MEB shall be modelled in 3D design software. Revit and Inventor (for shop drawing detail) is preferred. The M&E 3D model shall serve as the single point of truth for M&E data (as defined above). It shall serve as the source for equipment and instrument lists. GA drawings and shop drawings shall be produced from the model. P&IDs, schematics and other diagrammatic drawings shall be linked to the 3D model by using unique tag IDs.

The M&E 3D model shall be updated weekly and coordinated with the Civil 3D model (developed by the Employer). The M&E model and Civil model will be federated into a single model in a web based common data environment (CDE). The model shall be used by the Contractor to coordinate construction activities and in design workshops and technical meetings with the Engineer.

The Contractor's Information Modelling leader shall be experienced (at least 5 years) and accredited in information modelling. The Contractor shall provide proof of accreditation and project experience during Construction.

The P&IDs shall be developed in design software that allows the back-end database to be queried.

DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS

C3.3 Procurement

CONTENTS

- 3.3.1 PREFERENTIAL PROCUREMENT
- 3.3.2 SUB-CONTRACTING PROCEDURES

3.3.1 PREFERENTIAL PROCUREMENT

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

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

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

3.3.2 SUB-CONTRACTING PROCEDURES

3.3.2.1 Monitoring the use of sub-contractors

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

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

The Contractor shall submit to the Engineer documentary evidence in accordance with the applicable codes of good practise, of the B-BBEE status level of every sub-contractor employed by the Contractor. Until such time as documentary evidence as described above has been submitted to the Engineer, a sub-contractor shall be deemed to be a non-compliant contributor.

The Contractor shall furthermore, on the written request of the Engineer, provide documentary evidence showing the value of work sub-contracted to any or all of the sub-contractors employed by the Contractor.

3.3.2.2 Procedure for the selection of sub-contractors/suppliers

Where monetary allowances for provisional sums or prime 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 R300 000, the Contractor shall invite three quotations from suitably qualified sub-contractors/suppliers for the required work or items. The selection of the three sub-contractors/suppliers shall be in consultation with, and to the approval of the Engineer. The evaluation of the quotations received must include a preference points system as described in C.3.11 of the Tender Data.

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

approval of the Contractor, invitations to tender will be advertised in the media by the Engineer on behalf of the Contractor, and a sub-contractor/supplier will be selected from the responses received, by the Contractor and Engineer 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 itself that the selected sub-contractor/supplier can meet the requirements of the sub-contract /supply agreement and may, on reasonable grounds, elect not to employ a particular sub-contractor/supplier.

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

C3.4 Construction

CONTENTS

- 3.4.1 TRADE NAMES OR PROPRIETARY PRODUCTS
- 3.4.2 APPLICABLE STANDARDISED SPECIFICATIONS
- 3.4.3 PARTICULAR / PROJECT SPECIFIC SPECIFICATIONS
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- 3.4.9 PLANT AND MATERIALS
- 3.4.10 SITE-RELATED ITEMS
- 3.4.11 CONSTRUCTION EQUIPMENT
- 3.4.12 SITE USAGE
- 3.4.13 OTHER CONTRACTORS
- 3.4.14 CONSTRUCTION RESTRICTIONS

3.4.1 TRADE NAMES OR PROPRIETARY PRODUCTS

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

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

3.4.2 APPLICABLE STANDARDISED SPECIFICATIONS

All works under the scope of works shall comply with the following Specifications and the latest relevant SANS, BS or ISO standards where applicable:

Standard Specification for Mechanical Works (including General Works) is included in Volume 3A)

Standard Specification for LV and Electrical Works (including General Works) is included in Volume 3B

Standard Specification for MV Electrical Works is included in Volume 3B

3.4.3 PARTICULAR / PROJECT SPECIFIC SPECIFICATIONS

All works under the scope of works shall comply with the following Specifications and the latest relevant SANS, BS or ISO standards where applicable:

Detailed Mechanical Specification (including General Works) is included in Volume 3A

Detailed Electrical Specification (including General Works) is included in Volume 3B

Detailed Electronic Specification (including General Works) is included in Volume 3B)

General Specification SPE-II-0007 – Instrumentation is included in Volume 3B

Electrical and Electronic Design Schedules is included in Volume 3B

Asset Numbering System is included in Volume 3B

Standard for Standby Supply Soft Load Transfer Scheme is included in Volume 3B

Technical Standard for the Interconnection of Embedded Generation is included in Volume 3B

General Specification SPE-EP-0024 – NECRT is included in Volume 3B

General Specification SPE-EE-0015 - Street and Area Lighting is included in Volume 3B

Particular Specification G: Environmental Management Specification and its Annexures are included in Volume 3A

Particular Specification H: Health and Safety Specification is in Volume 3A.

3.4.4 WAYLEAVES, PERMISSIONS AND PERMITS

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

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

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

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

3.4.5 LOCAL PRODUCTION AND CONTENT

Not applicable to this tender.

3.4.6 EMPLOYMENT OF SECURITY PERSONNEL

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

3.4.7 UNIVERSAL ACCESS

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

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

3.4.8 EXISTING SERVICES

3.4.8.1 Known services

A potable water supply and power supply to the site exists. The Contractor shall inform the Engineer immediately if services other than those shown on the drawings are detected.

3.4.8.2 Damage to services

The Contractor shall repair or arrange to immediately repair any damage to the existing services at his own cost if the damage was caused by the Contractor during the construction process.

3.4.8.3 Reinstatement of services and structures damaged during construction

The Contractor shall immediately inform the Engineer of any damage to existing services or structures.

3.4.9 PLANT AND MATERIALS

3.4.9.1 Plant and materials supplied by the employer

The Employer shall not supply any plant or materials.

3.4.9.2 Materials, samples and shop drawings

(a) Samples

Materials or work which does not conform to the approved samples submitted in terms of Sub-clause 7.3 of the Conditions of Contract will be rejected. The Engineer reserves the right to submit samples to tests to ensure that the material represented by the sample meets the specification requirements.

The costs of any such tests conducted by or on behalf of the Engineer, the results of which indicate that the samples provided by the Contractor do not conform to the requirements of the Contract, shall, in accordance with the provisions of Sub-clause 7.5 of the Conditions of Contract, be for the Contractor's account.

3.4.10 SITE-RELATED ITEMS

3.4.10.1 Services and facilities provided by the Employer

(a) Water sources

The responsible water supply authority in the area of the Site is the CCT.

Should the Contractor, in complying with his obligations in terms of Sub-clause C3.4.9.2(b): Water, wish to utilise such water supply, he shall himself be responsible for making his own arrangements with the responsible water supply authority for the supply of all water that he may require from such reticulation network for construction purposes as well as for domestic consumption.

If so, required by the responsible water supply authority, the Contractor shall further be responsible, at his own cost, for making or otherwise providing metered connections to the available services at the positions specified by the water authority, as well as for the removal of such connections on completion of the Contract.

No warranty is offered or given by the Employer that the existing available reticulated water supply will necessarily be adequate for the Contractor's purposes nor that such supply is in any way guaranteed.

All charges as may be levied by the responsible water supply authority in respect of water consumed by the Contractor shall be for the Contractor's account and payment to the Contractor in respect thereof shall, in accordance with the provisions of Sub-clause C3.4.9.2(b), be deemed to be included in the sums tendered by the Contractor for the various Preliminary and General items listed in the Bill of Quantities, as well as in the rates tendered by the Contractor for the various other items listed in the Bill of Quantities which require the consumption of water.

The Contractor shall, when reasonably required by the Engineer, produce documentary proof that all amounts as may have become due and payable by the Contractor to the responsible water authority have been promptly paid in full.

(b) Electricity supply

A reticulated electrical power supply is available in the vicinity of the Site.

The responsible electricity supply authority in the area of the Site is the CCT.

Should the Contractor, in complying with his obligations in terms of Sub-clause C3.4.9.2(c): Electricity, wish to avail himself of such supply, he shall, in accordance with the provisions of Sub-clause C3.4.9.2(c), and at his own cost, be responsible for making his own arrangements with the responsible electricity supply authority for the supply of all electrical power he may require from such reticulation network for construction purposes as well as for domestic consumption.

If so, required by the responsible electricity supply authority, the Contractor shall, at his own cost, be responsible for making metered connections to the available services at the positions specified by the electricity supply authority, as well as for the removal of such connections on completion of the Contract.

No warranty is offered or given by the Employer that the existing available reticulated electrical power supply will necessarily be adequate for the Contractor's purposes nor that its supply is in any way guaranteed.

All charges as may be levied by the responsible electricity supply authority in respect of electrical power consumed by the Contractor shall be for the Contractor's account and payment to the Contractor in respect thereof shall, in accordance with the provisions of Sub-clause C3.4.9.2(c), be deemed to be included in the sums tendered by the Contractor for the various Preliminary and General items listed in the Bill of Quantities, as well as in the rates tendered by the Contractor for the various other items listed in the Bill of Quantities which require the consumption of electricity.

The Contractor shall, when reasonably required by the Engineer, produce documentary proof that all amounts as may have become due and payable by the Contractor to the responsible electricity supply authority have been promptly paid in full.

(c) Excrement disposal

The responsible sewage disposal authority is the CCT.

Should the Contractor, in complying with his obligations in terms of Sub-clause C3.4.9.2(d): Excrement disposal, wish to avail himself of such facility, he shall, in accordance with the provisions of Sub-clause C3.4.9.2(d), and at his own cost, be responsible for making his own arrangements with the responsible disposal authority, and for making such connections he may require to the available services.

If so, required by the responsible sewage disposal authority, the Contractor shall, at his own cost, be responsible for making connections to the available services at the positions specified by the sewage disposal authority, as well as for the removal of such connections on completion of the Contract.

No warranty is offered or given by the Employer that the existing available reticulated water-borne sewage disposal will necessarily be adequate for the Contractor's purposes nor that its operation is in any way guaranteed.

All charges as may be levied by the responsible sewage disposal authority in respect of the disposal of sewage generated by the Contractor shall be for the Contractor's account and payment to the Contractor in respect thereof shall, in accordance with the provisions of sub-clause C3.4.9.2(d), be deemed to be included in the sums tendered by the Contractor for the various Preliminary and General items listed in the Bill of Quantities.

The Contractor shall, when reasonably required by the Engineer, produce documentary proof that all amounts that may have become due and payable by the Contractor to the responsible sewage disposal authority have been promptly paid in full.

(d) Area for contractor's site establishment

A specific area in close proximity to or on the Site of the Works will be made available by the Employer to the Contractor for the Contractor's site establishment. The specific area for the Contractor's site establishment will be identified to the Contractor by the Engineer and the Contractor shall have sole use of such area, free of charge, for the duration of the Contract. The Contractor shall use this area only for the purposes of erecting his site offices, workshops, stores and other facilities required for the execution of the Contract. The Contractor shall not use the area nor allow it to be used for any purposes not directly associated with the execution of the Contract.

The Contractor shall be responsible for arranging, at his own cost, for the provision of all services he may require in the area, as well as elsewhere on the Site.

Should the Contractor deem the area made available by the Employer to be inadequate or unsuitable for the Contractor's particular needs, then the Contractor shall be at liberty to make his own arrangements with the owners of other sites which he considers are better suited to his needs; provided always that the use by the Contractor of any area other than that made available to him by the Employer shall be subject to the prior written approval of the Engineer, which approval shall not be unreasonably withheld; and provided further that the Contractor shall have no claim against the Employer in respect of any costs incurred by him, either directly or indirectly in consequence of utilising any area other than that made available to him by the Employer, and which costs exceed those costs allowed for by the Contractor in his Tender. The approval of any area proposed by the Contractor will be subject to the conditions of the Environmental Authorisation received for the Project.

3.4.10.2 Facilities to be provided by the Contractor

(a) Facilities for the Engineer

The Contractor shall provide on the Site, for the duration of the Contract and for the exclusive use of the Engineer and/or his Representative (as applicable), the various facilities described hereunder. All such facilities shall be provided promptly on the commencement of the Contract and failure on the part of the Contractor to provide any facility required in terms of this specification shall constitute grounds for the Engineer to withhold payment of the Contractor's tendered Preliminary and General items until the facility has been provided or restored as the case may be.

i) Site Offices

The Contractor shall supply and furnish four (4) air-conditioned "Kwikjack" or equivalent approved (6m x 3m) site offices, internal size of at least 15 m² each. Each container to include a toilet (provision for separate male and female) for the exclusive use of the Engineer and his staff. The toilet shall have a connection to water borne sanitation system (no chemical toilets) and have a hand wash basin and liquid soap dispenser. The Contractor must provide the following per site office: two suitable office desks, internet connectivity (WIFI), lockable drawers, four office chairs, two "Barhold" or equivalent wall-mounted racks with 6 clamps suitable for hanging A0 sized drawings, electric lighting, air-conditioning (minimum 18,000 BTU for each split unit type), minimum of one plug (15A each), one kettle, one 100 l (minimum) fridge, a microwave oven (28 l, 900 W minimum), a lockable plan cupboard as well as windows fitted with blinds, burglar bars and fly screens over the openings, for the exclusive use of the Engineer, Engineer's Representative and assistant. A wash sink, other than the one provided for ablutions, shall be provided for washing of dishes. A concrete floor will be permitted for the office provided that it is covered with linoleum. The roof and walls should be insulated.

The Engineer, the Engineer's Representative and assistants shall be allowed free use of all the Contractor's site facilities.

The Engineer, the Engineer's Agent's Representative and assistant shall be allowed free use of survey equipment and assistants to carry out control work as and when required, and the Contractor shall provide all pegs, concrete, tools and other necessary items as well as all necessary labour for excavation, bush clearing, mixing and placing of concrete, as and when required for the control of the setting out of the Works.

The offices shall have a clean and neat appearance throughout.

The Contractor shall arrange for the offices and facilities to be cleaned daily.

ii) Carports

Six (6) shaded carports (6m x 3m wide), with a free draining, wearing course floor. The roof must be built in such a way that a vehicle will always be shielded against the sun throughout the day.

(b) Water

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

The sources of all water utilised for the purposes of the Contract shall be subject to the prior approval of the Engineer, which approval shall not be unreasonably withheld.

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

All water provided by the Contractor for construction purposes shall be clean, free from undesirable concentrations of deleterious salts and other materials and shall comply with any further relevant

specifications of the Contract. The Contractor shall, whenever reasonably required by the Engineer, produce test results demonstrating such compliance. Water provided by the Contractor for human consumption shall be healthy and potable to the satisfaction of the health authorities in the area of the Site. No separate payment will be made to the Contractor for the obtainment, distribution and consumption of water, the costs of which will be deemed to be included in the Contractor's tendered rates.

As part of the operation and training portion of the Contract, the Contractor may use the Employer's existing water supply and shall not be charged for reasonable use for the execution of tasks that fall under this Contract.

(c) Electricity

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

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

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

As part of the operation and training portion of the Contract, the Contractor may use the Employer's existing electricity supply and shall not be charged for reasonable use for the execution of tasks that fall under this Contract.

(d) Excrement disposal

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

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

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

As part of the operation and training portion of the Contract, the Contractor may make use of the Employer's existing sanitation facilities. The Contractor shall ensure his personnel maintain these facilities in a good condition and shall always adhere to acceptable hygienic standards. The Employer shall reserve the right to revoke access to these facilities for the Contractor's personnel should they fail to adhere to acceptable hygienic standards. Should access to sanitary facilities be revoked, the Contractor shall make alternate arrangements for sanitary use by his workmen.

(e) Security

The Contractor may be exposed to criminal actions, including theft and vandalism, and shall make the necessary security arrangements for the duration of the Contract. The Contractor shall, as a minimum, enclose the whole camp with a security fence. The Contractor shall remove the fencing and shall rehabilitate the camp site areas on completion of the Contract.

3.4.10.3 Features requiring special attention

(a) Site maintenance

During progress of the work and upon completion thereof, the Site of the Works shall be kept and left in a clean and orderly condition. The Contractor shall store materials and equipment for which he is responsible in an orderly manner and shall keep the Site free from debris and obstructions.

(b) Subcontractors

All matters pertaining to subcontractors (including Nominated Subcontractors) and the work executed by them shall be dealt with directly between the Engineer and the Contractor in the context of all subcontract work being an integral part of the Works for which the Contractor is responsible. The Contractor is responsible for work carried out on his behalf by Subcontractors.

The Engineer will not liaise directly with any subcontractors, nor will he issue instructions concerning the subcontract works directly to any subcontractor.

All matters arising from the subcontract agreements shall be dealt with directly between the Contractor and the subcontractors and the Engineer will not become involved.

Any problems related to payments, programming, workmanship, etc. shall be the concern of the Contractor and the Subcontractor, and the Engineer will not be involved.

(c) Access to properties

The Contractor shall organise the work to cause the least possible inconvenience to the public and to the property owners adjacent to or affected by the work, and except as hereunder provided, shall at all times provide and allow pedestrian and vehicular access to properties within or adjoining or affected by the area in which he is working. In this respect the Contractor's attention is drawn to Clause 4.13 of the Conditions of Contract.

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

Notwithstanding the aforementioned, the Contractor may, with the prior approval of the Engineer (which approval shall not be unreasonably withheld), make arrangements with and obtain the acceptance of the occupiers of erven and properties to close off part of a street, road, footpath or entrance temporarily, provided that the Contractor duly notifies the occupiers of the intended closure and its probable duration, and reopens the route as punctually as possible. Where possible, such streets, roads, footpaths and entrances shall be made safe and reopened to traffic overnight. Such closure shall not absolve the Contractor from his obligations under the Contract to provide access at all times. Barricades, traffic signs, drums and other safety measures appropriate to the circumstances shall be provided by the Contractor to suit the specific conditions.

(d) Monthly statements and payment certificates

The statement to be submitted by the Contractor in terms of Clause 14.3 of the Conditions of Contract shall be prepared by the Contractor at his own cost, strictly in accordance with the standard payment certificate prescribed by the Engineer, in digital electronic computer format. The Contractor shall submit to the Engineer the digital electronic computer file of the statement.

For the purposes of the Engineer's payment certificate, the Contractor shall subsequently be responsible, at his own cost, for making such adjustments to his statement as may be required by the Engineer for the purposes of accurately reflecting the actual quantities and amounts which the Engineer deems to be due and payable to the Contractor in the payment certificate.

The Contractor shall, at his own cost, make the said adjustments to the statement and return it to the Engineer within three (3) normal workings days from the date on which the Engineer communicated to the Contractor the adjustments required. The Contractor shall submit to the Engineer the electronic digital computer file which includes the adjusted statement.

Any delay by the Contractor in making the said adjustments and submitting to the Engineer the requisite adjusted statement for the purposes of the Engineer's payment certificate will be added to the times allowed to the Engineer in terms of Clause 14.6 of the Conditions of Contract to submit the signed payment certificate to the Employer and the Contractor. Any such delay will also be added to the period in which the Employer is required to make payment to the Contractor.

PROCESS CONTROL: ASSISTANCE AND MAINTENANCE OF WORKS (FULL TIME):

Payment for Process Control: Assistance, Maintenance and Training scheduled items shall be read in conjunction with the Project Specifications (Part C3.1.10) and shall conform to payment clauses as stated herein under.

OMT1. Preliminary and General Items

Unit Sum

Where provision is made in the Bill of Quantities for Preliminary and General items, the sum(s) tendered shall cover the cost of all responsibilities specified in the Specifications together with all responsibilities in

terms of the Conditions of Contract. In interim certificates, payment for Preliminary and General Items will be made, unless otherwise provided for, as a percentage of the tendered lump sum(s) pro-rated to the value of work certified for payment. Note that the Preliminary and General Items in Bill M35 are for **twelve (12)** months process control assistance, maintenance and training (full time) where the Contractor's staff shall be based full time on site during the defects notification period.

OMT2. Process Control Assistance and Maintenance of Works (Full time)

Unit Month

The tendered rate or sum shall be payable monthly to the Contractor in accordance with the requirements specified in the Project Specifications.

The tendered rate shall include full compensation for all liabilities and obligations described or implied in the Project Specifications and deemed by the Contractor to be applicable to the maintenance of an entire installation and all appurtenant works deemed to form part thereof, as defined in the Project Specifications.

Remuneration for all value-related as well as all time-related preliminary and general charges shall be deemed included in the Contractor's monthly operation costs.

OMT3. Process Control and Maintenance Training of Works Personnel (including Certification)

(a) Development of a Syllabus for Training of Operators

Unit Sum

The unit of measurement shall be the sum for the compilation of a training syllabus for each installation. The training material shall be revised and update at the end of the training contract before the Municipality takes ownership of the training material.

The tendered amount shall include full compensation for identification of pre-qualification criteria and training needs, staff assessment and evaluation prior to training, all technical research, development and compilation of an approved training course and course material, and all other actions necessary for commencement of official training sessions in accordance with the specification.

The tendered amount shall also include full compensation for the compilation of a draft syllabus and for incorporation of all the Engineer's comments and corrective requirements.

(b) Presenting a Training Course for Operators

UnitSum

The unit of measurement shall be the sum for the number of training courses presented based on the approved syllabus.

The tendered rate shall include full compensation for presenting a training course, including lectures, demonstrations, on-site training and hands-on development and improvement of operators' skills to enable the operators to operate installations safely and efficiently.

The tendered rate shall include full compensation for the Contractor's time, appointment of the accredited trainer for the course, and for all material expenses such as paper hand-outs and slides for the whole group of trainees, the number of which shall be determined during development of the training course.

(c) Presenting a Training Course for Maintenance Personnel (mechanical and electrical)

Unit Sum

The unit of measurement shall be the sum for the number of training courses presented.

The tendered rate shall include full compensation for presenting a course, including lectures, demonstrations, on-site training and hands-on development, and improvement of maintenance personnel's skills to enable them to maintain and repair installations safely and efficiently at the satisfactory functional condition specified.

The tendered rate shall include full compensation for the Contractor's time, appointment of the accredited trainer for the course, and for all material expenses such as paper hand-outs and slides for the whole group of trainees, the number of which shall be determined during development of the training course.

(d) Arranging Demonstration Session(s) for Trainees

Unit Sum

The unit of measurement shall be a sum depending on the number of demonstration sessions arranged. This will depend on the number of trainees that underwent training.

The tendered rate shall include full compensation for any reasonable costs arising from the arrangement of demonstration sessions but shall exclude any time related claims for the course presenter(s) as this shall be assumed to be covered under (b) and (c) above.

OMT4. Compensation in terms of Clause 19.1, 19.6 (c) and 19.6(d) of the FIDIC Conditions of Contract – 1999, for delays incurred

(a) Plant and equipment.....Unit: Sum per working day

(b) Labour.....Unit: Sum per working day

(c) Supervision.....Unit: Sum per working day

(d) Other services, facilities, etc. not covered by (a), (b) and (c) above.....Unit: Sum per working day

The sum tendered for each item shall cover the full and final costs of delaying the specified resource or facility and no additional compensation shall apply, notwithstanding any provisions to the contrary in the contract document in respect of any extension of time granted in relation to the circumstances described in Clauses 19.1, 19.6 (c) and 19.6(d) of the FIDIC Conditions of Contract – 1999.

For the purposes of calculating the total delay, a working week shall consist of 5 working days and a working day 8 hours.

MAINTENANCE INSPECTIONS AFTER DEFECTS NOTIFICATION PERIOD (PART TIME):

Payment for scheduled items shall be read in conjunction with the Project Specifications (Part C3.1.10) and shall conform to payment clauses as stated herein under.

MI1. Preliminary and General Items

Unit Sum

Where provision is made in the Bill of Quantities for Preliminary and General items, the sum(s) tendered shall cover the cost of all responsibilities specified in the Specifications together with all responsibilities in terms of the Conditions of Contract. In interim certificates, payment for Preliminary and General Items will be made, unless otherwise provided for, as a percentage of the tendered lump sum(s) pro-rated to the value of work certified for payment. Note that the Preliminary and General Items in Bill M36 are for a total period of **six (6)** months after the Defects Notification Period where the Contractor's staff shall be based part time on site during this period.

MI2. Maintenance Inspections of Specific Works for a total period of six months after the Defects Notification Period (Part Time)

Unit Month

The tendered rate or sum shall be payable monthly to the Contractor in accordance with the requirements specified in the Project Specifications C3.10.1 and shall account for inspections as defined in the Bill of Quantities.

The tendered rate shall include full compensation for all liabilities and obligations described or implied in the Project Specifications and deemed by the Contractor to be applicable to conduct routine maintenance inspections for the operation of an entire installation and all appurtenant works (as defined in the Bill of Quantities) deemed to form part thereof, as defined in the Project Specifications.

Remuneration for all value-related as well as all time-related preliminary and general charges shall be deemed included in the Contractor's monthly operation costs.

MI3. Call-out charge in response to a breakdown

Unit: No

The unit of measurement shall be a single charge rate per call-out responding to a breakdown. The maximum allowable response-time is applicable (Refer to Part C3.1.10).

The call-out charge rate shall include full compensation for all costs related to travelling, accommodation and labor, inspecting, assessing and reporting of dysfunctional component/s or installation.

MI4. Charge for actual repair work done during breakdown

Unit: Hours

The unit of measurement shall be the number of hours the Contractor spent performing the actual repair work on a dysfunctional component or installation as a result of a breakdown. The rate shall cover all labor, travelling to site, accommodation, dismantling, resetting, calibrating, protecting, recoating, re-assembling, re-installing, testing and re-commissioning of the dysfunctional component or installation.

All consumables, materials, equipment, components and spares required in attending to a breakdown shall be covered by the Prime Cost Sum items allowed for in the Bill of Quantities.

(e) Construction in restricted areas

Working space is sometimes restricted. The construction method used in these restricted areas largely depends on the Contractor's Plant. Notwithstanding, measurement and payment will be strictly according to the specified cross-sections and dimensions irrespective of the method used, and the rates and prices tendered will be deemed to include full compensation for any difficulties encountered by the Contractor while working in restricted areas. Neither extra payment nor any claim for payment due to these difficulties will be considered.

(f) Notices, signs, barricades and advertisements

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

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

(g) Workmanship and quality control

The onus to produce work that conforms in quality and accuracy of detail to the requirements of the Specifications and Drawings rests with the Contractor, and the Contractor shall, at his own expense, institute a quality control system and provide suitably qualified and experienced engineers, foremen, surveyors, materials technicians, other technicians and technical staff, together with all transport, instruments and equipment to ensure adequate supervision and positive control of the Works at all times.

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

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

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

(h) Dealing with Water

The Contractor shall deal with water on the Site so that the Works are kept sufficiently dry for their proper execution. The Contractor shall:

- a) Prevent flooding of the Works and by the Works
- b) Keep all completed Works properly drained
- c) Not inhibit surface drainage

- d) Manage and dispose of water; which shall include for by-pass arrangements, temporary earthworks, cofferdams, pumping equipment, well-pointing, de-watering equipment etc., and for dealing with all possible flows whether or not the existing flow path is being interfered with during construction
- e) Note that the Contractor under this contract shall be responsible for dewatering of the tanks during installation of mechanical equipment.

The onus to produce work that conforms in quality and accuracy of detail to the requirements of the Specifications and Drawings rests with the Contractor, and the Contractor shall, at his own expense, institute a quality control system and provide suitably qualified and experienced.

3.4.11 Construction Equipment

3.4.5.11.1 Requirements for equipment

The Contractor shall supply all the plant and equipment required and all plant and equipment shall comply with the requirements as stipulated in the Environmental and Occupational Health and Safety Act and the Construction Regulation Act (2014).

3.4.5.11.2 Equipment provided by the employer

The Employer shall supply no plant, material or equipment.

3.4.12 Site Usage

Access to site shall be limited to the contractor, his personnel and authorised operational staff. The contractor shall be responsible to control unauthorized entry to the site and shall inform the Engineer of any breach of such rules. The site shall be managed and used for its intended purpose.

It must further be noted that the Macassar WWTW must perform satisfactory in terms of its effluent standards and the Employer's employees shall require access to all parts of the treatment works for normal or emergency duties and work.

3.4.13 Other Contractors

As discussed in Part C3.1 (Description of Works), Clause 3.1.9, other contractors (civil) will be engaged by the Employer and will be present on site during the period of the contract.

The contractor shall arrange or adjust as necessary, the sequence of its work so as not to delay the programmes of the other contractors. The programmes of the other contractors will be made available at the offices of the engineer for perusal within two weeks upon commencement of the contracts.

3.4.14 Construction Restrictions

The Contract will be subject to construction restrictions. The aforementioned will need to be considered for programming and planning requirements as stipulated in Clause C3.5.7 (Part C3.5: Management) of this Contract Document. The Works must at all times during the construction of the Contract, remain operational in such a way so as to at least achieve the treatment performance currently achieved by the existing Works before construction began. This means that an existing process unit (or equipment associated with the process unit) in a treatment step can only be taken offline if that treatment step is not taken offline completely, permanently or with irreversible effects. Guidance from the Engineer can be sought in this respect. Further, where such works is programmed, the Contractor will be required to submit a Method Statement to the Engineer for approval.

Furthermore, once new equipment and process units are brought into operation to replace existing equipment or process units, the new equipment and/or process units may need to remain operation to ensure treatment. Due to the nature of a wastewater treatment plant, it may be necessary to commission equipment/process units at different stages to achieve the development of the treatment process and its parameters. As such, it

is noted that the Contractor should expect that the commissioning of equipment/process units will not occur simultaneously, and that equipment/process unit will be in operation prior to the rest of the works. This does not constitute the Employer taking over the works and the works must be complete in its entirety and the treatment process (including all the necessary ancillaries) operational prior to the Employer taking over.

DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS

C3.5 Management

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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 C3.7 Annexes as amended from time to time):

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

The Monthly Project Labour Report must include details of all labour (including that of sub-contractors) that are South African citizens earning less than **R350.00** 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 Engineer with copies of the signed employment contracts entered into with such labour, together with certified copies of identification documents, proof of attendance in the form of attendance register or timesheets as well as evidence of payments to such labour in the form of copies of payslips or payroll runs. If the worker is paid in cash or by cheque, this information must be recorded on the envelope and the worker must acknowledge receipt of payment by signing for it and proof of such acknowledgement shall be furnished to the Engineer.

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

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

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

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

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

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

In respect of Annexes 2 and 3, the Employer shall, in addition to any other sanctions available to it, apply the financial penalties applicable to breach of preferencing conditions in the **Preference Schedule** Preference Schedule in Part T2.2 Returnable Schedules. In the case of joint ventures (Annex 3), the contractor shall prove his compliance with item 6) in Section 2 of the Preference Schedule by providing a consolidated scorecard at his own cost on instruction from the Engineer.

3.5.2 PARTICIPATION OF TARGETED LABOUR

3.5.2.1 Minimum targeted labour contract participation goal

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

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

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

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

0 %

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 Engineer 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 shown on plan in Part C4: Site Information

"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 R350.00 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 through the Job-Seekers Database, or as regards any matter relating to the employment of targeted labour, shall be immediately referred to the Engineer.

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:

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

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

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

P^* = the value of the contract.

3.5.3 COMMUNITY LIAISON OFFICER

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 Sub-council Manager through a process of advertising and shortlisting. Should suitable candidates not be identified through this process, 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 C1.7: 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. The rate of remuneration for the CLO, payable by the Contractor, is currently **R462.00** per day. 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.

3.5.4 PARTICIPATION OF TARGETED ENTERPRISES

3.5.4.1 Minimum targeted enterprises contract participation goal

It is a requirement of this contract that enterprises located within the target area, as defined, be engaged by the Contractor for the provision of supplies, services or works necessary for the performance of this contract.

To this end, a minimum targeted enterprises 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 enterprises contract participation goal (CPG_E) is

0 %

The Contractor shall engage targeted enterprises directly or indirectly in the performance of the contract to the extent that the total monetary value of such engagements (exclusive of VAT), expressed as a percentage of the value of the contract, is sufficient to achieve the specified minimum CPG_E.

3.5.4.2 Definitions

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

“**Target area**” means the geographical area shown on plan in Part C4: Site Information

“**Targeted enterprises contract participation goal (CPG_E)**” means the value of supplies, services or works (exclusive of VAT), for which the Contractor contracts targeted enterprises, either directly or indirectly, in the performance of the contract, expressed as a percentage of the value of the contract.

“**Targeted enterprises**” means any sole trader, partnership or legal entity that acts as a supplier, manufacturer, service provider or sub-contractor, and which has its base of operations in the target area.

“**Value of the contract**” means the contract sum (accepted contract amount) less provisional sums, contingencies and VAT.

3.5.4.3 Achieving the contract participation goal

The contractor may achieve the specified minimum CPG_E as follows:

- a) by engaging one or more targeted enterprises to perform commercially useful functions in the performance of the contract;
- b) by engaging non-targeted enterprises, who in turn engage one or more targeted enterprises to perform commercially useful functions in the performance of the contract;
- c) by a combination of the above.

The Contractor shall, within 5 working days of being requested by the Engineer to do so, submit details of his/her plan to achieve the minimum CPG_E.

3.5.4.4 Contract participation goal credits

Credits towards achieving the minimum CPG_E shall be granted by converting the total monetary value (exclusive of VAT) of the agreements between the Contractor, or Contractor's sub-contractors, and targeted enterprises, to a percentage of the value of the contract.

No credits shall be accorded should the Contractor (or sub-contractors):

- a) make direct payment to third parties in connection with the contract on behalf of targeted enterprises, when such payment is recovered by making deductions from payments due to the targeted enterprise;
- b) fail to enter into written contractual agreements with the relevant targeted enterprises.

Credits claimed towards the contract participation goal shall be denied where such written contractual agreements contain any of the following:

- c) conditions which are more onerous than those that exist in the prime contract (this contract);
- d) payment procedures based on a pay when paid system;
- e) authoritarian rights given to the employing contractor, with no recourse to independent adjudication in the event of a dispute arising.

No credits may be claimed in respect of targeted enterprises that do not adhere to statutory labour practices.

No credits shall be accorded in respect of targeted enterprises engaged on work in respect of provisional sums or prime cost items.

In the event that a targeted enterprise sub-contracts to another targeted enterprise, only the value of the higher level sub-contract shall be granted as credit towards achieving the specified minimum CPG_E.

In addition to the form required for contract administration (the Targeted Enterprises Contract Participation Expenditure Report), the Contractor shall furnish the Engineer, upon written request, with documentary evidence that the targeted enterprises have their base of operations in the target area, copies of the contractual agreements with the various targeted enterprises, as well as documentary proof of payments made to the various targeted enterprises.

3.5.4.5 Penalties

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

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

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

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

P^* = the value of the contract.

3.5.5 ENVIRONMENTAL MANAGEMENT PROGRAMME

The Contractor will be responsible for managing his activities so that damage to the environment is minimised, as per the specifications contained as per Particular Specification H: Environmental Management Specification and its Annexures are included in Volume 3A.

3.5.6 HEALTH AND SAFETY

The Contractor shall be responsible for complying with the Occupational Health and Safety Act, Act 85 of 1993, and specifically the Construction Regulations 2014 issued in terms of Section 43 of the Act (GNR 84 of 10 February 2014).

The Contractor is referred to Part T1.2 Tender Data. Notwithstanding the Project Health and Safety Specification included the Particular Specification G: Health and Safety Specification included in Volume 3A; the following shall apply.

3.5.6.1 Health and safety requirements and procedures

In terms of the provisions of Section 37(2) of the Occupational Health and Safety Amendment Act, 1993 (Act 85 of 1993), hereinafter referred to as the Act, the following arrangements and procedures shall apply between the Contractor and the Employer to ensure compliance by the Contractor with the provisions of the Act:

- (i) The Contractor undertakes to acquaint the appropriate officials and employees of the Contractor with all relevant provisions of the Act and the Regulations promulgated in terms of the Act.
- (ii) The Contractor undertakes that all relevant duties, obligations and prohibitions imposed in terms of the Act and Regulations on the Contractor will be fully complied with.

- (iii) The Contractor accepts sole liability for such due compliance with the relevant duties, obligations and prohibitions imposed by the Act and Regulations and expressly absolves the Employer from himself being obliged to comply with any of the aforesaid duties, obligations and prohibitions, with the exception of such duties, obligations and prohibitions expressly assigned to the Employer in terms of the Act and its associated Regulations.
- (iv) The Contractor agrees that any duly authorised officials of the Employer shall be entitled, although not obliged, to take such steps as may be necessary to monitor that the Contractor has conformed to his undertakings as described in paragraphs (i) and (ii) above, which steps may include, but will not be limited to, the right to inspect any appropriate site or premises occupied by the Contractor, or any appropriate records or safety plans held by the Contractor.
- (v) The Contractor shall be obliged to report forthwith to the Employer and Engineer of any investigation, complaint or criminal charge which may arise as a consequence of the provisions of the Act and Regulations, pursuant to work performed in terms of this Contract, and shall, on written demand, provide full details in writing, to the Employer and Engineer, of such investigation, complaint or criminal charge.
- (vi) The Contractor shall furthermore, in compliance with Constructional Regulations 2014 (Government Gazette 37305 and Regulation Gazette 10113 of 7 February 2014) to the Act acquaint himself with the requirements of the Employer's Health and Safety Specification as laid down in regulation 4(1)(a) of the Construction Regulation 2014, and prepare a suitably and sufficiently documented health and safety plan as contemplated in regulation 7(1)(a) of the Construction Regulation 2014 for approval by the Employer or his assigned agent. The Contractor's health and safety plan and risk assessment shall be submitted for approval, to the Employer or his agent, within 14 days of the Commencement Date and shall be implemented and maintained from the commencement of the Works.

The Contractor shall at all times be responsible for full compliance with the approved plan as well as with the Construction Regulations and no extension of time will be considered for delays due to non-compliance with the abovementioned plan or regulations.

- (vii) The Employer, or his assigned agent, reserves the right to conduct periodic audits, as contemplated in the Construction Regulations 2014, to monitor that the Contractor is compliant in respect of his obligations. Failure by the Contractor to comply with the requirements of these Regulations shall entitle the Engineer, at the request of the Employer or his agent, to suspend all or any part of the Works, with no recourse whatsoever by the Contractor for any damages incurred as a result of such suspension, until such time that the Employer or his agents are satisfied that the issues in which the Contractor has been in default have been rectified.
- (viii) The proposed type of work, materials to be used and potential hazards likely to be encountered on this Contract are detailed in the Parts C3.4 and C3.5, the Bill of Quantities, the Drawings, and in the Employers' Health and Safety Specification (regulation 5(1)(b) of the Construction Regulations 2014), which is contained in the Particular Specifications.

Payment items are included in the Bill of Quantities to cover the Contractor's cost for compliance with the OHS Act and the abovementioned regulations.

3.5.6.2 Health and Safety Plan

Without limiting his obligations and liabilities in terms of the Construction Regulations, 2014 of the OHS Act, the Contractor, in his Health and Safety Plan to be submitted in terms of the Contract Data, shall inter alia deal with the safety provisions he will set up in respect of the aspects specified in the Specifications.

The Health and Safety Plan shall be neatly set out in a lever-arch type file, with labelled dividers for each section.

A copy of the approved Health and Safety Plan shall be kept on Site and made available upon request.

3.5.6.3 Protection of the public and Employer's staff

The Contractor shall at all times ensure that his operations do not endanger any member of the public, or the Employer's staff.

Open excavations and other hazardous conditions on site shall be barricaded and precautions shall be taken to protect the public from the same in terms of the OHS Act.

The Contractor shall direct, control, facilitate and safeguard all pedestrian traffic during construction of the Works, provide all notices, and arrange for watching and lighting in accordance with the requirements of the relevant authorities.

3.5.6.4 Excavations

Without limiting his responsibility for the safety of his workers in any excavation, the Contractor shall ensure the safety of his workers in trenches and excavations deeper than 1,0 m. in terms of the provisions of the OHS Act. The Contractor may choose to batter excavations to a safe slope if sufficient space is available, or adequately shore the excavations.

3.5.6.5 Working and entering confined spaces

Confined space is defined in the Occupational Health and Safety Act, Act 85, 1993, as an enclosed, restricted, or limited space in which, because of its construction, location or contents, or any work activity carried on therein, a hazardous substance may accumulate or an oxygen-deficient atmosphere may occur, and includes any chamber, tunnel, pipe, pit, sewer, container, valve, pump, sump, or similar construction, equipment, machinery or object in which a dangerous liquid or dangerous concentration of gas, vapour, dust or fumes may be present.

(a) Hazardous conditions in confined spaces could be identified as:

Hazardous atmosphere:

- Too little or too much Oxygen (too little can cause brain damage and cause the heart to stop and too much increases the risk of fire or explosion)
- Presence of Toxic gases
- Liquids or solids inside the confined space. Liquids may produce hazardous atmosphere when it evaporates e.g. fuel
- Type of work done inside the confined space. Activities can lead to the release of harmful substances e.g. grinding, descaling etc.
- Contamination from outside/adjacent sources. A contaminant could enter the confined space through porous walls, communicating openings e.g. sewers

Explosive atmospheres:

- High concentration of Oxygen (>23%),
- Fuel e.g. Acetylene gas from leaking welding equipment;
- Methane gas and hydrogen sulphide produced by rotting organic waste in sewers;
- Hydrogen gas produced by contact between aluminium or galvanized metals and corrosive liquids;
- grain or coal dust;
- solvents such as acetone, ethanol, toluene, turpentine, and xylene which may be introduced into the space through spills) and
- Ignition sources e.g. open flames, welding arcs, chemical reaction, arcing of electrical motors etc.)

Physical hazards

- Loose and unstable material may lead to trapping or burying workers
- Slip, trip and fall hazards
- Falling objects from above
- Moving parts of equipment and machinery
- Electrical shock from defective extension cords, welding cables etc.
- Poor visibility
- Temperature extremes

- Noise
- Risk of drowning
- Rusted railings

(b) Safe work procedures for Confined Spaces shall include:

Only enter confined space after the air has been tested and evaluated by a competent person who has certified in writing that the space is safe and will remain safe for the duration of the work. Where the confined space cannot be certified as safe steps must be taken 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;

- 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
- 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.

In an instance where it's not possible to purge and ventilate the confined space, the following precautions must be taken:

- the confined space is entered only when the employee or person entering is using breathing apparatus of a type approved by the chief inspector and, further, that;
- 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 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);
- 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
- effective, approved apparatus for breathing and resuscitation is available immediately outside the confined space.

Ensure that everybody vacate the confined space after completion of any work therein. Where the hazardous gas, vapour, dust or fumes are of an explosive or flammable nature, further steps must be taken to ensure that such a confined space is entered only if –

- the concentration of the gas, vapor, dust or fumes does not exceed 25 percent of the lower explosive limit of the gas, vapor, 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
- such concentration does not exceed 10 per cent of the lower explosive limit of the gas, vapor, dust or fumes where other work is performed

Employees required to work in confined spaces must be trained and competent in confined space procedures. Working alone in a confined space is not permitted. A Confined Space Entry Permit is required for entry prior to any work performed in a confined space. A suitably trained person must undertake a written risk assessment before carrying out work involving entry into a confined space. The assessment shall take into account the following:

- the nature of the confined space;
- the work required and the methods by which the work can be done;
- the hazards involved and associated risks;
- implementation of control measures;
- the emergency and rescue procedures.

The risk assessment must be signed by all the people involved in the work to be done in the confined space. Communication between people in a confined space must be established as well as communication with any stand-by staff located outside. Rescue procedures must be established before entry into any confined space which, include a stand-by person. If working

under a contractor or client's entry permit, this must be reviewed by a suitably qualified Health and Safety Specialist person to ensure adequacy of risk assessment, control measures and safe working procedures before entry.

3.5.6.6 Health and safety specialist

The Contractor shall employ a health and safety specialist, with suitable and proven qualifications, either on full-time or part-time basis, for the duration of the Contract. This specialist shall assist with the preparation of the health and safety plan, shall provide on-going training for all construction staff (at least 1 hour per week whilst work on site is in progress, in the form of weekly tool-box talks), and shall assist with the upkeep of the health and safety plan and associated regular inspections etc.

The requirement for a weekly presence on Site necessitates that the Health and Safety Specialist be based locally, at least for the period while the Contractor is working on Site (i.e. site establishment, site clearance, earthworks, construction).

3.5.6.7 Monthly health and safety reports

The health and safety specialist required in terms of C3.5.6.6 shall submit a report to the Engineer at the monthly site meetings, detailing the state of health and safety on the site over the last month, new risk assessments added, potential new risks, new precautions taken, and summarising the results of various inspections required in terms of the health and safety plan, etc. If this report is not submitted at each monthly site meeting, the Engineer shall impose a fine of R5000.00 on the Contractor, in each instance.

3.5.7 PROGRAMMING AND PLANNING

The Construction Programme shall be submitted to the Engineer within 14 days of the commencement date by the Contractor and shall meet the following requirements:

- (a) Be in the form of a bar chart/Gantt chart
- (b) Clearly indicate the start and end dates and duration of all construction activities and identify the critical path
- (c) Take full cognizance of all the Contractor's risks and obligations in terms of the Contract
- (d) Indicate key dates in respect of work to be carried out by others in accordance with the table that follows
- (e) Indicate key dates in respect of information to be provided by the Engineer and/or others.

The said Programme and all revisions thereto shall also be provided to the Engineers in electronic digital format using the MS PROJECT software.

The programme shall be updated monthly during the contract period. In addition to the above, a monthly cash flow forecast shall also be submitted to the Engineer.

The Contractor must plan their works and order of works to allow the existing WWTW to operate satisfactorily.

When drawing up his programme, the Contractor shall, take into consideration and make allowance for, inter alia:

- (a) Expected weather conditions and their effects,
- (b) Known physical conditions or artificial obstructions
- (c) Searching for, dealing with and carrying out alterations to the existing services
- (d) The accommodation of public access and traffic
- (e) The provision and implementation of the health and safety plan in terms of the Construction Regulations, 2014 of the Occupational Health and Safety Act
- (f) Time required for the biological processes to establish and stabilise

The following key dates shall apply:

- (a) It is anticipated that the instruction for Commencement of the Works will be within 14 days of the Commencement date as per Clause 8.1 of the General Conditions of Contract
- (b) The Contractor shall complete the entire Works within the period stated in C1.2:
The time for completion of the whole of the Works including the Trial Operation Period is **48 (Forty-Eight) months** and inclusive of all special non-working days. Further, the programme shall be subject to the following access dates for the various process units:

SCOPE OF WORKS	CIVIL SECTIONAL COMPLETION - READY FOR INSTALLATION OF EQUIPMENT	ALLOW M&E CONTRACTOR ACCESS FOR INSTALLATION	READY FOR TESTING AND COMMISSIONING OF EQUIPMENT	PHASE
Process Units				
Inlet Works	29 Months after Commencement of the Works	30 Months	38 Months	1
Primary Settling Tank Splitter	27 Months after Commencement of the Works	29 Months	38 Months	1
Primary Settling Tanks	28 Months after Commencement of the Works	29 Months	38 Months	1
Reactor Flow Splitter	31 Months after Commencement of the Works	34 Months	38 Months	1
Biological Reactors	26 Months after Commencement of the Works	27 Months	38 Months	1
Offline Balancing Tank	26 Months after Commencement of the Works	28 Months	38 Months	1
Secondary Settling Tanks Splitter	33 Months after Commencement of the Works	36 Months	38 Months	1
Secondary Settling Tanks	29 Months after Commencement of the Works	30 Months	38 Months	1
Effluent Channels 1	32 Months after Commencement of the Works	35 Months	38 Months	1
Effluent Channels 2	41 Months after Commencement of the Works	43 Months	45 Months	2
UV Channels and Building	27 Months after Commencement of the Works	30 Months	38 Months	1
Chlorine Contact Tank	43 Months after Commencement of the Works	43 Months	45 Months	2
Primary Sludge Screening Facility	29 Months after Commencement of the Works	35 Months	38 Months	1
Gravity Thickeners	26 Months after Commencement of the Works	31 Months	38 Months	1
Anaerobic Digesters	27 Months after Commencement of the Works	29 Months	38 Months	1

SCOPE OF WORKS	CIVIL SECTIONAL COMPLETION - READY FOR INSTALLATION OF EQUIPMENT	ALLOW M&E CONTRACTOR ACCESS FOR INSTALLATION	READY FOR TESTING AND COMMISSIONING OF EQUIPMENT	PHASE
Sludge Holding Tanks	25 Months after Commencement of the Works	31 Months	38 Months	1
Sludge Silos	27 Months after Commencement of the Works	32 Months	38 Months	1
Return Flow Pump Station	28 Months after Commencement of the Works	35 Months	38 Months	1
Main Sludge Transfer Pump Station	27 Months after Commencement of the Works	29 Months	38 Months	1
Gas Holding Tanks	29 Months after Commencement of the Works	31 Months	38 Months	1
Boiler House	31 Months after Commencement of the Works	33 Months	38 Months	1
Service Water Pump Station	30 Months after Commencement of the Works	32 Months	38 Months	1
Treated Sewage Effluent (TSE) & Filter Building	40 Months after Commencement of the Works	41 Months	44 Months	2
Ancillary Structures	33 Months after Commencement of the Works	35 Months	38 Months	1
Maturation Pond 04 Refurbishment	32 Months after Commencement of the Works	34 Months	38 Months	1
Maturation Pond 02 & 03 Refurbishment	35 Months after Commencement of the Works	36 Months	38 Months	1
Pipelines				
Diversion of incoming mains to new Inlet Works	37 Months after Commencement of the Works	-	-	1
Interconnecting Pipework	35 Months after Commencement of the Works	-	-	1
Wash water Reticulation	33 Months after Commencement of the Works	-	-	1
Potable Water Reticulation	32 Months after Commencement of the Works	-	-	1
Onsite sewage Reticulation	32 Months after Commencement of the Works	-	-	1
Buildings				
Dewatering Building	25 Months after Commencement of the Works	23 Months	38 Months	1
Blower Building	26 Months after Commencement of the Works	28 Months	38 Months	1
Chlorination building	42 Months after Commencement of the Works	43 Months	45 Months	2

SCOPE OF WORKS	CIVIL SECTIONAL COMPLETION - READY FOR INSTALLATION OF EQUIPMENT	ALLOW M&E CONTRACTOR ACCESS FOR INSTALLATION	READY FOR TESTING AND COMMISSIONING OF EQUIPMENT	PHASE
MV Intake Substation	23 Months after Commencement of the Works	25 Months	31 Months	1
Motor Control Centre (MCC) and Generator Buildings	21 Months after Commencement of the Works	24 Months	32 Months	1 and 2
Process Operations Building	35 Months after Commencement of the Works	-	-	1
Workshop and Store Building	35 Months after Commencement of the Works	-	-	1
Guard House	34 Months after Commencement of the Works	-	-	1
Security Hut	3 Months after Commencement of the Works	-	-	1
Demolition Works				
Existing sludge ponds infrastructure	33 Months after Commencement of the Works	-	-	1
Existing infrastructure	39 Months after Commencement of the Works	-	-	2
Existing Fencing	3 Months after Commencement of the Works	-	-	1
Existing chlorine contact tank	38 Months after Commencement of the Works	38 Months	-	2
Existing six (6) SST's and associated infrastructure (splitters and collection chambers)	38 Months after Commencement of the Works	38 Months	-	2
Existing guard house	17 Months after Commencement of the Works	-	-	2
Existing workshop, store and laboratory building	17 Months after Commencement of the Works	-	-	2
Existing administration building	17 Months after Commencement of the Works	-	-	2
Existing board room building and house	17 Months after Commencement of the Works	-	-	2
Existing chlorine building	38 Months after Commencement of the Works	38 Months	-	2
Existing irrigation and wash water pumpstation building	38 Months after Commencement of the Works	38 Months	-	2
Existing biological reactor 1 and associated infrastructure, including MCC and screw lift pump station 1	40 Months after Commencement of the Works	40 Months	-	2

SCOPE OF WORKS	CIVIL SECTIONAL COMPLETION - READY FOR INSTALLATION OF EQUIPMENT	ALLOW M&E CONTRACTOR ACCESS FOR INSTALLATION	READY FOR TESTING AND COMMISSIONING OF EQUIPMENT	PHASE
Existing screw lift pump station 2	38 Months after Commencement of the Works	38 Months	-	2
Existing generator building	38 Months after Commencement of the Works	38 Months	-	2
Existing inlet works and associated infrastructure	38 Months after Commencement of the Works	38 Months	-	2
Existing inlet works MCC building	38 Months after Commencement of the Works	38 Months	-	2
Existing dewatering building and sludge silos	38 Months after Commencement of the Works	38 Months	-	2
Existing river outlet	38 Months after Commencement of the Works	-	-	2
All existing pipelines which will not form part of the upgrade	38 Months after Commencement of the Works	-	-	2
General Civil Works				
Site Clearance and Bulk Earthworks 1	9 Months after Commencement of the Works	-	-	1
Site Clearance and Bulk Earthworks 2	39 Months after Commencement of the Works	-	-	2
Roads and Stormwater 1	39 Months after Commencement of the Works	-	-	1
Roads and Stormwater 2	47 Months after Commencement of the Works	-	-	2
Pond Dredging	6 Months after Commencement of the Works	-	-	1
Weighbridge	35 Months after Commencement of the Works	-	-	1
Boundary Wall/ Fencing	9 Months after Commencement of the Works	-	-	1
Landscaping	48 Months after Commencement of the Works	-	-	2

The Contractor is to take cognisance of the fact that some of the new and existing structures may remain empty for a period of time until installation of the mechanical and electrical equipment or hot commissioning thereof. This poses a risk of the structure becoming buoyant / floating during periods of a high ground water table. This is applicable to all buried water retaining and water-excluding (i.e., structure keeping water out) structures (including channels and sumps etc.), and excludes any buildings. Two scenarios are applicable for dealing with ground water where scenario 1 is applicable to the Civil Contractor, and scenario 2 is applicable to the Mechanical and Electrical (M&E) Contractor.

- Scenario 1, dealing with groundwater table prior to M&E installation, or any other period when the structure is in possession of the Civil Contractor:

- Where a structure is being emptied or remains empty it is noted that the floatation design of the structure relies on maintaining (via pumping if necessary) groundwater levels around the structure below the lowest top of concrete floor level (or a specified level stated on the latest construction drawings). For these structures, the underdrainage system should be maintained and fully operational at all times to facilitate pumping and monitoring.
- After the construction of all concrete elements, structures to be filled with water to avoid buoyancy risk. Water levels to be filled to top water level as per latest construction drawings, unless otherwise agreed and approved by the Engineer. The Civil Contractor will be responsible for filling the structure.
- In terms of sequencing of the works, this scenario runs up until the period when “Allow M&E Contractor Access for Installation” or will apply if the structure is handed back to the Civil Contractor (i.e., civil contractor takes possession) after M&E Contractor Access for Installation.
- Scenario 2, dealing with groundwater table during M&E installation or commissioning, or any other period when the structure is in possession of the M&E Contractor:
 - When the M&E contractor is allowed access to the structure for installation, if the structure contains water as a result of dealing with buoyancy the M&E contractor will be responsible for draining the water in the structure in order to proceed with the installation. While the structure is being emptied and for the duration of it being empty floatation design of the structure relies on maintaining (via pumping if necessary) groundwater levels around the structure below the lowest top of concrete floor level (or a specified level stated on the latest construction drawings). For these structures, the underdrainage system should be maintained and fully operational at all times to facilitate pumping and monitoring.
 - After the installation of the M&E equipment it is recommended that structures to be filled with water to avoid buoyancy risk. Water levels to be filled to top water level as per latest construction drawings, unless otherwise agreed and approved by the Engineer. The M&E Contractor will be responsible for filling the structure.
 - In terms of sequencing of the works, this scenario runs from the period when “Allow M&E Contractor Access for Installation” and up until hot commissioning. Once a structure has been hot commissioned it is assumed that the structure is operating at its design levels.

3.5.8 WORKS NOT TO INTERFERE

The Contractor is to take cognisance of the fact that the proposed site for the Works is located in close proximity to the industrial area and within the existing WWTW. The Contractor shall ensure that the Works do not affect operations of the aforementioned facilities.

The Contractor is to take cognisance of the fact that the Works is to remain operational during construction and interference with the existing process must be kept to a minimum. The Contractor shall ensure that:

- a) The Contractor’s site staff shall cooperate with the Employer’s staff.
- b) The Employer’s rules and requirements for operations are adhered to.
- c) Site staff is familiar with and comply with the Employer’s emergency procedures.
- d) Activities of the Site staff do not adversely affect the health and safety of the Employer’s staff once the Works is put into operation.

3.5.9 UNAUTHORIZED PERSONS

The Contractor shall keep unauthorized persons from the Works at all times.

3.5.10 MANAGEMENT MEETINGS

3.5.10.1 Technical Meetings

Technical meetings shall be held on an ad-hoc basis as required either by the Engineer or the Contractor.

The Contractor shall arrange for the Contractor's project manager and the Contractor's Technical Supervisor to attend these meetings. The Contractor shall also arrange for the Technical Inspector to attend.

The Engineer or his authorized representative will make notes of the decisions taken and hand these to the Contractor within seven (7) working days. The Contractor shall attend to these items and shall provide all present with copies of the notes within one working day.

3.5.10.2 Site Meetings

Site meetings shall be held monthly. The Contractor shall arrange for the Contractor's Representative to be present at these meetings.

The Engineer will take minutes of these meetings and distribute these to all relevant parties at least one week prior to the next site meeting.

3.5.10.3 Health and Safety Meetings

Health and Safety Meetings shall be held monthly.

3.5.10.4 HAZOP Meeting

HAZOP Meeting will be called by the Contractor at the commencement of the Contract and prior to installation of mechanical and electrical equipment.

3.5.10.5 Defects Notification Period

The Contractor shall attend meetings during the Defects Notification Period called by the Engineer.

3.5.11 ELECTRONIC PAYMENTS

The Contractor shall provide his banking details to enable electronic payments to be made for all payment certificates; such payments shall be at the direction of Municipality's Director of Procurement.

CITY OF CAPE TOWN

DIRECTORATE: WATER AND SANITATION

CONTRACT NO. 191Q/2023/24

DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF THE MACASSAR WASTEWATER TREATMENT WORKS

C3.6 Annexes

CONTENTS

Annex 1: Monthly Project Labour Report

Annex 2: B-BBEE Sub-Contract Expenditure Report

Annex 3: Joint Venture Expenditure Report

Annex 4: Targeted Labour Contract Participation Expenditure Report

Annex 5: Targeted Enterprises Contract Participation Expenditure Report

ANNEX 1

CITY OF CAPE TOWN MONTHLY PROJECT LABOUR REPORT



CITY OF CAPE TOWN
ISIXEKO SASEKAPA
STAD KAAPSTAD

Instructions for completing and submitting forms

General

- The Monthly Project Labour Reports must be completed in full, using typed, proper case characters; alternatively, should a computer not be available, handwritten in black ink.
- Incomplete / incorrect / illegible forms will not be accepted.
- Any conditions relating to targeted labour stipulated in the Contract (in the case of contracted out services or works) shall apply to the completion and submission of these forms.
- This document is available in Microsoft Excel format upon request from the City's EPWP office, tel 021 400 9406, email EPWPLR@capetown.gov.za.

Project Details

- If a field is not applicable insert the letters: NA
- Only the Project Number supplied by the Corporate EPWP Office must be inserted. The Project Number can be obtained from the Coordinator or Project Manager or from the e-mail address in point 4 above.
- On completion of the contract or works project the anticipated end date must be updated to reflect the actual end date.

Beneficiary Details and Work Information

- Care must be taken to ensure that beneficiary details correspond accurately with the beneficiary's ID document.

- A new beneficiary is one in respect of which a new employment contract is signed in the current month. A certified ID copy must accompany this labour report on submission.
- Was the beneficiary sourced from the City's job seeker database?
- The contract end date as stated in the beneficiary's employment contract.
- Where a beneficiary has not worked in a particular month, the beneficiary's name shall not be reflected on this form at all for the month in question.
- Training will be recorded separately from normal working days and together shall not exceed the maximum of 23 days per month
- Workers earning more than the maximum daily rate (currently R450 excluding any benefits) shall not be reflected on this form at all.

Submission of Forms

- Signed hardcopy forms must be scanned and submitted to the City's project manager in electronic (.pdf) format, together with the completed form in Microsoft Excel format.
- Scanned copies of all applicable supporting documentation must be submitted along with each monthly project labour report. Copies of employment contracts and ID documents are only required in respect of new beneficiaries.
- If a computer is not available hardcopy forms and supporting documentation will be accepted.

PROJECT DETAILS

Numbers in cells below e.g (6) refer to the relevant instruction above for completing and submitting forms

CONTRACT OR WORKS PROJECT NAME: (6)		EPWP SUPPLIED PROJECT NUMBER: (6)														
DIRECTORATE:		DEPARTMENT:														
CONTRACTOR OR VENDOR NAME:		CONTRACTOR OR VENDOR E-MAIL ADDRESS:														
CONTRACTOR OR VENDOR CONTACT PERSON:		CONTRACTOR OR VENDOR TEL. NUMBER:														
CELL WORK																
PROJECT LABOUR REPORT CURRENT MONTH (mark with "X")																
JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR				
ACTUAL START DATE (yyyy/mm/dd)				ANTICIPATED / ACTUAL END DATE (yyyy/mm/dd) (7)												
TOTAL PROJECT EXPENDITURE / VALUE OF WORK DONE TO-DATE (INCLUDING ALL COSTS, BUT EXCLUDING VAT)																
R																

MONTHLY PROJECT LABOUR REPORT

BENEFICIARY DETAILS AND WORK INFORMATION

CITY OF CAPE TOWN
ISIIXEKO SASEKAPA
STAD KAAPSTAD

CONTRACT OR WORKS PROJECT NUMBER:				Year		Month		Sheet				
								1 of				

	(8)	(8)	(8)	(9)			(10)		(11)	(12)	(13)	(14)
No.	First name	Surname	ID number	New Beneficiary (Y/N)	Gender (M/F)	Disabled (Y/N)	Job seeker database (Y/N)	Contract start date (DDMMYY)	Contract end date (DDMMYY)	No. days worked this month (excl. training)	Training days	Rate of pay per day (R – c)
1												
2												
3												
4												
5												
6												
7												
8												
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11												
12												
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17												
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19												
20												

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Declared by Contractor or Vendor to be true and correct:	Name		Signature	
	Date			

Received by Employer's Agent / Representative:	Name		Signature	
	Date			

ANNEX 2

CITY OF CAPE TOWN

CONTRACT NO. AND NAME: _____

CONTRACTOR: _____

B-BBEE SUB-CONTRACT EXPENDITURE REPORT BASED ON PAYMENT CERTIFICATE NO.

Value of the contract (as defined in the Preference Schedule) (P*)	R	B-BBEE Status Level of Prime Contractor	
--	---	---	--

Name of Sub-contractor (list all)	B-BBEE Status Level of Sub-contractor ¹	Total value of Sub-contract (excl. VAT) ¹	Value of Sub-contract work to date (excl. VAT) ¹	Value of Sub-contract work to Sub-contractors with a lower B-BBEE Status Level than Prime Contractor
Sub-contractor A		R	R	R
Sub-contractor B		R	R	R
Sub-contractor C		R	R	R

¹ Documentary evidence to be provided	Total:	R
	Expressed as a percentage of P*	%

Signatures

Declared by Contractor to be true and correct: _____ Date: _____

Verified by Engineer/ Engineer’s Agent’s Representative: _____ Date: _____

ANNEX 3

CITY OF CAPE TOWN

CONTRACT NO. AND NAME:

CONTRACTOR:

JOINT VENTURE EXPENDITURE REPORT BASED ON PAYMENT CERTIFICATE NO.

Value of the contract (as defined in the Preference Schedule) (P*)	R	B-BBEE Status Level of Joint Venture	
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Name of Joint Venture partner (list all)	B-BBEE Status Level of each JV partner as at contract award	Percentage contribution of JV partner per JV Agreement ¹ A	Total value of JV partner's contribution (excl. VAT) ¹ B = A% x P*	Value of JV partner's contribution to date (excl. VAT) ¹ C	Value of JV partner's contribution as a percentage of the work executed to date D = C/P*x100
JV Partner A		%	R	R	%
JV Partner B		%	R	R	%
JV Partner C		%	R	R	%

¹Documentary evidence to be provided

Signatures

Declared by Contractor to be true and correct:

Date:

Verified by Engineer/ Engineer's Representative:

Date:

ANNEX 4

CITY OF CAPE TOWN

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	%
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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
¹ Documentary evidence to be provided			Total: R
			Expressed as a percentage of P* %

Signatures

Declared by Contractor to be true and correct: _____

Date _____

Verified by Engineer/Engineers’s Representative: _____

Date _____

ANNEX 5

CITY OF CAPE TOWN

CONTRACT NO. AND NAME: _____

CONTRACTOR: _____

TARGETED ENTERPRISES CONTRACT PARTICIPATION EXPENDITURE REPORT BASED ON CERTIFICATE NO. _____

Value of the contract (as defined in the Preference Schedule) (P*)	R
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Specified Targeted Enterprises Contract Participation Goal	%
--	---

Name of targeted enterprise (list all)	Total previous expenditure (excl. VAT) to targeted enterprises	Net Amount for this month ¹	Total expenditure (excl. VAT) to targeted enterprises
Targeted Enterprise A	R	R	R
Targeted Enterprise B	R	R	R
Targeted Enterprise C	R	R	R
¹ Documentary evidence to be provided			Total: R
			Expressed as a percentage of P* %

Signatures

Declared by Contractor
to be true and correct: _____

Date _____

Part C4: Site Information

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CITY OF CAPE TOWN

DIRECTORATE: WATER AND SANITATION

CONTRACT NO. 191Q/2023/24

**DESIGN BUILD OF MECHANICAL AND ELECTRICAL WORKS FOR THE UPGRADING AND EXPANSION OF
THE MACASSAR WASTEWATER TREATMENT WORKS**

C4.1 Locality Plan

[SEE ATTACHED]