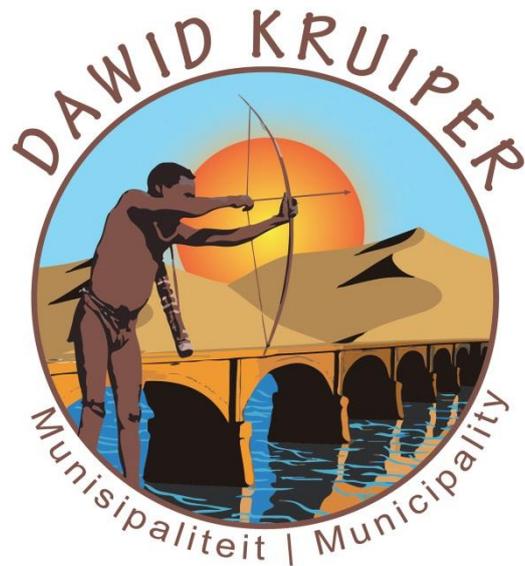


# MUNISIPALITEIT DAWID KRUIPER MUNICIPALITY



**TN003/2026:**  
**REPLACEMENT OF ABRAHAM HOLBORS SEPTEMBER WATER**  
**TREATMENT PLANT MOTOR CONTROL CENTRES**

<b>Name of bidder</b>	
<b>Contact details</b>	<b>Telephone Number:</b> _____ <b>Cell phone Number:</b> _____
<b>Email address</b>	
<b>CSD Registration Nr</b>	<b>MAAA</b>
<b>Locality (where the business is located)</b>	
<b>TOTAL BID AMOUNT:</b>	<b>R</b> _____ <p style="text-align: center;"><b>(Inclusive of VAT)</b></p>

## **DAWID KRUIPER MUNICIPALITY**

### **1. SCOPE OF BID**

In 2025, a condition assessment for the Abraham Holbors September Water Treatment Plant was conducted, covering the status quo of the medium voltage (MV) switchgear, distribution transformers, programmable logic controllers (PLCs), supervisory control and data acquisition (SCADA) systems, and electrical components associated with all the process units of the plant, with the objective of evaluating operational bottlenecks, reliability and risk exposure.

The assessment revealed that while the WTW is operational, a significant portion of the electrical and control infrastructure has reached or is approaching the end of its service life. Several PLCs were found to be non-operational, and the plant's automation systems were entirely non-functional. As a result, all process units are currently operated manually, increasing the risk of operational errors and reducing overall efficiency. Numerous motors, starters, sensors, and associated electrical components in the treatment processes were identified as requiring maintenance or refurbishment to restore optimal performance and ensure compliance with safety and reliability standards.

The condition assessment conducted highlighted that while the Abraham Holbors September WTW remains operational, immediate and strategic intervention is required across its electrical, control, and instrumentation systems. Implementation of the recommended refurbishment and upgrade measures will restore automation, improve the WTW efficiency, reduce the risk of unplanned outages, and support the plant's long-term operational objectives.

To help address the plant's operational challenges, replacing the main MCC was identified as a critical intervention. A tender process was subsequently initiated to solicit suitably qualified electrical and electronic engineering contractors to carry out the required works. Tender invitations are extended to selected contractors with proven experience and relevant qualifications for the MCC replacement.

As part of the upgrade works, the existing MCC will be completely removed from site. Although the Engineer has specified the equipment to be provided for tendering purposes, the Contractor shall be responsible for the detail design of all proprietary Plant and Materials in order to ensure that these are appropriately selected for their intended use and installed to meet the particular installation conditions on Site.

The contractor shall plan and coordinate the removal and installation activities carefully to ensure minimal downtime. Adequate teams must be deployed to dismantle, remove, and replace the MCC as efficiently as possible.

The contract comprises the **design, supply, installation, and commissioning** of the following works:

## **Scope of Work:**

### **a) Main Motor Control Centre**

- Provision of Main MCC wiring diagrams
- Overseeing the building of the Main MCC
- Procurement and installation of VFDs
- Associated minor civil works
- Removal of existing Main MCC

### **b) Filter Motor Control Centre**

- Provision of Filter MCC wiring diagrams
- Overseeing the building of the Filter MCC
- Procurement, installation and programming of PLCs
- Associated minor civil works
- Removal of existing Filter MCC

## **2. CLOSING DATE AND COMPULSORY SITE INSPECTION MEETING**

2.1 Sealed bids clearly marked “**TN003/2026: REPLACEMENT OF ABRAHAM HOLBORS SEPTEMBER WATER TREATMENT PLANT MOTOR CONTROL CENTRES**” must be placed in the Municipal tender Box **before or at 14:00 on Friday, 13 March 2026** and will be opened directly thereafter in the Councillor Chambers at the Municipal Offices.

2.2 A compulsory virtual clarification will be held on **13th of February 2026 @ 14:00**. Bidders must send a request to attend the virtual meeting to [Mario.neethling@dkm.gov.za](mailto:Mario.neethling@dkm.gov.za) in order to receive the link.

## **3. GENERAL REQUIREMENTS**

- 3.1. This bid document as a whole, without any alteration, modification, deletion, editing or formatting of the documents content, must be completed and returned no later than the closing date and time to be evaluated. Any incomplete, altered, modified, edited or formatted document will not be considered.
- 3.2. The lowest or only bid will not necessarily be accepted.
- 3.3. Bids per fax or E- mail will also not be considered, only the original signed document will be accepted.
- 3.4. The following forms, Summary of items and bid price, MBD 1, MBD 4, MBD5, MBD 6.1, MBD 7.1, MBD 8 and MBD 9, must be completed.
- 3.5. Bids will be evaluated in accordance with the applicable Preferential Point Scoring System as set out in the Councils Supply Chain Management Policy.
- 3.6. Bidders must be registered at National Treasury’s Central Suppliers Data Base (CSD) and proof must be submitted.
- 3.7. A copy of the Municipal account not older than 3 months and not in arrears for more than 90 days, on date of submission.
- 3.8. If the bidder is not liable for levies for municipal services a valid Lease Agreement indicating such must be provided.

#### **4. COMPULSORY DOCUMENTATION**

These documents **must be attached** to the bid form. ***Failure to submit the applicable documents will result in the tender offer being disqualified from further consideration.***

- 4.1 **Proof of CIDB registration certificate** in the grading designation - **6EB or 6EP or higher. Evidence:** Please provide 1x Completion Certificate of a project of similar related scope (installation of MCC's for water/sewer treatment plants or water/sewer pump stations) successfully completed.
- 4.2 Certified copy of COIDA registrations (Workman's Compensation),
- 4.3 Original Bank Rating Certificate – minimum rating C will be accepted,
- 4.4 Pro-forma Certificate of Insurance Cover to the value of R5 000 000.00,
- 4.5 Certificate of Authority of Signatory,
- 4.6 Form of Offer and Acceptance,
- 4.7 Health and Safety Agreement,
- 4.8 CSD Registration

#### **5. ADDITIONAL RETURNABLE DOCUMENTS THAT WILL BE INCORPORATED INTO THE CONTRACT**

**Note:** Failure to submit the applicable documents will result in the Tenderer having to submit upon request within **7 calendar days** and **if not complied with, will result to the tender offer being disqualified from further consideration** [See also clause 2.18 of the Standard Conditions of Tender

- 5.1 First Programme and Method Statements,
- 5.2 Estimated Monthly Expenditure on Contract Works by Tenderer,
- 5.3 Key-Personnel / Management and Supervisory Staff,
- 5.4 Quality Management Systems,
- 5.5 Schedule of Proposed Subcontractors
- 5.6 Additional information required with tender offer.

#### **6. OTHER DOCUMENTS THAT WILL BE INCORPORATED INTO THE CONTRACT**

**Note:** Failure to submit the applicable documents will result in the tender offer being disqualified from further consideration.

- 6.1 Record of Addenda to Tender Documents,
- 6.2 Proposed Amendments,

**7. BID PRICING**

- 7.1. Bidders are required to quote prices according to the price schedules and specifications.
- 7.2. Price(s) quoted must be valid for at least 120 days from bid closing date
- 7.3. Price(s) quoted must be firm and must be inclusive of VAT.
- 7.4. All prices must include delivery cost, accommodation and travel cost.

**8. METHOD OF DELIVERY AND ADDRESS**

Goods and services must be delivered as a whole.

Delivery must be made to

Dawid Kruiper Municipality  
Corner of Scott & Mutual Street  
Upington  
Northern Cape

**DAWID KRUIPER MUNICIPALITY**

**SECTION "C"**

To: The Municipal Manager  
Private Bag X6003  
UPINGTON  
8800

Sir

In response to the official notice calling for the supply and delivery of the services listed I/we, the undersigned, carrying on a business under the name of:

\_\_\_\_\_  
\_\_\_\_\_

Address: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Tel nr: \_\_\_\_\_

do hereby quote to supply the services in accordance with the General Conditions of Quotation and the Specifications attached hereto except in so far as amended in our accompanying covering letter, at the prices given and to deliver those services within the stated delivery period measured from the date of the Council's letter of acceptance of my/our quotation. Quotation prices are included in Section "D" hereof.

The undersigned agrees, that in terms of these documents this Quotation shall remain open for acceptance for a period of **120 (one hundred and twenty)** days from the date on which quotations are returnable and that notification of acceptance by the Municipal Manager shall constitute a binding contract with effect from the date of such notification.

**Bid price (all taxes included):** R \_\_\_\_\_

Amount in words:  
\_\_\_\_\_

SIGNED AT \_\_\_\_\_ ON THIS \_\_\_\_\_ DAY OF \_\_\_\_\_  
2026.

Signed by, or on behalf of the bidder, in the presence of the undersigned witnesses.

**WITNESSES:**

- 1. \_\_\_\_\_
- 2. \_\_\_\_\_

\_\_\_\_\_  
**SIGNATURE OF BIDDER**

**DAWID KRUIPER MUNICIPALITY****SECTION "D"****SUMMARY OF ITEMS AND BID PRICES**

All prices quoted must be VAT inclusive.

The following page must be completed in full:

**UPINGTON WATER TREATMENT WORKS**

Contract:

**Summary of Schedules**

<b>Schedule No.</b>	<b>Description</b>	<b>Amount</b>
1	Preliminary & General	
E1	MOTOR CONTROL CENTRES AND DISTRIBUTION BOARDS	
E2	PROGRAMMABLE LOGIC CONTROLLERS	
E3	ELECTRICAL DISTRIBUTION SYSTEM	
E4	GENERAL AND MISCELLANEOUS	
E5	SMALL POWER AND LIGHTING	
E6	MULTICORE CABLES AND EARTH WIRES	
<b>Sub-Total A</b>		
	Provisional sum: Allowance for Contingencies (10% of Sub-Total A)	
<b>Total Construction Cost</b>		
Value Added Tax at 15%		
<b>Total Amount of Tender Carried Forward to Form of Bid</b>		

**NB** :Completion of this page is compulsory and the total must be entered as the bid price in the MBD 1 form below and section C above.

**Signature of Bidder** .....

Witnesses:1.....

2.....

**DAWID KRUIPER MUNICIPALITY**

**SECTION "E"**

**FORMS TO BE COMPLETED**

## PART A INVITATION TO BID

<b>YOU ARE HEREBY INVITED TO BID FOR REQUIREMENTS OF THE DAWID KRUIPER MUNICIPALITY</b>					
BID NUMBER:	TN003/2026	CLOSING DATE:	Friday 13 March 2026	CLOSING TIME:	14H00
DESCRIPTION	REPLACEMENT OF ABRAHAM HOLBORS SEPTEMBER WATER TREATMENT PLANT MOTOR CONTROL CENTRES				
<b>THE SUCCESSFUL BIDDER WILL BE REQUIRED TO FILL IN AND SIGN A WRITTEN CONTRACT FORM (MBD7).</b>					

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

<b>DAWID KRUIPER MUNICIPALITY</b>					
<b>CIVIC CENTRE</b>					
<b>MUTUAL STREET</b>					
<b>UPINGTON</b>					
<b>8800</b>					
<b>SUPPLIER INFORMATION</b>					
NAME OF BIDDER					
POSTAL ADDRESS					
STREET ADDRESS					
TELEPHONE NUMBER	CODE		NUMBER		
CELLPHONE NUMBER					
FACSIMILE NUMBER	CODE		NUMBER		
E-MAIL ADDRESS					
VAT REGISTRATION NUMBER					
TAX COMPLIANCE STATUS	TCS PIN:		<b>OR</b>	CSD No:	

<u>ARE YOU THE ACCREDITED REPRESENTATIVE IN SOUTH AFRICA FOR THE GOODS /SERVICES OFFERED?</u>	<input type="checkbox"/> Yes <input type="checkbox"/> No  [IF YES ENCLOSE PROOF]	<u>ARE YOU A FOREIGN BASED SUPPLIER FOR THE GOODS /SERVICES OFFERED?</u>	<input type="checkbox"/> Yes <input type="checkbox"/> No  [IF YES, ANSWER PART B:3 ]
<u>TOTAL NUMBER OF ITEMS OFFERED</u>		<u>TOTAL BID PRICE</u>	R
<u>SIGNATURE OF BIDDER</u>	.....	<u>DATE</u>	
<u>CAPACITY UNDER WHICH THIS BID IS SIGNED</u>			
<b>BIDDING PROCEDURE ENQUIRIES MAY BE DIRECTED TO:</b>		<b>TECHNICAL INFORMATION MAY BE DIRECTED TO:</b>	
DEPARTMENT	Supply Management Chain	CONTACT PERSON	Mr. Mduduzi Mganga / Mr. Mario Neethling
CONTACT PERSON	Mary Marabi	TELEPHONE NUMBER	054-338-7076/7061
TELEPHONE NUMBER	054-338-7436	FACSIMILE NUMBER	
FACSIMILE NUMBER		E-MAIL ADDRESS	
E-MAIL ADDRESS	mary.marabi@dkm.gov.za	<a href="mailto:mduduzi.mganga@dkm.gov.za">mduduzi.mganga@dkm.gov.za</a> / <a href="mailto:mario.neethling@dkm.gov.za">mario.neethling@dkm.gov.za</a>	

## PART B TERMS AND CONDITIONS FOR BIDDING

### 1. BID SUBMISSION:

- 1.1. BIDS MUST BE DELIVERED BY THE STIPULATED TIME TO THE CORRECT ADDRESS. LATE BIDS WILL NOT BE ACCEPTED FOR CONSIDERATION.
- 1.2. **ALL BIDS MUST BE SUBMITTED ON THE OFFICIAL FORMS PROVIDED (NOT TO BE RE-TYPED) OR ONLINE**
- 1.3. THIS BID IS SUBJECT TO THE PREFERENTIAL PROCUREMENT POLICY FRAMEWORK ACT AND THE PREFERENTIAL PROCUREMENT REGULATIONS THE GENERAL CONDITIONS OF CONTRACT (GCC) AND, IF APPLICABLE, ANY OTHER SPECIAL CONDITIONS OF CONTRACT.

### 2. TAX COMPLIANCE REQUIREMENTS

- 2.1 BIDDERS MUST ENSURE COMPLIANCE WITH THEIR TAX OBLIGATIONS.
- 2.2 BIDDERS ARE REQUIRED TO SUBMIT THEIR UNIQUE PERSONAL IDENTIFICATION NUMBER (PIN) ISSUED BY SARS TO ENABLE THE ORGAN OF STATE TO VIEW THE TAXPAYER'S PROFILE AND TAX STATUS.
- 2.3 APPLICATION FOR THE TAX COMPLIANCE STATUS (TCS) CERTIFICATE OR PIN MAY ALSO BE MADE VIA E-FILING. IN ORDER TO USE THIS PROVISION, TAXPAYERS WILL NEED TO REGISTER WITH SARS AS E-FILERS THROUGH THE WEBSITE WWW.SARS.GOV.ZA.
- 2.4 FOREIGN SUPPLIERS MUST COMPLETE THE PRE-AWARD QUESTIONNAIRE IN PART B:3.
- 2.5 BIDDERS MAY ALSO SUBMIT A PRINTED TCS CERTIFICATE TOGETHER WITH THE BID.
- 2.6 IN BIDS WHERE CONSORTIA / JOINT VENTURES / SUB-CONTRACTORS ARE INVOLVED, EACH PARTY MUST SUBMIT A SEPARATE TCS CERTIFICATE / PIN / CSD NUMBER.
- 2.7 WHERE NO TCS IS AVAILABLE BUT THE BIDDER IS REGISTERED ON THE CENTRAL SUPPLIER DATABASE (CSD), A CSD NUMBER MUST BE PROVIDED.

### 3. QUESTIONNAIRE TO BIDDING FOREIGN SUPPLIERS

- 3.1. IS THE ENTITY A RESIDENT OF THE REPUBLIC OF SOUTH AFRICA (RSA)?  YES  NO
- 3.2. DOES THE ENTITY HAVE A BRANCH IN THE RSA?  YES  NO
- 3.3. DOES THE ENTITY HAVE A PERMANENT ESTABLISHMENT IN THE RSA?  YES  NO
- 3.4. DOES THE ENTITY HAVE ANY SOURCE OF INCOME IN THE RSA?  YES  NO
- 3.5. IS THE ENTITY LIABLE IN THE RSA FOR ANY FORM OF TAXATION?  YES  NO

**IF THE ANSWER IS "NO" TO ALL OF THE ABOVE, THEN IT IS NOT A REQUIREMENT TO REGISTER FOR A TAX COMPLIANCE STATUS SYSTEM PIN CODE FROM THE SOUTH AFRICAN REVENUE SERVICE (SARS) AND IF NOT REGISTER AS PER 2.3 ABOVE.**

**NB: FAILURE TO PROVIDE ANY OF THE ABOVE PARTICULARS MAY RENDER THE BID INVALID.**

**NO BIDS WILL BE CONSIDERED FROM PERSONS IN THE SERVICE OF THE STATE.**

SIGNATURE OF BIDDER:.....

CAPACITY UNDER WHICH THIS BID IS SIGNED:.....

DATE:.....



## DECLARATION OF INTEREST

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

3.1 Full Name of bidder or his or her representative:.....

3.2 Identity Number: .....

3.3 Position occupied in the Company (director, trustee, shareholder<sup>2</sup>):.....

3.4 Company Registration Number: .....

3.5 Tax Reference Number:.....

3.6 VAT Registration Number: .....

3.7 The names of all directors / trustees / shareholders members, their individual identity numbers and state employee numbers must be indicated in paragraph 4 below.

3.8 Are you presently in the service of the state? YES / NO

3.8.1 If yes, furnish particulars.

.....  
 .....

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<sup>1</sup>MSCM Regulations: "in the service of the state" means to be –

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

<sup>2</sup> Shareholder" means a person who owns shares in the company and is actively involved in the management of the company or business and exercises control over the company.

3.9 Have you been in the service of the state for the past twelve months? **YES / NO**

3.9.1 If yes, furnish particulars

.....  
.....

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

3.10.1 If yes, furnish particulars.

.....  
.....

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

3.11.1 If yes, furnish particulars

.....  
.....

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

3.12.1 If yes, furnish particulars.

.....  
.....

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

3.13.1 If yes, furnish particulars.

.....  
.....

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

3.14.1 If yes, furnish particulars:

.....  
.....





## DECLARATION FOR PROCUREMENT ABOVE R10 MILLION (ALL APPLICABLE TAXES INCLUDED)

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

1. Are you by law required to prepare annual financial statements for auditing? **\*YES / NO**

1.1. If yes, submit audited annual financial statements for the past three years or since the date of establishment if established during the past three years.

.....  
.....

2. Do you have any outstanding undisputed commitments for municipal services towards any municipality for more than three months or any other service provider in respect of which payment is overdue for more than 30 days? **\*YES / NO**

2.1. If no, this serves to certify that the bidder has no undisputed commitments for municipal services towards any municipality for more than three months or other service provider in respect of which payment is overdue for more than 30 days

2.2. If yes, provide particulars.

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

3. Has any contract been awarded to you by an organ of state during the past five years, including particulars of any material non-compliance or dispute concerning the execution of such contract? **\*YES / NO**

3.1. If yes, furnish particulars

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

4. Will any portion of goods or services be sourced from outside the Republic, and, if so, what portion and whether any portion of payment from the municipality / municipal entity are expected to be transferred out of the Republic? \*YES / NO

4.1. If yes, furnish particulars

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

\* Delete if not applicable

### CERTIFICATION

I, THE UNDERSIGNED (NAME) .....

CERTIFY THAT THE INFORMATION FURNISHED ON THIS DECLARATION FORM IS CORRECT.

**I ACCEPT THAT THE STATE MAY ACT AGAINST ME SHOULD THIS DECLARATION PROVE TO BE FALSE.**

.....  
Signature

.....  
Date

.....  
Position

.....  
Name of Bidder

## PREFERENCE POINTS CLAIM FORM IN TERMS OF THE PREFERENTIAL PROCUREMENT REGULATIONS 2022

This preference form must form part of all tenders invited. It contains general information and serves as a claim form for preference points for specific goals.

**NB: BEFORE COMPLETING THIS FORM, TENDERERS MUST STUDY THE GENERAL CONDITIONS, DEFINITIONS AND DIRECTIVES APPLICABLE IN RESPECT OF THE TENDER AND PREFERENTIAL PROCUREMENT REGULATIONS, 2022**

### 1. GENERAL CONDITIONS

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

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

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

*(delete whichever is not applicable for this tender).*

- a) The applicable preference point system for this tender is the 90/10 preference point system.
- b) The applicable preference point system for this tender is the 80/20 preference point system.
- c) Either the 90/10 or 80/20 preference point system will be applicable in this tender. The lowest/ highest acceptable tender will be used to determine the accurate system once tenders are received.

2. 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.

### 2.1 To be completed by the organ of state:

The maximum points for this tender are allocated as follows:

	POINTS
PRICE	80
SPECIFIC GOALS	20
Total points for Price and SPECIFIC GOALS	100

- 2.2 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.
- 2.3 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.

### 3. DEFINITIONS

- (a) “**tender**” means a written offer in the form determined by an organ of state in response to an invitation to provide goods or services through price quotations, competitive tendering process or any other method envisaged in legislation;
- (b) “**price**” means an amount of money tendered for goods or services, and includes all applicable taxes less all unconditional discounts;
- (c) “**rand value**” means the total estimated value of a contract in Rand, calculated at the time of bid invitation, and includes all applicable taxes;
- (d) “**tender for income-generating contracts**” means a written offer in the form determined by an organ of state in response to an invitation for the origination of income-generating contracts through any method envisaged in legislation that will result in a legal agreement between the organ of state and a third party that produces revenue for the organ of state, and includes, but is not limited to, leasing and disposal of assets and concession contracts, excluding direct sales and disposal of assets through public auctions; and
- (e) “**the Act**” means the Preferential Procurement Policy Framework Act, 2000 (Act No. 5 of 2000).

### 4. 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:

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

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:

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

Where

- $P_s$  = Points scored for price of tender under consideration  
 $P_t$  = Price of tender under consideration  
 $P_{max}$  = 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: A maximum of the 20 points will be allocated as follows:**

Locality	Points (80/20)
Within the Boundaries of Republic of South Africa	20.00

**Proof of Evidence to submit to claim preference points:**

- **Where the tenderer is the owner of the property or the business: A Municipal account registered in the name of the tenderer not older than 3 months must be submitted.**
- **Where the tenderer is not the owner of the property of the business, a valid lease Agreement signed by both parties must be submitted.**

**Tenderers failing to submit proof of required evidence to claim preferential points for specific goals – NO POINTS WILL BE ALLOCATED**

- **May only score in terms of the 80 / 90 points formula for price**

**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 1.4 and 4.2, the contractor may be required to furnish documentary proof to the satisfaction of the organ of state that the claims are correct;
- iv) If the specific goals have been claimed or obtained on a fraudulent basis or any of the conditions of contract have not been fulfilled, the organ of state may, in addition to any other remedy it may have –
  - (a) disqualify the person from the tendering process;
  - (b) recover costs, losses or damages it has incurred or suffered as a result of that person's conduct;

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

.....

**SIGNATURE(S) OF TENDERER(S)**

**SURNAME AND NAME:** .....

**DATE:**.....

**ADDRESS:**.....

.....

.....

.....

## CONTRACT FORM - PURCHASE OF GOODS/SERVICES

**THIS FORM MUST BE FILLED IN DUPLICATE BY BOTH THE SUCCESSFUL BIDDER (PART 1) AND THE PURCHASER (PART 2). BOTH FORMS MUST BE SIGNED IN THE ORIGINAL SO THAT THE SUCCESSFUL BIDDER AND THE PURCHASER WOULD BE IN POSSESSION OF ORIGINALLY SIGNED CONTRACTS FOR THEIR RESPECTIVE RECORDS.**

### PART 1 (TO BE FILLED IN BY THE BIDDER)

1. I hereby undertake to supply all or any of the goods and/or services described in the attached bidding documents to (name of institution)..... in accordance with the requirements and specifications stipulated in bid number..... at the price/s quoted. My offer/s remain binding upon me and open for acceptance by the purchaser during the validity period indicated and calculated from the closing time of bid.
  
2. The following documents shall be deemed to form and be read and construed as part of this agreement:
  - (i) Bidding documents, viz
    - Invitation to bid;
    - Proof of Tax Compliance Status;
    - Pricing schedule(s);
    - Technical Specification(s);
    - Preference claim form for Preferential Procurement in terms of the Preferential Procurement Regulations;
    - Declaration of interest;
    - Declaration of bidder's past SCM practices;
    - Certificate of Independent Bid Determination;
    - Special Conditions of Contract;
  - (ii) General Conditions of Contract; and
  - (iii) Other (specify)
  
3. I confirm that I have satisfied myself as to the correctness and validity of my bid; that the price(s) and rate(s) quoted cover all the goods and/or works specified in the bidding documents; that the price(s) and rate(s) cover all my obligations and I accept that any mistakes regarding price(s) and rate(s) and calculations will be at my own risk.
  
4. I accept full responsibility for the proper execution and fulfilment of all obligations and conditions devolving on me under this agreement as the principal liable for the due fulfillment of this contract.
  
5. I declare that I have no participation in any collusive practices with any bidder or any other person regarding this or any other bid.

6. I confirm that I am duly authorised to sign this contract.

NAME (PRINT).....

CAPACITY.....

SIGNATURE.....

NAME OF FIRM.....

DATE.....

<p>WITNESSES</p> <p>1.....</p> <p>2. ....</p> <p>DATE:.....</p>
---

## CONTRACT FORM - PURCHASE OF GOODS/SERVICES

### PART 2 (TO BE FILLED IN BY THE PURCHASER)

1. I..... in my capacity as..... accept your bid under reference number .....dated.....for the supply of goods/services indicated hereunder and/or further specified in the annexure(s).
  
2. An official order indicating delivery instructions is forthcoming.
  
3. I undertake to make payment for the goods/services delivered in accordance with the terms and conditions of the contract, within 30 (thirty) days after receipt of an invoice accompanied by the delivery note.

<b>ITEM NO.</b>	<b>PRICE (ALL APPLICABLE TAXES INCLUDED)</b>	<b>BRAND</b>	<b>DELIVERY PERIOD</b>	<b>TOTAL PREFERENCE POINTS CLAIMED</b>	<b>POINTS CLAIMED FOR EACH SPECIFIC GOAL</b>

4.I confirm that I am duly authorized to sign this contract.

SIGNED AT .....ON.....

NAME (PRINT) .....

SIGNATURE .....

OFFICIAL STAMP

WITNESSES

1. ....

2. ....

DATE.....



## *DAWID KRUIJER MUNICIPALITY*

### **CONTRACT No: TN003/2026**

### **REPLACEMENT OF ABRAHAM HOLBORS SEPTEMBER WATER TREATMENT PLANT MOTOR CONTROL CENTRE**

#### **BUILD OF ELECTRICAL WORKS**

<b>DESCRIPTION</b>	<b>COLOUR</b>	
<b>CONTENTS LIST OF VOLUMES</b>		
<b>PORTION 1</b>	<b>TENDER</b>	
<b>Part T1</b>	<b>Tendering Procedures</b>	
Section T1.1	Tender Notice and Invitation to Tender	White
Section T1.2	Tender Data	Pink
Section T1.3	Standard Conditions of Tender	Pink
<b>Part T2</b>	<b>Returnable Documents</b>	
Section T2.1	List of Returnable Documents	Yellow
Section T2.2	Returnable Schedules	Yellow
Section T2.3	Technical Schedules	Yellow
<b>PORTION 2</b>	<b>CONTRACT</b>	
<b>Part C1</b>	<b>Agreements and contract data</b>	Yellow
Section C1.1	Forms of offer and acceptance	
Section C1.2	Contract data	
Section C1.3	Form of Guarantee	
Section C1.4	Guarantee (Cash Deposit)	
Section C1.5	Health and Safety Agreement	
<b>Part C2</b>	<b>Pricing Data</b>	Yellow
Section C2.1	Pricing Instructions	
Section C2.2	Schedule of Quantities	
Section C2.3	Summary of Schedules	



<b>Part C3</b>	<b>Scope of Work</b>	<b>Blue</b>
Section C3.1	Description of the Works	
Section C3.2	Engineering	
Section C3.3	Procurement	
Section C3.4	Construction	
<i>Part C3.4.1</i>	<i>General Clauses and Requirements</i>	
<i>Part C3.4.2</i>	<i>Project Specifications – Electrical Works</i>	
<i>Part C3.4.3</i>	<i>Particular Specifications - Electrical Works</i>	
Section C3.5	Management	
Section C3.6	Health and Safety Specifications	
<b>Part C4</b>	<b>Tender Drawings</b>	<b>White</b>



<b>DESCRIPTION</b>		<b>PAGE</b>
<b>THIS DOCUMENT</b>		
<b><u>PORTION 1</u></b>	<b><u>TENDER</u></b>	
<b>Part T1</b>	<b>Tendering Procedures</b>	
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## *DAWID KRUIJER MUNICIPALITY*

**CONTRACT No: TN003/2026**

**REPLACEMENT OF ABRAHAM HOLBORS SEPTEMBER WATER TREATMENT  
PLANT MOTOR CONTROL CENTRE**

**BUILD OF ELECTRICAL WORKS**

**PORTION 1: TENDER**

**PART T1: TENDERING PROCEDURES**



## T1 TENDERING PROCEDURES

### INDEX

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T1.2	TENDER DATA	32
T1.3	STANDARD CONDITIONS OF TENDER	43



## T1.1 TENDER NOTICE AND INVITATION TO TENDER: TN003/2026

### REPLACEMENT OF ABRAHAM HOLBORS SEPTEMBER WATER TREATMENT PLANT MOTOR CONTROL CENTRE

Dawid Kruiper Municipality is soliciting bids from suitably qualified and experienced contractors for the replacement of Abraham Holbors September Water Treatment Plant Motor Control Centre.

Closing Date: **13 March 2026 @14:00**

Issuing of documents: Documents will only be distributed in electronic format

Submitting of documents: Only signed hardcopy documents will be accepted

Contract Person: Dawid Kruiper Municipality  
Mario Neethling  
Mario.neethling@dkm.gov.za  
054 338 7061

#### **Please Note:**

1. Late proposals, telegraphic proposals or proposals sent by fax or email will not be considered.
2. The lowest or any proposal will not necessarily be accepted and Dawid Kruiper Municipality reserves the right to accept, where applicable, a portion of any bid.

M. Neethling

Senior Engineering Technician: Planning, Design and Project Management

On behalf of Dawid Kruiper Municipality



## T1.2 TENDER DATA

The conditions of tender are the Standard Conditions of Tender as contained in Annex C of the Construction Industry Development Board (CIDB) Board Notice 423 of 2019 (contained in Government Gazette No. 42622 of 08 August 2019), referenced in Section T1.3.

The Standard Conditions of Tender makes several references to the Tender Data. The Tender Data also contains project-specific amendments to the Standard Conditions of Tender applicable to this document. 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.

Reference to relevant clauses in Standard Conditions of Tender		Addition or Variation to Standard Conditions of Tender
Clause	Description	
C.1.1	Actions	The Employer/Client is Dawid Kruijer Municipality.
C.1.2	Tender documents	<p>The tender documents issued by the Employer comprise of the following:</p> <p><b><u>Portion 1: Tender</u></b></p> <p><b>Part T1: Tendering procedures</b></p> <p>T1.1 Invitation to Tender</p> <p>T1.2 Tender Data</p> <p>T1.3 Standard Conditions of Tender</p> <p><b>Part T2: Returnable documents and schedules</b></p> <p>T2.1 Returnable Documents</p> <p>T2.2 Returnable Schedules</p> <p><b><u>Portion 2: Contract</u></b></p> <p><b>Part C1: Agreements and Contract Data</b></p> <p>C1.1 Form of Offer and Acceptance</p> <p>C1.2 Contract Data</p> <p>C1.3 Form of Guarantee</p> <p>C1.4 Health &amp; Safety Specifications by Employer</p> <p>C1.5 Collateral Warranty</p> <p><b>Part C2: Pricing Data</b></p> <p>C2.1 Pricing Instructions</p> <p>C2.2 Bill of Quantities</p> <p>C2.3 Summary of Bill of Quantities</p> <p><b>Part C3: Scope of Work</b></p> <p>C3.1 Description of the Works</p> <p>C3.2 Engineering</p> <p>C3.3 Procurement</p> <p>C3.4 Construction</p> <p>C3.5 Management</p> <p>C3.6 Health and Safety Specification</p> <p><b>Part C4: Site Information</b></p> <p>C4.1 Drawings</p> <p>A Book of Drawings contains the drawings listed in the Drawing Register bound in the front of that volume.</p>



C.1.3.2	Interpretation	<p><i>Replace this sub-clause with the following:</i></p> <p>These Conditions of Tender, the Tender Data, List of Returnable Documents and Returnable Schedules which are required for tender evaluation purposes, shall form part of the Contract arising from the invitation to tender.</p>
C.1.4	Communication	<p><i>Delete the first sentence of the clause and replace with the following:</i></p> <p>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 Employers agent.</p> <p>The Employer's Agent is (also known as the Project Manager) is listed below:</p> <p>Dawid Kruijer Municipality        Mutual Street        Upington, 8800        Contact person:        Tel: (054) 338 7061        e-mail: Mario.neethling@dkm.gov.za        Attention: Mr. Mario Neethling</p>
C.1.6.2.1	Negotiation procedure	<p><i>Add the following to C.1.6.2.1:</i></p> <p>A competitive negotiation procedure will not be followed.</p>
C.1.6.3	Two-stage system	<p><i>Add the following to C.1.6.3 and C.1.6.3.1:</i></p> <p>A two-stage system will not be followed.</p>
Add the following new clause: "C.1.7"	CSD Registration	<p><i>Add the following new clause C.1.7:</i></p> <p>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.</p> <p>Tenderers who wish to register on the National Treasury Web Based Central Supplier Database (CSD) may do so via the web address <b><a href="https://secure.csd.gov.za">https://secure.csd.gov.za</a></b>.</p> <p>It is each tenderer's responsibility to keep all the information on the National Treasury Web Based Central Supplier Database (CSD) updated.</p>



<p>Add the following new clause: "C.2.1.3"</p>	<p>Responsive tender</p>	<p><i>Add the following new clause: C.2.1.3</i></p> <p>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.</p> <p>Tender offers will be considered non-responsive if, inter alia: (This is a requirement on submission of the bid document)</p> <ul style="list-style-type: none"> <li>a) The Bidder did not fully complete and sign the offer section of the "Form of offer and acceptance" (Part C1.1);</li> <li>b) The Bidder does not comply with the eligibility criteria listed in clause C2.1;</li> <li>c) The Bidder has failed to comply with the prescribed specifications, Pricing Assumptions and Bill of Quantities as advertised;</li> <li>d) The Bidder has failed to comply with the additional conditions of tender as included in Returnable Schedules</li> </ul>
<p>Add the following new clause: "C.2.1.4"</p>	<p>Eligibility</p>	<p><i>Add the following new clause: C.2.1.4.</i></p> <p>Only those tenders that satisfy the following criteria will be declared responsive:</p>
<p>Add the following new clause: "C.2.1.4.1"</p>		<p><i>Add the following new clause: C.2.1.4.1</i></p> <p><b>Construction Industry Development Board</b></p> <p>Only those tenderers who are registered with the CIDB, or are capable of being registered 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 are eligible to have their tenders evaluated.</p> <p>Joint ventures are eligible to submit tenders provided that:</p> <ul style="list-style-type: none"> <li>1. every member of the joint venture is registered with the CIDB;</li> <li>2. the lead partner has a contractor grading designation not lower than one level below the required grading designation in the class of works construction works under consideration and possess the required recognition status; and</li> </ul>



		<p>3. 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 EP class of construction work, or a value determined in accordance with Regulation 25 (1B) or 25(7A) of the Construction Industry Development Regulations.</p>
C.2.2.1		<p><i>Add the following to sub-clause C.2.2.1:</i></p> <p>Accept that the Employer will not compensate the tenderer for any costs incurred in attending interviews in the office of the employer or the employer's agent (if required).</p>
C.2.7	Clarification meeting	A compulsory clarification meeting will be held for this tender.
C.2.10	Pricing the tender offer	<p><i>Add the following sub-clause C.2.10.5:</i></p> <p>A digital copy of the Bill of Quantities can be obtained from the Employer's Agent from the office of the Employer upon sufficient notice.</p>
C.2.11	Alterations to documents	<p><i>Replace the last sentence of the clause with the following:</i></p> <p>To correct errors made, draw a line through the incorrect entry and write the correct entry above in black ink and place the full signatures of the authorised signatories next to the correct entry.</p>
C.2.12.1	Alternative tender offers	<p><i>Add the following to C.2.12.1 at the end of the first sentence:</i></p> <p>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.</p> <p>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:</p> <ol style="list-style-type: none"> <li>a) the schedule that compares the alternative(s) offered with the requirements of the issued tender documents</li> <li>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</li> </ol>



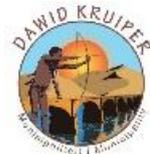
		<p>c) revised Bills of Quantities, or parts thereof, highlighting the changes made, together with a revised Summary, the total of which has been carried to the Form of Offer</p> <p>d) details of any proposed amendments to the Pricing Assumptions</p> <p>An alternative of the highest ranked acceptable 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.</p> <p>The Employer's costs in confirming the acceptability of the alternative offer will be, inter alia, taken into account in considering the alternative offer.</p> <p>The Employer will not be bound to consider alternative tenders and shall have sole discretion in this regard.</p> <p>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.</p>
C.2.12.3		<i>Delete this clause.</i>
C.2.13.2	Submitting a tender offer	<p><i>Replace the contents of the clause with the following:</i></p> <p>Return all volumes of the tender document to the Employer after completion of the relevant sections of each volume in their entirety by writing in black ink.</p> <p>All volumes are to be left intact in its original format and no pages shall be removed or re-arranged.</p>
C.2.13.3		Nil copies of the tender offer are required.
C.2.13.4		<p><i>Add the following to the clause:</i></p> <p>Only authorised signatories may sign the original and all copies of the tender offer where required in terms of C.2.13.3.</p>
C.2.13.5		<p>The Employer's address for delivery of tender offers and identification details to be shown on each tender offer package are:</p> <p>Physical address:          Dawid Kruijer Municipality          Mutual Street          Upington, 8800</p> <p>Tel: (054) 338 7061          e-mail: Mario.neethling@dkm.gov.za</p>



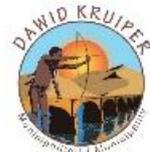
		<p>Attention: Mr Mario Neethling</p> <p>Identification details: Replacement of Abraham Holbors September Water Treatment Plant Motor Control Centre of – DKM (TN003/2026)</p> <p>The name and address of the tender shall be entered on the back of the envelope.</p>
C.2.13.6		A two-envelope procedure will not be followed.
C.2.13.7		<p><i>Replace sub-clause C.2.13.7 with the following:</i></p> <p>Should the tender wish to submit a hard copy, the tenderer shall 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.</p>
C.2.13.9		<p><i>Replace sub-clause C.2.13.9 with the following:</i></p> <p>Tenders may not issue their tender offer via email.</p>
C.2.13.10		<p><i>Add the following new sub-clause C.2.13.10:</i></p> <p>Accept that all conditions, which are printed or written upon any stationary used by the Tenderer for the purpose of or in connection with the submission of a tender offer for this Contract, which are in conflict with the conditions laid down in this document shall be waived, renounced and abandoned.</p>
C.2.14	Information and Data to be completed in all respect	<p><i>Add the following to the clause:</i></p> <p>The Tenderer is required to enter information in the following sections of the document:</p> <p>Section T2.2:Returnable Schedules          Section T2.3:Technical Schedules          Section C1.1:Form of Offer and Acceptance          Section C1.2:Contract Data (Part 2)          Section C2.2:Bill of Quantities</p> <p>The above sections shall be signed by the Tenderer (and witnesses where required). Individual pages should only be initialled by the successful Tenderer and by the witnesses after acceptance by the Employer of the Tender Offer.</p> <p>The Tenderer shall complete and sign the Form of Offer prior to the submission of a Tender Offer.</p>



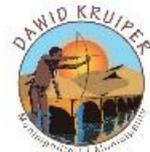
		<p>Accept that failure on the part of the Tenderer to submit any one of the Returnable Documents listed in clause C.2.23 within the period stipulated, shall be just cause for the Employer to consider the tender offer as being regarded as non-responsive.</p> <p>Accept that the Employer shall in the evaluation of tender offers take due account of the Tenderer's past performance in the execution of similar engineering works of comparable magnitude, and the degree to which he possesses the necessary technical, financial and other resources to enable him to complete the Works successfully within the contract period. Satisfy the Employer and the Engineer as to his ability to perform and complete the Works timeously, safely and with satisfactory quality, and furnish details in section T2.2.2 of contracts of a similar nature and magnitude which they have successfully executed in the past.</p> <p>Accept that the Employer is restricted in accordance with clause 5 (1) of the Construction Regulations, 2014, to only appoint a contractor whom he is satisfied has the necessary competencies and resources to carry out the work safely. Accept that submitting inferior and inadequate information relating to health and safety (as required in clause C.2.23) shall be regarded as justifiable and compelling reasons not to accept the Tender Offer of the Tenderer scoring the highest number of tender evaluation points.</p>
C.2.15.1	Closing Time	The closing time and location for the submission of tender offers is as stipulated in invitation to tender under Part T1.1 Tender Notice and Invitation to Tender.
C.2.16.1	Tender Offer validity	The tender offer validity period is 120 days.
C.2.16.1		<p><i>Add the following to the clause:</i></p> <p>If the tender validity expires on a Saturday, Sunday or public holiday, the tender shall remain valid and open for acceptance until the closure of business on the following working day.</p>
C.2.16.5		<p><i>Add the following new clause:</i></p> <p>Accept that should the Tenderer unilaterally withdraw his tender during the tender validity period, the Employer shall, without prejudice to any other rights he may have, be entitled to accept any less favourable tender for the Works from those received, or to call for fresh tenders, or to otherwise arrange for execution of the Works, and the Tenderer shall pay on demand any additional expense incurred by the Employer on account of the adoption of</p>



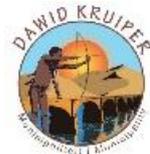
		<p>the said courses, as well as either the difference in cost between the tender withdrawn (as corrected in terms of clause C.3.9 of the Conditions of Tender) and any less favourable tender accepted by the Employer, or the difference between the tender withdrawn (as corrected) and the cost of execution of the Works by the Employer as well as any other amounts the Employer may have to pay to have the Works completed.</p>
C.2.18.1		<p><i>Add the following to the clause:</i></p> <p>Accept that if requested, the Tenderer shall within 7 days of the date upon which he is requested to do so, submit a full report from his banker as to his financial standing. The Employer may, in its discretion, and subject to the provisions of Section 4(1)(d) of the State Tender Board Act 86 of 1968, condone any failure to comply with the foregoing condition.</p> <p>Accept that the Employer or his agent, reserves the right to approach the Tenderer's banker or guarantor(s) as indicated in the tender document, or the bankers of each of the individual members of any joint venture that is constituted for purposes of this Contract, with a view to ascertaining whether the required guarantee will be furnished, and for purposes of ascertaining the financial strength of the Tenderer or of the individual member of such venture.</p>
C.2.19	Inspections, tests and analysis	<p><i>Add the following at the end of the clause:</i></p> <p>".....or upon written request"</p>
C.2.22	Return of other tender documents	<p><i>Replace the contents of the clause with the following:</i></p> <p>Return all retained tender documents prior to the closing time for the submission of Tender Offers.</p>
C.2.23	Certificates	<p>The following certificates / information are to be provided with the tender offer or within three days of receipt of the Employer's or his Agent's written request to submit same:</p> <ol style="list-style-type: none"> <li>a) CIDB registration certificate in the grading designation stipulated in clause 2.1 above,</li> <li>b) Original valid Tax Clearance Certificate, or a unique security personal identification number (PIN) issued by the SA Revenue Services (in terms of the Preferential Procurement Regulations, 2001 published in Government Gazette No. 22549 dated 10 August 2001). In the case of a Joint Venture/Consortium the tax clearance certificate must be for the Joint Venture/Consortium (if available) and individual valid tax clearance certificates of all the members of the Joint Venture/Consortium</li> </ol>



		<p>c) Certified copy of Letter of Good Standing issued by the Department of Labour in terms of Act 130 of 1993,</p> <p>d) Certified copy of Unemployment Insurance Fund Certificate of Compliance in terms of Act 4 of 2002,</p> <p>e) Joint Venture Agreement (if tenderer is a Joint Venture),</p> <p>f) Curriculum vitae of the person who prepares the Contractor's Health and Safety Plan, and</p> <p>g) Curriculum vitae of the Health and Safety Officer the successful tenderer intends appointing in accordance with the Occupational Health and Safety Act (Act 85 of 1993).</p> <p>Certified copies of Curricula Vitae of all design, supervisory and safety personnel.</p>
C.3.1.1	Respond to requests from tenderer	<p><i>Replace the contents of the clause with the following:</i></p> <p>Respond to a request for clarification received up to ten (10) working days before the Tender closing time stated in the Tender Data and notify all Tenderers who collected procurement documents within five (5) working days of the closing date.</p>
C.3.2	Issue addenda	<p><i>Add the following to C.3.2 at the end of the paragraph:</i></p> <p>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 or web based document transfer system (e.g. WeTransfer).</p>
C.3.4	Opening of Tender submissions	<p><i>Delete clause C3.4.1 to C3.4.3 and replace with the following new clause C3.4.1:</i></p> <p>Record of the tendering entity and offered price shall be made available to all interested persons upon request.</p>
C.3.5	Two-envelope system	A two-envelope procedure will not be followed.
C.3.8.3		<p><i>Add the following after clause C.3.8.2</i></p> <p>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.</p>
C.3.9	Arithmetical errors, omissions and discrepancies	<p><i>Replace the contents of the clause with the following:</i></p> <p>1. Check responsive tenders for discrepancies between amounts in words and amount in figures. Where there is a</p>



		<p>a discrepancy between the amounts in figures and the amounts in words, the amount in words shall govern.</p> <p>2. Check responsive tender offers for arithmetical errors, correcting them in the following manner:</p> <p>b) If a bill of quantities (or schedule of quantities or schedule of rates) applies and there is an error in the line item total resulting from the product of the unit rate and the quantity, the unit rate shall govern and the line item total shall be corrected.</p> <p>c) Where there is an error in the total of the prices, either as a result of other corrections required by this checking process or in the tenderer's addition of prices, the corrected total of the prices shall govern.</p> <p>d) Where there is a discrepancy between the amount indicated in the Tenderer's tender offer and the corrected amount obtained after completing the above steps, the corrected amount shall govern.</p> <p>Notify a tenderer upon written request received after the closing date of tenders of all arithmetical errors made by that particular tenderer.</p>
C.3.11.2		<p><i>Add the following sub-clause:</i></p> <p><b>The 80/20 preference point system for acquisition of services, works or goods up to Rand value of R50 million will apply.</b></p> <p>a) (4)(a)(i) The following formula must be used to calculate the points for price in respect of tenders (including price quotation) with a rand value equal to, or above R300 000 and up to Rand value of R50 000 000 (all applicable taxes included):</p>



		<p><i>Add the following sub-clause:</i></p> <p>The Employer reserves the right to appoint the bidder scoring first, second and third highest preference points at any time during the duration of the contract. When the tenderer scoring the highest points cannot perform on the contract, the municipality has the right to purchase from the tenderer scoring the second highest points and if the second highest points scorer cannot perform on the</p>
--	--	---

C3.11.4		<p>contract, the municipality reserves the right to purchase from the tenderer scoring the third highest points.</p>
C.3.16	Registration of the award	<p><i>Add the following to the clause:</i></p> <p>Notice of non-acceptance of tender will not be sent to individual unsuccessful tenderers. Particulars of the accepted tender can be obtained from the Employer' Agent.</p>
C.3.17	Provide Copies of Contract	<p>The successful tenderer shall receive one copy of the signed contract.</p>



### **T1.3 STANDARD CONDITIONS OF TENDER**

The conditions of tender are the Standard Conditions of Tender as contained in Annex C of the Construction Industry Development Board (CIDB) Board Notice 423 of 2019 (contained in Government Gazette No. 42622 of 08 August 2019).

A copy of the Standard Conditions of Tender may be downloaded from the CIDB website; [www.cidb.org.za](http://www.cidb.org.za).

**END OF SECTION**



## *DAWID KRUIJER MUNICIPALITY*

**CONTRACT No: TN003/2026**

**REPLACEMENT OF ABRAHAM HOLBORS SEPTEMBER WATER TREATMENT  
PLANT MOTOR CONTROL CENTRE**

**BUILD OF ELECTRICAL WORKS**

**PORTION 1 : TENDER**

**PART T2 : RETURNABLE DOCUMENTS**

**Section T2.1 List of Returnable Documents**

**Section T2.2 Returnable Schedules**

**Section T2.3 Technical Schedules**



## *DAWID KRUIJER MUNICIPALITY*

**CONTRACT No: TN003/2026**

**REPLACEMENT OF ABRAHAM HOLBORS SEPTEMBER WATER TREATMENT  
PLANT MOTOR CONTROL CENTRE**

**BUILD OF ELECTRICAL WORKS**

### **T2.1 LIST OF RETURNABLE DOCUMENTS**



## CONTENTS

### RD.A RETURNABLE DOCUMENTS REQUIRED FOR TENDER EVALUATION PURPOSES

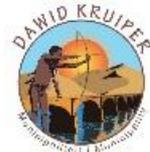
**Note:** *Failure to submit the applicable documents may result in the tender offer being disqualified from further consideration.*

Document Name	Reference	Confirmation of Document Included (Tenderers may use this column to confirm documents have been completed and included in the tender)
Schedule of Tenderer's experience	Form RDA 1	
Certified copy of COIDA registrations (Workman's Compensation)	Form RDA 2	
Certified copy of CIDB Registration Certificate	Form RDA 3	
Original Bank Rating Certificate	Form RDA 4	
Pro-forma Certificate of Insurance Cover	Form RDA 5	
Certificate of Authority of Signatory	Form RDA 6	
Form of Offer and Acceptance	Section C1.1	
Health and Safety Agreement	Section C1.4	

### RD.B ADDITIONAL RETURNABLE DOCUMENTS THAT WILL BE INCORPORATED INTO THE CONTRACT

**Note:** *Failure to submit the applicable document will result in the Tenderer having to submit same upon request within 7 days and if not complied with, will result in the tender offer being disqualified from further consideration [See also clause 2.18 of the Standard Conditions of Tender]*

Document name	Reference	Confirmation of Document Included (Tenderers may use this column to confirm documents have been completed and included in the tender)
First Programme and Method Statements	Form RDB 1	
Estimated Monthly Expenditure on Contract Works by Tenderer	Form RDB 2	
Key-Personnel / Management and Supervisory Staff	Form RDB 3	
Quality Management Systems	Form RDB 4	
Schedule of Proposed Subcontractors	Form RDB 5	
Additional information required with tender offer	Form RDB 6	



## **RD.C OTHER DOCUMENTS THAT WILL BE INCORPORATED INTO THE CONTRACT**

<b>Document Name</b>	<b>Reference</b>	<b>Confirmation of Document Included</b> <i>(Tenderers may use this column to confirm documents have been completed and included in the tender)</i>
Record of Addenda to Tender Documents	Form RDC 1	
Proposed Amendments	Form RDC 2	

**Note:** *Failure to submit the applicable documents may result in the tender offer being disqualified from further consideration.*



## *DAWID KRUIJER MUNICIPALITY*

**CONTRACT No: TN003/2026**

**REPLACEMENT OF ABRAHAM HOLBORS SEPTEMBER WATER TREATMENT  
PLANT MOTOR CONTROL CENTRE**

**BUILD OF ELECTRICAL WORKS**

### **T2.2                    RETURNABLE SCHEDULES**



## *DAWID KRUIJER MUNICIPALITY*

### **CONTRACT No: TN003/2026**

### **REPLACEMENT OF ABRAHAM HOLBORS SEPTEMBER WATER TREATMENT PLANT MOTOR CONTROL CENTRE**

#### **BUILD OF ELECTRICAL WORKS**

#### **T2.2 RETURNABLE SCHEDULES**

##### **INDEX**

<b>Item</b>	<b>Description</b>	<b>Page no</b>
RDA 1	Schedule of Tenderers Experience	50
RDA 2	Certified copy of COIDA registrations	51
RDA 3	Certified copy of CIDB Registration Certificate	52
RDA 4	Original Bank Rating Certificate	53
RDA 5	Pro-forma Certificate of Insurance Cover	54
RDA 6	Certificate of Authority of Signatory	55
RDB 1	First programme and method statements	57
RDB 2	Estimated monthly expenditure on contract works by tenderer	58
RDB 3	Key personnel/management and supervisory staff	59
RDB 4	Quality management systems	60
RDB 5	Proposed subcontracts	61
RDB 6	Additional information required	62
RDC 1	Record of addenda to tender documents	63
RDC 2	Proposed amendments	64



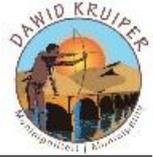
## RDA 1: SCHEDULE OF TENDERER'S EXPERIENCE

The following is a statement of similar work successfully executed by myself / ourselves: **Please provide 1x Completion Certificate of similar work successfully completed.**

EMPLOYER, CONTACT PERSON AND TELEPHONE NUMBER.	DESCRIPTION OF CONTRACT	VALUE OF WORK INCLUSIVE OF VAT (RAND)	DATE COMPLETED
1. _____  _____ <i>(Name)</i>  _____ <i>(Telephone Number)</i>	_____  _____  _____	_____  _____	_____  _____
2. _____  _____ <i>(Name)</i>  _____ <i>(Telephone Number)</i>	_____  _____  _____	_____  _____	_____  _____
3. _____  _____ <i>(Name)</i>  _____ <i>(Telephone Number)</i>	_____  _____  _____	_____  _____	_____  _____
4. _____  _____ <i>(Name)</i>  _____ <i>(Telephone Number)</i>	_____  _____  _____	_____  _____	_____  _____
5. _____  _____ <i>(Name)</i>  _____ <i>(Telephone Number)</i>	_____  _____  _____	_____  _____	_____  _____

Contract: TN003/2026  
Portion T1: Tender  
Part T2: Returnable Documents

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**RDA 2: CERTIFIED COPY OF COIDA REGISTRATIONS**

Attach document hereto.



**RDA 3: CERTIFIED COPY OF CIDB REGISTRATION CERTIFICATE**

Attach document hereto.



## **RDA 4: ORIGINAL BANK RATING REGISTRATION CERTIFICATE**

Attach document hereto.



**RDA 5: PRO-FORMA CERTIFICATE OF INSURANCE COVER**

**Note to tenderer:**

**In the event of the tenderer being a joint venture/consortium the following details of the individual members must also be provided after award of Contract.**

**The tenderer shall provide the following details of this insurance cover:**

- 1. Name of Tenderer: .....
  
- 2. Period of Validity: .....
  
- 3. Value of Insurance:
  - (a) Insurance for Works and Contractor's Equipment:
    - Company: .....
    - Value: .....
  
  - (b) Insurance for Contractor's Personnel:
    - Company: .....
    - Value: .....
  
  - (c) General Public Liability:
    - Company: .....
    - Value: .....
  
  - (d) South African Special Risks Insurance Association (SASRIA):
    - Company: .....
    - Value: .....

Authorised Signatory Signature: .....



## RDA 6: CERTIFICATE OF AUTHORITY OF SIGNATORY

**RESOLUTION** of a meeting of the Board of \*Directors / Members / Partners of:

.....  
 (Legally correct full name and registration number, if applicable, of the Enterprise)

Held at \_\_\_\_\_ (place)

on \_\_\_\_\_ (date)

### RESOLVED that:

- The Enterprise submits a Bid / Tender to Dawid Kruijer Municipality in respect of the following project:

\_\_\_\_\_

\_\_\_\_\_ (Project description as per Bid / Tender Document)

Bid / Tender Number: \_\_\_\_\_ (Bid/Tender No as per Bid/Tender Document)

- Mr/Mrs/Ms: \_\_\_\_\_

In \*his/her capacity as: \_\_\_\_\_ (Position in the Enterprise)

And who will sign as follows:

\_\_\_\_\_ be, and is hereby, authorised to sign the Bid/Tender, and any and all other documents and/or correspondence in connection with and relating to the Bid/Tender to the Enterprise mentioned above.

	NAME	CAPACITY	SIGNATURE
1			
2			
3			
4			
5			
6			

NOTE:

- \*Delete which is not applicable
- NB: This resolution must be signed by all the Directors/Members/Partners of the Bidding Enterprise
- Should the number of Directors/Members/Partners exceed the space available above, additional names and signatures must be supplied on a separate page.

**ENTERPRISE STAMP**



## CERTIFICATE OF AUTHORITY FOR JOINT VENTURES AND CONSORTIA

This Returnable Schedule is to be completed by joint ventures.

*(Attach additional pages if more space is required.)*

We, the undersigned, are submitting this tender offer in a Joint Venture / Consortium and hereby authorise Mr/Ms ..... authorised signatory of the company .....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.

Registered Name Of Firm	Reg. Number	% Of Contract Value	Address	Duly Authorized Signatory	Mark (x) Lead Partn er



## **RDB 1: FIRST PROGRAMME AND METHOD STATEMENT**

Attach document hereto.



## **RDB 2: ESTIMATED MONTHLY EXPENDITURE**

Attach document hereto.



### RDB 3:KEY PERSONEL/MANAGEMENT AND SUPERVISORY STAFF

The Tenderer shall insert in the spaces below, the name of key personnel.

	NAME	CATEGORY *	QUALIFICATION	EXPERIENCE (YEARS RELEVANT)	LOCAL OR NON – LOCAL
1.		CONTRACT'S MANAGER			
2.		ELECTRICAL ENGINEER/TECHNOLOGIST/ / TEAM LEADER			
3.		HEALTH AND SAFETY OFFICER			
4.		ELECTRONIC TECHNICIAN / TEAM LEADER			
5.					
6.					
7.					

*(Attach additional pages if more space is required.)*

**Note:**

- 1 **Failure to comply with the requirements of a full time site agent as noted under item C3.3.5 will result in disqualification of your tender.**
- 2 **Please ensure that a CV for all the key personnel entered in the table above is attached on submission of your tender document.**



## RDB 4: QUALITY MANAGEMENT SYSTEMS

Briefly describe the construction quality system incorporated by the tenderer in its organisation and which will be applicable to this Contract.

	Internal	External	Name of responsible Company /or Person (In case of Person, give years of experience and qualification)
Electrician or Technician: Site Supervision:			
Electrician: Site Installation:			
Quality Supervisor: Site Checks			



## RDB 5: SCHEDULE OF PROPOSED SUBCONTRACTORS

You, the client, are hereby notified that it is our intention to employ the following Subcontractors for work on this contract.

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

	NAME AND ADDRESS OF PROPOSED SUBCONTRACTOR	NATURE AND EXTENT OF WORK
1.		
2.		
3.		
4.		
5.		



## **RDB 6: INFORMATION TO BE SUPPLIED WITH TENDER**

Over and above the relevant information stipulated throughout this document, the following information has to be provided with the Tender's submission:

- a. Design proposal with schematic illustrations (where applicable).
- b. Supporting material and brochure for equipment offered.
- c. All information stipulated in project specifications required for tender evaluation.





## RDC 2: PROPOSED AMMENDMENTS

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

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

PAGE	CLAUSE OR ITEM	PROPOSAL

**END OF SECTION**



## *DAWID KRUIJER MUNICIPALITY*

**CONTRACT No: TN003/2026**

**REPLACEMENT OF ABRAHAM HOLBORS SEPTEMBER WATER TREATMENT  
PLANT MOTOR CONTROL CENTRE**

**BUILD OF ELECTRICAL WORKS**

### **T2.3 Technical Schedules**



## **PART T2.3 TECHNICAL SCHEDULES**

The proper completion of the technical schedules under this section is critical to the evaluation of the tender and hence failure to complete the schedule may lead to the rejection of the bid.

Once the Contract has been awarded to the successful bidder, equipment shall be supplied as recorded in the technical schedules and the Contractor's Proposal, unless written acceptance of any variances thereto is issued by the Engineer.

Tenderers shall note that equipment in accordance with the relevant Specifications and with a proven track record with local operational installations shall be proposed as required. Failure to adhere to this requirement implies that the equipment offered does not meet tender prescriptions and may lead to disqualification of the bid.

Where the Contractor's offer includes equipment, which does not comply with the requirements of these schedules, it shall include separate technical data sheets with its tender.



## T2.3 TECHNICAL SCHEDULES

### INDEX

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TDS E4	UNINTERRUPTIBLE POWER SUPPLIES	74
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### **T2.3.2 Technical Schedules (Electrical Works)**

<b>Section</b>	<b>Description</b>	<b>Page</b>
TDS E1	MOTOR CONTROL CENTRES AND FLOOR STANDING DISTRIBUTION BOARDS	69
TDS E2	FLUSH/ SURFACE MOUNTED DISTRIBUTION BOARDS	70
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TDS E4	UNINTERRUPTIBLE POWER SUPPLIES	74
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TDS E7	LOW VOLTAGE CABLES	78



## TDS E1 MOTOR CONTROL CENTRES AND FLOOR STANDING DISTRIBUTION BOARDS

Item Description	Units	Technical Particulars
Manufacturer		
Supplier		
Manufacturer of factory-built distribution boards or motor control centres shall have certification equal to the short-circuit rating of the board	kA	Attach SABS certificate
Colours	All	
Installation contractor		
Manufacturer of circuit breakers	Make	
Manufacturer of contactors	Make	
Manufacturer of meters	Make	
Manufacturer of current transformers	Make	
Manufacturer motor protection relays	Make	
Manufacturer of Ammeters	Make	
Manufacturer Power Analysers	Make	
Manufacturer of Indicators	Make	
Gland Plate		3CR12 Unpainted
Base		Mild Steel Powder Coated



## TDS E2 FLUSH / SURFACE MOUNTED DISTRIBUTION BOARDS

Item Description	Units	Technical Particulars
Manufacturer		
Supplier		
Manufacturer of factory built distribution boards or motor control centres shall have certification equal to the short-circuit rating of the board	kA	Attach SABS certificate
Colours	All	
Installation contractor		
Manufacturer of circuit breakers	Make	
Manufacturer of contactors	Make	
Manufacturer of meters	Make	
Manufacturer of current transformers	Make	
Manufacturer motor protection relays	Make	
Manufacturer of Ammeters		
Manufacturer Power Analysers		
Manufacturer of Indicators		
Gland Plate		3CR12 Unpainted



### TDS E3 PROGRAMMABLE LOGIC CONTROLLERS

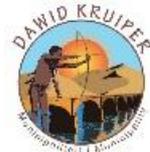
Item Description	Units	Technical Particulars
General		
Manufacturer		
Supplier		
Installation contractor		
Central Processing Unit		
Model		
Type		
Number of Slaves	63	
Memory description internal RAM	4096kB	
Memory description internal RAM for data	256 kB	
Memory description internal RAM for program constants and symbols	3584 kB	
Execution time per instruction		
Boolean	0.12 $\mu$ s	
double-length words	0.17 $\mu$ s	
single-length words	0.25 $\mu$ s	
floating points	1.16 $\mu$ s	
Standards		EN 61000-6-2, EN 61000-6-4, EN 61131-2 & EN 61010-2-201
Data sheets must be provided with tender	Yes / No	
Power Supply Unit		
Model		
Type		
Rated output current	Amp	
Rated output power	W	
Rated output voltage	V	
Rated input power [full load]	W	
Efficiency Factor	%	
Mains voltage variation	%	
Primary peak current	A	
Heat dissipation	W	
Protective Rating		IP20 according to EN60529, IEC 529
Data sheets must be provided with tender	Yes / No	
Digital & Analogue Modules		
Model		
Type		
Protective Rating		IP20 according to EN60529
Equipment Class		Class 1 according to IEC 61140
Isolation		Group wise isolated from ground & individually



Item Description	Units	Technical Particulars
Data sheets must be provided with tender	Yes / No	
Ethernet Module		
Model		
Type		
Protective Rating		IP20 according to EN60529
Equipment Class		EN 61000-6-2 EN 61000-6-4 EN 61131-2 EN 61010-2-201
Isolation		Group wise isolated from ground & individually
Data sheets must be provided with tender	Yes / No	
Additional standards		IEEE 1613, IEC 61850-3, IEEE 61800-3, IEC 61000-6-2 and NEMA TS-2
Managed Switch		
Manufacturer		
Supplier		
Multi-level passwords	Required	
SSH/SSL encryption	Required	
Enable/disable ports, MAC based port security	Required	
Port based network access control (802.1x)	Required	
VLAN (802.1Q) to segregate and secure network traffic	Required	
RADIUS centralized password management	Required	
SNMPv3 encrypted authentication and access security	Required	
Physical Ports	Required	
WAN Port Options	Required	
Warranty	5 Years	
Data sheets must be provided with tender	Yes / No	
Human Machine Interface		
Manufacturer		
Supplier		
Rated input voltage	Required	
Display size	Required	15 inches
Temperature	Required	0-55°C working -20-60°C Storage
Language Fonts	Required	ASCII: (Code page 850) Alphanumeric (including European characters) Chinese: (GB2312-80 codes) Simplified Chinese fonts Japanese: ANK 158, Kanji: 6,962 (JIS Standards 1 & 2) (including 607 non-kanji characters) Korean: (KSC5601 - 1992 codes) Hangul fonts Taiwanese: (Big 5 codes) Traditional Chinese fonts



Item Description	Units	Technical Particulars
Language Fonts	Required	ASCII: (Code page 850) Alphanumeric (including European characters) Chinese: (GB2312-80 codes) Simplified Chinese fonts Japanese: ANK 158, Kanji: 6,962 (JIS Standards 1 & 2) (including 607 non- kanji characters) Korean: (KSC5601 - 1992 codes) Hangul fonts Taiwanese: (Big 5 codes) Traditional Chinese fonts
Integrated connection type	Required	Ethernet RJ45, interface: IEEE 802.3 Ethernet RJ45, interface: 10BASE- T/100BASE-TX USB 2.0 port mini B USB USB 2.0 port USB type A COM2 serial link RJ45, interface: RS485, transmission rate: 187.5 kbps compatible with Siemens MPI COM2 serial link RJ45, interface: RS485, transmission rate: 2400...115200 bps COM1 serial link SUB-D 9, interface: RS232C, transmission rate: 2400...115200bps
Protocol	Required	Modbus, TCP/IP, Ethernet
Application Memory	Required	
Data sheets must be provided with tender	Yes / No	

**TDS E4 UNINTERRUPTIBLE POWER SUPPLIES**

Item Description	Units	Technical Particulars
Manufacturer		
Supplier		
Installation contractor		



## TDS E5 INSTRUMENTATION

Item Description	Units	Technical Particulars
<b>Pressure Sensor</b>		
Manufacturer		
Supplier		
Installation contractor		
<b>Magnetic Flow Meter</b>		
Manufacturer		
Supplier		
Installation contractor		
<b>Point Level Switch</b>		
Manufacturer		
Supplier		
Installation contractor		
<b>Ultrasonic Level Sensor</b>		
Manufacturer		
Supplier		
Installation contractor		
<b>Ultrasonic Level Sensor</b>		
Kiosk – Refer to project specification. Contractor shall use the same panel manufacturer to ensure all equipment is equal and similar.		
Manufacturer		
Supplier		
Installation contractor		
<b>Ball Type Level Control</b>		
Manufacturer		
Supplier		
Installation contractor		
<b>No Flow Sensors</b>		
Kiosk – Refer to project specification. Contractor shall use the same panel manufacturer to ensure all equipment is equal and similar.		
Manufacturer		
Supplier		
Installation contractor		
<b>Free Chlorine Analyser</b>		
Kiosk – Refer to project specification. Contractor shall use the same panel manufacturer to ensure all equipment is equal and similar.		



Item Description	Units	Technical Particulars
Manufacturer		
Supplier		
Installation contractor		
<b>pH Analyser</b>		
Kiosk – Refer to project specification. Contractor shall use the same panel manufacturer to ensure all equipment is equal and similar.		
Manufacturer		
Supplier		
Installation contractor		
<b>Thermal Mass Flow Meter</b>		
Kiosk – Refer to project specification. Contractor shall use the same panel manufacturer to ensure all equipment is equal and similar.		
Manufacturer		
Supplier		
Installation contractor		



### TDS E6 MULTICORE CABLES & INSTRUMENTATION CABLE

Item Description	Units	Technical Particulars
Manufacturer		
Supplier		
Installation contractor		
Instrument cables	Make	
CAT 6 Cables [4 Pair]	Make	
Profibus PVC	Make	
Fibre Cables	Make	
Submersible Pump Cable	Make	



### TDS E7 LOW VOLTAGE CABLES

Item Description	Units	Technical Particulars
Manufacturer		
Supplier		
Installation contractor		
600/1000V Armoured	Make	
300/500V Surfex	Make	
300/500V Surfex with aluminium / vinyl laminate		
600/1000V Single Core Wiring		

**END OF TECHNICAL DATA SHEETS**



## *DAWID KRUIJER MUNICIPALITY*

**CONTRACT No: TN003/2026**

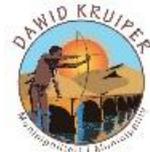
**REPLACEMENT OF ABRAHAM HOLBORS SEPTEMBER WATER TREATMENT  
PLANT MOTOR CONTROL CENTRE**

**BUILD OF ELECTRICAL WORKS**

**PORTION 2: CONTRACT**

**PART C1: AGREEMENTS AND CONTRACT DATA**





## C1.1 FORM OF OFFER AND ACCEPTANCE

### OFFER

The Employer, identified in the Acceptance signature block, has solicited offers to enter into a contract in respect of the following works:

#### **CONTRACT TN003/2026: TENDER FOR REPLACEMENT OF ABRAHAM HOLBORS SEPTEMBER WATER TREATMENT PLANT MOTOR CENTRE**

The Tenderer, identified in the Offer signature block below, 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 authorised, 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**

R ..... (in figures) .....  
..... (in words) .....

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.

NAME(s): (in block letters)	.....	.....
CAPACITY of authorized agents:	.....	.....
SIGNATURE(s) of authorized agents:	.....	.....
SIGNED at on this day of .....	.....	.....
WITNESSES: (Full name – in block letters – and signature)		
1.	.....	.....
2.	.....	.....



## 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 T1 Tendering Procedures

Part T2 Returnable Documents

Part C1 Agreements and Contract Data, (which includes this Agreement)

Part C2 Pricing Data

Part C3 Scope of Work

and drawings and documents or parts thereof, which may be incorporated by reference into Parts C1 to C3 above.

Deviations from and amendments to the documents listed in the Tender Data and any addenda thereto listed in the Tender Schedules as well as any changes to the terms of the Offer agreed by the Tenderer and the Employer during this process of offer and acceptance, are contained in the Schedule of Deviations attached to and forming part of this Agreement. No amendments to or deviations from said documents are valid unless contained in this schedule.

The Tenderer shall within two weeks after receiving a letter of acceptance, contact the Employer's agent (whose details are given in the Contract Data) to arrange the delivery of guarantees, proof of insurance and any other documentation to be provided in terms of the Conditions of Contract identified in the Contract Data. Failure to fulfil any of these obligations in accordance with those terms shall constitute a repudiation of this Agreement.

Notwithstanding anything contained herein, this Agreement comes into effect on the date when the Tenderer receives one fully completed original copy of this document, including the Schedule of Deviations (if any). Unless the Tenderer (now Contractor) within five days of the date of such receipt notifies the Employer in writing of any reason why he cannot accept the contents of this Agreement, this Agreement shall constitute a binding contract between the parties.

NAME(s): ( BLOCK LETTERS)	.....	.....
CAPACITY of authorized agents:	.....	.....
SIGNATURE(s) of authorized agents:	.....	.....
SIGNED aton this day of	.....	.....
WITNESSE(s): (Full name – BLOCK LETTERS – and signature)	.....	.....
1.	.....	.....



## SCHEDULE OF DEVIATIONS

**Notes:**

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

- 4.1 **Subject** .....  
Details .....
- 4.2 **Subject** .....  
Details .....
- 4.3 **Subject** .....  
Details .....
- 4.4 **Subject** .....  
Details .....
- 4.5 **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 the amendments to the documents listed in the Tender Data and addenda thereto as listed in the Tender Schedules, as well as any confirmation, clarification or change 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, oral communication or implied during the period between the issue of the tender documents and the receipt by the Tenderer of a completed signed copy of this Agreement shall have any meaning or effect in the contract between the parties arising from this Agreement.



FOR AND ON BEHALF OF THE **TENDERER:**

NAME(s): (in block letters) .....

CAPACITY of authorized agents: .....

SIGNATURE(s) of authorized agents: .....

SIGNED aton this day of

WITNESSES: (Full name – in block letters – and signature) .....

1. ....

-

FOR AND ON BEHALF OF THE **EMPLOYER:**

NAME(s): (in block letters) .....

CAPACITY of authorized agents: .....

SIGNATURE(s) of authorized agents: .....

SIGNED aton this day of

WITNESSES: (Full name – in block letters – and signature) .....

1. ....

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## C1.2. CONTRACT DATA

### INDEX

Item	Description	Page No
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C1.2.3	APPENDIX TO TENDER (PARTICULAR CONDITIONS: PART A: CONTRACT DATA COMPLETED BY THE EMPLOYER).....	94
C1.2.4	APPENDIX TO TENDER (PARTICULAR CONDITIONS: PART A: CONTRACT DATA PROVIDED BY THE CONTRACTOR).....	96



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### C1.2.1 GENERAL CONDITIONS OF CONTRACT

The General Conditions of Contract applicable to this Contract shall be the **Short Form Contract – FIDIC (Green Book) First Edition (1999)**, which shall be read together with the Variations and Additions to the Conditions of Contract (referred to as Particular Conditions of Contract) as well as the Contract Data specified herein.

Tenderers, Contractors and Subcontractors shall obtain their own copies of the abovementioned document for tendering purposes and for use for the duration of the Contract from the International Federation of Consulting Engineers (FIDIC) (refer to website [www.fidic.org](http://www.fidic.org)) and shall bear all expenses in this regard.

A copy of this document will be made available at the Employers premises.

#### Note 1

Each item of data below is cross-referenced to the clause in the Conditions of Contract to which it applies.



## C1.2.2 VARIATIONS AND ADDITIONS TO THE GENERAL CONDITIONS OF CONTRACT (PARTICULAR CONDITIONS: PART B SPECIAL PROVISIONS)

In terms of Clause 1(1) of the **General Conditions of Contract for Short Form Contract – FIDIC (Green Book) First Edition (1999)**, the following Particular Conditions shall apply to the Contract. Certain standard forms of agreement that are contained in the FIDIC Green Book are replaced by new forms of agreement bound into this document.

CLAUSE/ SUB- CLAUSE	PARTICULAR CONDITION
1.1	<p><b>Definitions</b></p> <p><i>Replace and Add the following Sub-Clauses</i></p>
1.1.1	<p><i>Replace the Sub-Clause with:</i></p> <p>“<b>Contract</b>” 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 <i>Form of Offer and Acceptance</i>, and further includes drawings and documents or parts thereof, which any of the aforesaid documents incorporate by reference.</p>
1.1.2	<p><i>Replace the Sub-Clause with:</i></p> <p>“<b>Specification</b>” means the section of the documents entitled “Part C3: <i>Scope of Works</i>”, 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.</p>
1.1.20	<p><i>Add the following new Sub-Clause:</i></p> <p>“<b>Base Date</b>” means the month prior to the closing of bids.</p>
1.3	<p><b>Priority of Documents</b></p> <p><i>Replace the Sub-Clause with:</i></p> <p>“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:</p> <ul style="list-style-type: none"> <li>(a) the Form of Offer and Acceptance;</li> <li>(b) the Appendix to Tender within the Contract Data;</li> <li>(c) the Particular Conditions within the Contract Data;</li> <li>(d) the General Conditions of Contract;</li> <li>(e) the Employer’s Requirements including Specifications – in descending order: Project Specification, Particular Specification, Standard Specification;</li> <li>(f) the Drawings;</li> <li>(g) the Schedules;</li> <li>(h) any other documents forming part of the Contract</li> </ul> <p>If an ambiguity or discrepancy is found in the documents, the Engineer shall issue any necessary clarification or instruction.”</p>
1.4	<p><b>Law</b></p> <p><i>Replace the Sub-Clause with:</i></p> <p>The law of the Contract shall be the law of the Republic of South Africa. The Parties hereby consent to the jurisdiction of the High Court of South Africa (Gauteng Local Division) in respect of any proceedings instituted under this Contract.</p>



CLAUSE/ SUB- CLAUSE	PARTICULAR CONDITION
2.1	<p><b>Provision to Site</b></p> <p><i>Replace the Sub-Clause with:</i></p> <p>“Access to site shall be on such a day as provided by the End Client.”</p>
4.1	<p><b>General Obligations</b></p> <p><i>Add the following at the end of this Sub-Clause 4.1:</i></p> <p>“Although the Engineer has specified the equipment to be provided for tendering purposes, the Contractor shall be responsible for the detail design of all proprietary Plant and Materials in order to ensure that these are appropriately selected for their intended use and installed to meet the particular installation conditions on Site.”</p>
4.4	<p><b>Performance Security</b></p> <p><i>Delete the first paragraph of Sub-Clause 4.2.1 and replace with:</i></p> <p>“The Contractor shall deliver the Performance Security to the Engineer within the period specified in the Contract Data. The Performance Security submitted must be issued by either an insurance company duly registered in terms of the Short-Term Insurance Act, 1998 (Act 35 of 1998) or by a bank duly registered in terms of the Banks Act, 1990 (Act 94 of 1990) and to which the Employer gives consent. The form of Performance Security shall contain the precise wording of the document included in the “Form of Performance Guarantee”. Such consent and/or agreement shall not relieve the contractor from any obligation under this Sub-Clause.</p> <p>The Performance Security shall not have an expiry date and the Contractor shall ensure that the Performance Security remains valid and enforceable until such time that the requirements associated with Clause 9 [Remedying Effects] have been complied with.”</p>
4.3	<p><b>Subcontracting</b></p> <p><i>Add the following to this Sub-Clause:</i></p> <p>Unless the Engineer approves in writing, the Contractor shall employ the specific Sub-Contractors and Suppliers proposed in the Schedules at tender stage and included in the Contract and he shall include these Sub-Contractor and Suppliers in his arrangements for the execution of the Works.</p>
4.5	<p><b>Contractor’s Operations on Site</b></p> <p><i>Add the following new Sub-Clause:</i></p> <p>“The Contractor shall take note that the Site is located within the premises of an operational water supply system and construction activities shall be scheduled and executed in such a way as to limit the interruption of water supply.</p> <p>In the event that a shut-down is required for the execution of the Contract, the Contractor shall submit a request for shut-down to the Engineer at least 7 days prior to the planned execution of the activity. The request shall be in writing and shall indicate the envisaged period that the shut-down will be required. The Engineer shall approve such a request in writing.</p>



CLAUSE/ SUB- CLAUSE	PARTICULAR CONDITION
4.6	<p><b>Indemnity</b></p> <p><i>Add the following new Sub-Clause:</i></p> <p>“Notwithstanding anything else contained in this Contract, any indemnity provided by the Contractor to the Employer shall extend to the Employer and any of its subsidiary companies as well as its associates, directors and employees and to the End Client and any of its subsidiary companies as well as its associates, directors and employees. Subject to the provisions of Clause 6, the Contractor herewith indemnifies and holds harmless the Employer and the End Client from any loss or damages, including but not limited to monetary loss, costs and expenses incurred by the loss or damage, all actions, proceedings, liability, claims, damages, loss of limb, loss of life, injuries, costs and expenses which may occur due to any actions or omissions by the Contractor its sub-contractors, service providers, employees or representative or caused in any way whatsoever by the Contractor its sub-contractors, service providers, employees or representatives.”</p>
4.7	<p><b>Collateral Warranty</b></p> <p><i>Add the following new Sub-Clause:</i></p> <p>The Contractor agrees that the End Client has an actual and/or prospective interest in the Project. As such the Contractor shall sign the Collateral Warranty in favour of the End Client, which Collateral Warranty is attached hereto as <b>Part C1.5.</b>”</p>
7.3	<p><b>Extension of Time</b></p> <p><i>Add the following to the end of the clause:</i></p> <p>“Extension of Time for Completion caused by abnormal rainfall shall be calculated in accordance with the following formula. No additional extension of Time for Completion caused by exceptionally adverse climatic conditions will be allowed, irrespective of the cause thereof or the effect it may have on the execution of the Works:</p> $V = (N_w - N_n) + (R_w - R_n)/20$ <p>Where:</p> <p>V = <i>Extension of time in calendar days for the calendar month under consideration</i></p> <p>N<sub>w</sub> = Actual number of days during the calendar month under consideration on which a rainfall of 10mm and more is recorded</p> <p>R<sub>w</sub> = Actual total rainfall in mm recorded during the calendar month under consideration</p> <p>N<sub>n</sub> = Average number of days, derived from rainfall records, on which a rainfall of 10mm and more was recorded during the relevant calendar month as per the data tabulated hereinafter</p> <p>R<sub>n</sub> = Average total rainfall in mm for the relevant calendar month, derived from rainfall records, as tabulated hereinafter</p> <p>Where the extension of time due to abnormal rainfall has to be calculated for portion of a calendar month, pro rata values shall be used. Should V be negative for any particular month, and should its absolute value exceed the corresponding value of N<sub>n</sub>, then V shall be taken as being equal to minus N<sub>n</sub>. The total extension of time to be granted shall be the algebraic sum of all the monthly extensions, provided that if this</p>



CLAUSE/ SUB- CLAUSE	PARTICULAR CONDITION																																										
	<p>total is negative then the time for completion shall not be reduced due to subnormal rainfall.</p> <p>Rainfall records for the period of construction shall be taken on Site. The Contractor shall provide and install all the necessary equipment for accurately measuring the rainfall. The Contractor shall also provide, erect and maintain a security fence plus gate, padlock and keys at each measuring station, all at his own cost. The Engineer or his Representative shall take and record the daily rainfall readings. The Contractor shall be permitted to attend these readings, in the company of the Engineer's Representative. Access to the measuring gauge(s) shall at all times be under the Engineer's control.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Month</th> <th style="text-align: center;">R<sub>n</sub> (mm)</th> <th style="text-align: center;">N<sub>n</sub> (days)</th> </tr> </thead> <tbody> <tr><td>January</td><td style="text-align: center;">37</td><td style="text-align: center;">4</td></tr> <tr><td>February</td><td style="text-align: center;">37</td><td style="text-align: center;">5</td></tr> <tr><td>March</td><td style="text-align: center;">39</td><td style="text-align: center;">6</td></tr> <tr><td>April</td><td style="text-align: center;">27</td><td style="text-align: center;">4</td></tr> <tr><td>May</td><td style="text-align: center;">13</td><td style="text-align: center;">2</td></tr> <tr><td>June</td><td style="text-align: center;">6</td><td style="text-align: center;">0</td></tr> <tr><td>July</td><td style="text-align: center;">4</td><td style="text-align: center;">0</td></tr> <tr><td>August</td><td style="text-align: center;">3</td><td style="text-align: center;">0</td></tr> <tr><td>September</td><td style="text-align: center;">6</td><td style="text-align: center;">0</td></tr> <tr><td>October</td><td style="text-align: center;">14</td><td style="text-align: center;">2</td></tr> <tr><td>November</td><td style="text-align: center;">14</td><td style="text-align: center;">3</td></tr> <tr><td>December</td><td style="text-align: center;">28</td><td style="text-align: center;">3</td></tr> <tr> <td style="text-align: right;"><b>Total</b></td> <td style="text-align: center;"><b>228</b></td> <td style="text-align: center;"><b>29</b></td> </tr> </tbody> </table> <p>Notwithstanding anything to the contrary in the Contract, the Contractor shall not be entitled to an extension of the Time for Completion where he has not used all reasonable endeavours to prevent, reduce or mitigate the delay, including providing such temporary measures as may be necessary to enable work to continue and the Works and Contractor's Equipment to be protected during exceptionally adverse climatic conditions.</p>	Month	R <sub>n</sub> (mm)	N <sub>n</sub> (days)	January	37	4	February	37	5	March	39	6	April	27	4	May	13	2	June	6	0	July	4	0	August	3	0	September	6	0	October	14	2	November	14	3	December	28	3	<b>Total</b>	<b>228</b>	<b>29</b>
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<b>8.1</b>	<p><b>Completion</b></p> <p><i>Replace the first paragraph with the following:</i></p> <p><i>"For the Works to be considered completed the following shall be carried out, in the sequence listed below:</i></p> <ol style="list-style-type: none"> <li>a) <b>Pre-Commissioning Tests</b>, which shall include the appropriate inspections and ("dry" or "cold") functional tests to demonstrate that each item of the Works or Parts of the Works can safely undertake the next stage of testing or full commissioning. Pre-Commissioning shall be complete only when the Engineer certifies RFC for the item or Part of the Works or whole of the Works as practicable.</li> <li>b) <b>Commissioning Tests</b>, which shall include the specified operational tests to demonstrate that the Works or Parts of the Works can be operated safely for extended periods and perform as specified, all under available operating conditions; and</li> <li>c) <b>Trial Operation</b> by the Contractor for a specified period of time in accordance with the Specification, which shall demonstrate that the Works or Part of the Works perform reliably and in accordance with the Contract. During the Trial Operation Period the Contractor shall carry out all</li> </ol>																																										



CLAUSE/ SUB- CLAUSE	PARTICULAR CONDITION
8.1	<p>necessary servicing and adjustments required.</p> <p>Trial Operation shall not constitute a taking over under Clause 8 [Taking-Over]. Any product produced by the Works during trial operation shall be the property of the Employer and shall be provided by the Contractor at no cost to the Employer."</p> <p><i>Add the following at the end of this Sub-Clause:</i></p> <p>During the Trial Operation Period the Contractor shall carry out all necessary servicing and adjustments required. The Employer's staff may assist the Contractor in operating the Works or Section during this period and at this time the Contractor shall train the Employer's operational staff in the starting, operating and stopping of the Works or Section, and the Employer's maintenance staff on the maintenance requirements and procedures.</p>
9.1	<p><b>Remedying Defects</b></p> <p><i>Delete the first paragraph and replace with:</i></p> <p>The Employer shall be entitled to an extension of the relevant Remedying of Defects Period for the Works or a Section of the Works if that Works or Section of the Works 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.</p>
10.1	<p><b>Right to Vary</b></p> <p><i>Add the following to Clause:</i></p> <p>The Employer may vary the Contract to suit available budgets and cash flows. The Contractor must ensure its rates are balanced and all-inclusive in the event quantities are varied and re-measured.</p> <p>This is not a Lump Sum Contract and re-measured payments will only be made for goods and services actually delivered and provided in accordance with the Bill of Quantities and the scheduled rates.</p>
10.3	<p><b>Early Warning</b></p> <p><i>Delete the first and second paragraphs and replace with:</i></p> <p>"A Party shall notify the other as soon as it is aware of any circumstance which may delay or disrupt the Works, or which may give rise to a claim for additional payment. The Contractor shall take all reasonable steps to minimize the effects to ensure that the due completion date are not exceeded."</p>
11.3	<p><b>Interim Payments</b></p> <p><i>Delete the first paragraph and replace with:</i></p> <p>"The Employer shall invoice the End Client as and when to works are complete and shall pay the Contractor with 30 days of receiving payment for said works. This payment shall be subject to retention at the rate stated in the Appendix, and less any amount for which the Employer has specified its reason for disagreement. The Employer shall not be bound by any sum previously considered by it to be due to the Contractor."</p>
11.4	<p><b>Payment of First Half of Retention</b></p> <p><i>Delete this paragraph and replace with:</i></p>



CLAUSE/ SUB- CLAUSE	PARTICULAR CONDITION
	<p>“One half of the retention shall be paid by the Employer to the Contractor within 30 days after receiving payment from the End Client. The Contractor shall invoice the Employer for the release of retention after issuing the notice under Sub Clause 8.2.”</p>
<p><b>11.5</b></p>	<p><b>Payment of Second Half of Retention</b></p> <p><i>Delete this paragraph and replace with:</i></p> <p>“The remainder of the retention shall be paid by the Employer to the Contractor within 30 days of receiving payment from the End Client. The Contractor can invoice the release of the second half of the retention either the expiry of the period stated in the Appendix, or the remedying of notified defects or the completion of outstanding work, all as referred to in Sub-Clause 9.1, whichever is the later.”</p>
<p><b>11.6</b></p>	<p><b>Final Payment</b></p> <p><i>Delete the first and second paragraph and replace with:</i></p> <p>“Within 21 days of the latest of the events listed in Sub-Clause 11.5 above, the Contractor shall submit a final statement to the Employer together with any documentation reasonably required to enable the Employer to ascertain the final contract value.</p> <p>Notwithstanding anything else contained in this Contract, subject to the Employer’s receipt of payment from the End Client, the Employer will pay the Contractor within 30 (thirty) days of receipt of payment from the End Client any amount due. If the Employer disagrees with any part of the Contractor’s final account, he shall specify his reasons for disagreement when making payment.”</p>
<p><b>13.1</b></p>	<p><b>Contractor’s Care of the Works</b></p> <p><i>Add the following at the end of the second paragraph:</i></p> <p>“Notwithstanding anything contained in this Agreement, but subject to Clause 6, the Contractor herewith indemnifies and holds harmless the Employer and any of its subsidiary companies as well as associates, directors and employees from any loss or damage including but not limited to monetary loss, cost and expenses incurred by the loss or damage, all actions, proceedings, liability, claims, damages, loss of limb, loss of life, injuries, cost and expenses which may occur due to any action or omissions by the Contractor its sub-contractors, services providers, employees or representative or caused in any way whatsoever by the Contractor its sub-contractors, service providers, employees or representatives.”</p>
<p><b>14.1</b></p>	<p><b>Extent of Cover</b></p> <p><i>Add the following at the end of the first paragraph:</i></p> <p>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.”</p>



### C1.2.3 APPENDIX TO TENDER

#### PARTICULAR CONDITIONS: PART A: CONTRACT DATA COMPLETED BY THE EMPLOYER

In terms of Notes of the **General Conditions of Contract for Short Form of Contract – FIDIC (Green Book) Second Edition (1999)**, the following Particular Conditions shall apply to the Contract. Certain standard forms of agreement that are contained in the FIDIC Green Book are replaced by new forms of agreement bound into this document.

Condition	Sub-Clause	Data
<b>Time for Completion</b>	1.1.9	15 December 2026 (248 Days total (173 Work days excluding weekends and public holidays.)
<b>Law of the Contract</b>	1.4	Republic of South Africa
<b>Language</b>	1.5	English
<b>Provision of Site</b>	2.1	On Commencement Date
<b>Authorised Person</b>	3.1	Name: Mr Mario Neethling Email: <a href="mailto:mario.neethling@dkm.gov.za">mario.neethling@dkm.gov.za</a> Tel: 054 338 7061
<b>Name and address of Employer's representative</b>	3.2	Dawid Kruijer Municipality Mutual Street Uppington 8800
<b>Performance Security and Currency</b>	4.4	Amount: R5 000 000.00 (exclusive of VAT) Form: As per form attached in Section C1.3 of this document.
<b>Requirement for Contractor's design Programme</b>	5.1	As stipulated in specification C3.2 of Part C3 - Engineering
	7.2	Time for submission: Within 14 days of commencement date.  Form of programme: The programme shall be compiled by means of MS Project in Gantt chart format.
<b>Amount payable due to failure to complete</b>	7.4	R5,000.00 (excluding VAT) per day up to a maximum of 10% of sum stated in this agreement.
<b>Period for notifying defects</b>	9.1 & 11.5	365 days calculated from the date stated in the notice under Sub-Clause 8.2.
<b>Valuation of the Works</b>	11.1	The Works shall be valued as per specification C2 of Part C2 of this document.
<b>Percentage of value of Materials and Plant</b>	11.2	80% of all Materials and Plant delivered on site and proof of ownership can be provided.
<b>Percentage of Retention</b>	11.3	5% of Contractors appointment value.
<b>Currency of payment</b>	11.7	ZAR
<b>Rate of interest</b>	11.7	Zero (0)



Condition	Sub- Clause	Data	
<b>Insurances</b>	14.1	The Works, Materials, Plant and Fees: Third Party injury to persons and damages to property:  Contractors Equipment:  Workers:	Sum stated in agreement plus 15%  R10 million  Full replacement value  As governed by law
<b>Arbitration</b>	15.3	Rules: Arbitration Foundation of South Africa (AFSA)  Appointment Authority: AFSA  Place of Arbitration: Pretoria	



**C1.2.4 APPENDIX TO TENDER**

**PARTICULAR CONDITIONS: PART A: CONTRACT DATA PROVIDED BY THE CONTRACTOR**

Item	Clause	Entry
Contractor's Name and Address	1.1.5	..... ..... ..... ..... .....

**Signature** \_\_\_\_\_

**On behalf of** \_\_\_\_\_

**Date:** \_\_\_\_\_



### C1.3 FORM OF GUARANTEE

Employer	: Dawid Kruiper Municipality Mutal Street Upington 8801	Contractor	: .....
			.....
			.....
			.....
			.....
End Client	: Dawid Kruiper Municipality Mutal Street Upington 8801		

Amount of Guarantee: .....

I/WE the undersigned, duly acting on behalf of the Company that is described below, do hereby bind the said Company to the Employer that is described above, as surety or co-principal debtor in solidum for the due performance, fulfilment and completion of the Contract by the Contractor that is described above, and we hereby undertake, on behalf of the Company to pay on demand at the above mentioned address:

- any loss or damage which the Employer and/or the End Client may sustain
- as well as any penalties or claims and legal costs to which the Employer and/or the End Client may become entitled by reason of the non-fulfilment or breach of the terms of the Contract by the Contractor

always provided that the liability of the Company under this guarantee shall not exceed the guaranteed amount that is described above.

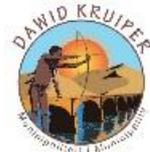
On behalf of the Company I/we do hereby renounce all benefits from the legal exceptions *non numeratae pecuniae, non causa debiti excussionis et divisionis* and all other exceptions which might or could be pleaded against the validity of this guarantee, the meaning whereof we declare ourselves to be fully acquainted with.

On behalf of the Company, I/we do hereby agree that this guarantee shall be irrevocable and shall remain in full force and effect during the term of the Contract, either until the date of issue of a Certificate of Completion for the whole or the final portion of the Works by the Employer's agent, or until any liability of the Contractor which has arisen before such date in terms of the Conditions of Contract has been satisfied, whichever is the later.

I/we do further agree and declare

- that all admissions and acknowledgements of indebtedness by the Contractor shall be binding on the Company,
- that the indebtedness of the Contractor to the Employer and/or the End Client shall at all times be determined and proved by a written certificate of the Chief Executive Officer, or by any other person acting in such capacity,
- that such certificate shall be binding on the Company and shall be conclusive proof of the amount of the Company's indebtedness, and that such certificate annexed to this guarantee will be valid as a liquid document against the Company in a competent court in the Republic of South Africa,

that the Employer and/or the End Client shall, without reference and/or notice to us, have complete liberty of action to act in any manner authorised and/or contemplated by the terms of the Contract, and/or to agree to any modifications, variations or alterations to the Works, or to any extensions of the Due Completion



- Date for the Works under the Contract, and that the rights of the Employer and/or the End Client under this guarantee shall in no way be prejudiced nor the liability of the Company be in any way reduced by reason of any steps or concessions which the Employer and/or the End Client may take, make, give, concede or agree to under the Contract.
- that the Employer and/or the End Client shall be entitled, without prejudice to any of its rights under this guarantee, to give time to and compound with, release from liability or to make any other arrangement with the Contractor, its assigns, its liquidators or its judicial managers, and that any such actions shall not exonerate the Company from any portion of its liability under this guarantee.
- this guarantee is neither negotiable nor transferable, purports to the payment of money only and should be returned to the Company upon payment, completion or cancellation whichever occurs earlier.

Name of Company: .....

The Company chooses as its domicilium citandi et executandi, and for the purpose of the service of any notices and legal processes the following address:

..... (insert address)

NAME(s): (BLOCK LETTERS) .....

CAPACITY of authorized agents: .....

SIGNATURE(s) of authorized agents: .....

SIGNED at on this day of ..... .....

WITNESSE(s): (Full name – in block letters – and signature)

1. ....

2. ....



---

## ANNEXURE B

### LIST OF INSTITUTIONS FROM WHO CONTRACT/DEPOSIT GUARANTEES CAN BE ACCEPTED.

1. ABSA Bank
2. CAPITEC Bank
3. Credit Agricole Indosuez (South Africa Branch)
4. Development Bank of South Africa
5. FirstRand Bank
6. ING Bank N.V. (South Africa Branch)
7. Investec Bank
8. Landbank
9. National Housing Finance Co.
10. Nedcor Bank
11. South African Reserve Bank
12. Standard Bank
13. AIG South Africa
14. Credit Guarantee Insurance Co
15. Emerald Insurance Company
16. Federated Employers Mutual Assurance Co
17. Global Insurance Company
18. Guardrisk Insurance Company
19. Hannover Re:
20. Home Loan Guarantee Company
21. Lion of Africa Insurance Company
22. Metropolitan Life
23. Metropolitan Odyssey Ltd
24. MUA Insurance
25. Mutual & Federal Insurance Company
26. Rand Mutual Assurance Company
27. Regent Insurance Company
28. SA Eagle Insurance Company
29. Lombard Insurance.





- d) 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 ensure that the CONTRACTOR has complied with the undertakings as more fully set out in paragraphs 1 and 2 above, which steps may include, but shall not be limited to, the right to inspect any appropriate site or premises occupied by the CONTRACTOR, or to inspect any appropriate records held by the CONTRACTOR or to take such steps it may deem necessary to remedy the default of the CONTRACTOR at the cost of the CONTRACTOR.
  
- e) The CONTRACTOR shall be obliged to report forthwith to the EMPLOYER any investigations, complaint or criminal charge which may arise as a consequence of the provisions of the ACT and Regulations, pursuant to work performed in terms of this agreement, and shall, on written demand, provide full details in writing of such an investigation, complaint or criminal charge as the case may be.

FOR AND ON BEHALF OF THE **EMPLOYER:**

NAME(s): (BLOCK LETTERS) .....

CAPACITY of authorized agents: .....

SIGNATURE(s) of authorized agents: .....

.....

SIGNED aton this day of .....

WITNESSES: (Full name – in block letters – and signature)

.....

1. ....

.....

FOR AND ON BEHALF OF THE **CONTRACTOR:**

NAME(s): (BLOCK LETTERS) .....

CAPACITY of authorized agents: .....

SIGNATURE(s) of authorized agents: .....

.....

SIGNED aton this day of .....

WITNESSES: (Full name – in block letters – and signature)

.....

1. ....

.....



### For the Contractor:

Representative: .....  
 Physical Address: .....  
 Postal Address: .....  
 Tel: .....  
 Fax: .....  
 E-mail: .....

#### 1.1.1. For the Beneficiary:

Representative: .....  
 Physical Address: .....  
 Postal Address: .....  
 Tel: .....  
 Fax: .....  
 E-mail: .....

- 1.2. A Party shall be entitled, in giving at least ten (10) days' prior written notice to the other Party, to change its *domicilium citandi et executandi* or its representative so stipulated.
- 1.3. Any notices or other communication to be given to any Party under the Agreement shall be in writing and effective from date of receipt at the address stated above. Deliveries may be by hand, facsimile, email or by registered mail.
- 1.4. The notice provisions in the Contract shall apply, unless there are no such provisions, then the following provisions shall apply to any notice or communication between the Parties:
- 1.4.1. sent by facsimile transmission to its chosen telefax number, shall be deemed to have been received on the day of despatch, as evidenced by a fax confirmation confirming successful transmission of such fax.
- 1.4.2. delivered by hand during ordinary business hours, shall be deemed to have been received on the day of delivery;
- 1.4.3. sent by registered mail in a correctly addressed envelope shall be deemed to have been received on the seventh (7th) business day after posting.
- 1.4.4. sent by email shall be deemed to have been received within 4 (four) hours of transmission at the destination after it is transmitted, if it is transmitted during normal business hours; or within 4 (four) hours of the beginning of the next business day at the destination after it is transmitted, if it is transmitted outside those business hours.
- 1.5. Subject to the above, the Parties contract out of the provisions of Sections 22 and Section 23 of the Electronic Communications and Transactions Act, 2002 (Act No 25 of 2002).
- 1.6. Notwithstanding anything to the contrary herein contained a written notice or other communication actually received by a Party (and for which written receipt has been obtained) shall be an adequate written notice or communication to it notwithstanding that the notice or communication was not sent to or delivered at its chosen address.

## 2. DISPUTE RESOLUTION

The dispute resolution provisions in the Contract shall apply *mutatis mutandis* hereto.



FOR AND ON BEHALF OF THE **EMPLOYER**:

NAME(S): (BLOCK LETTERS)

CAPACITY of authorized agents:

SIGNATURE(S) of authorized agents:

SIGNED aton this day of 20

WITNESSES: (Full name – in block letters – and signature)

1.

2.

FOR AND ON BEHALF OF THE **CONTRACTOR**:

NAME(S): (BLOCK LETTERS)

CAPACITY of authorized agents:

SIGNATURE(S) of authorized agents:

SIGNED aton this day of 20

WITNESSES: (Full name – in block letters – and signature)

1.

2.



---

*DAWID KRUIJER MUNICIPALITY*

**CONTRACT No: TN003/2026**

**REPLACEMENT OF ABRAHAM HOLBORS SEPTEMBER WATER TREATMENT  
PLANT MOTOR CONTROL CENTRE**

**BUILD OF ELECTRICAL WORKS**

**PORTION 2: CONTRACT**

**PART C2 PRICING DATA**



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## C2 PRICING DATA

### INDEX

<b>Section</b>	<b>Description</b>	<b>Page No</b>
C2.1	PRICING INSTRUCTIONS	106
C2.2	SCHEDULE OF QUANTITIES	112



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## *DAWID KRUIJER MUNICIPALITY*

**CONTRACT No: TN003/2026**

**REPLACEMENT OF ABRAHAM HOLBORS SEPTEMBER WATER TREATMENT  
PLANT MOTOR CONTROL CENTRE**

**BUILD OF ELECTRICAL WORKS**

### **C2.1 PRICING INSTRUCTIONS**



## C2.1 PRICING INSTRUCTIONS

### 1. General

1.1 This section provides the tenderer with guidelines and requirements with regard to the completion of the Bill of Quantities. The Schedule has to be completed in black ink and the tenderer is referred to the Tender Data in regard to the correction of errors.

1.2 The Bill of Quantities shall be read with all the documents which form part of this Contract.

1.3 The following words shall have the meanings hereby assigned to them:

Unit: The unit of measurement for each item of work in terms of the Specifications.

Quantity: The number of units of work for each item.

Rate: The payment per unit of work at which the tenderer tenders to do the work.

Amount: The product of the quantity and the rate tendered for an item.

Sum: An amount tendered for an item, the extent of which is described in the Bill of Quantities, the Specifications and the Drawings (if applicable), but the quantity of work of which is not measured in any units.

1.4 Reference shall be made to the General Conditions of Contract regarding Provisional and Prime Costs Sums.

### 2. Pricing of Works

#### 2.1 Design and Drawings

With reference to clause 4.1 [Contractors Obligations] of the General Conditions of Contract, the Contractor shall carry out and be responsible for the Works and the tenderer shall include, under the respective payment items and submission of associated General Arrangement (GA), workshop drawings and equipment data packs for the respective equipment and/or system as may be required.

#### 2.2 Manufacture, supply and delivery to Site

In terms of manufacture and supply of plant and equipment, the prices quoted 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.



### 2.3 Installation

In terms of erection and/or installation, the prices quoted 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;
- Guaranteeing for the period specified in Contract Data
- Full servicing, including replacement of all consumables, at the end of the defects notification period.

### 2.4 Testing and Commissioning

In terms of testing and commissioning, the prices quoted 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.

Any additional charges in connection with off-site storage which there may be over and above the prices quoted in the various sections of this schedule of prices, shall be set-out in detail by the Tenderer.

The work of installation, erection and testing of the plant and equipment shall as far as possible be carried out in one continuous operation and the cost of transporting personnel between the Contractors headquarters and the site will be paid at the tendered amount for same for only one return trip for such continuous operation, (if all installation and erection operations are carried out by same personnel) irrespective of the number of sections awarded. No additional payment will be made for any weekend or holiday trips back to the Contractor's headquarters. Additional trips for personnel will only be paid for if authorised, or when requested by the Engineer in writing.

Amounts allowed for provisional sums and contingencies will be spent in part or as a whole at the sole discretion of the Engineer.

The Employer reserves the right to sub-divide the contract. Prices quoted in this Schedule are deemed to apply to the section in which its priced. The tenderer may offer a reduction in price if awarded more than one section.

## 3. **Pay Items**

3.1 For preliminary and general charges, the method of measurement and payment shall be as specified in the contract documents. Measurement and payment of mechanical and electrical equipment shall be as described in the Particular Specification, as amended, or as described in the Schedule of Quantities.

3.2 Descriptions in the Bill of Quantities are abbreviated and comply generally with those in the Specifications. The measurement and payment clause in the 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 in the Specification, or the Scope of Work, conflict with the terms of the Bill of Quantities, the requirements of the Specification or Scope of Work, as applicable, shall prevail.



- 3.3 The item numbers appearing in the Bill of Quantities refer to the corresponding Specification or amended in the Scope of Work. Where a discrepancy exists, the Contractor shall bring this to the attention of the Engineer prior to submitting an offer.
- 3.4 Those parts of the contract to be constructed using labour-intensive methods (if any) have been marked in the bill of quantities with the letter LI in a separate column filled in against every item so designated. The works, or parts of the works so designated are to be constructed using labour-intensive methods only. The use of plant to provide such works, other than plant specifically provided for in the scope of work, is a variation to the contract. The items marked with the letters LI are not necessarily an exhaustive list of all the activities which must be done by hand, and this clause does not supersede any of the requirements in the generic labour intensive specification in the Scope of Works.
- 3.5 Payment for items which are designated to be constructed labour-intensive (either in this schedule or in the Scope of Works) will not be made unless they are constructed using labour-intensive methods. Any unauthorised use of plant to carry out work which was to be done labour-intensively will not be condoned and any works so constructed will not be certified for payment.
- 3.6 Unless otherwise stated, items are measured net in accordance with the drawings, and no allowance is made for waste.
- 3.7 The quantities set out in the Bill of Quantities are the estimated quantities of the Works, but the Contractor will be required to undertake whatever quantities may be directed by the Engineer 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.
- 3.8 The units of measurement described in the Bill of Quantities are metric units. Abbreviations used in the Bill of Quantities are as follows:

mm	=	millimetre	h	=	hour
m	=	metre	kg	=	kilogram
km	=	kilometre	t	=	ton (1000kg)
m <sup>2</sup>	=	square metre	no.	=	number
m <sup>2</sup> .pass	=	square metre pass	sum	=	lump sum
ha	=	hectare	MN	=	meganewton
m <sup>3</sup>	=	cubic metre	MN.m	=	meganewton-metre
m <sup>3</sup> .km	=	cubic metre-kilometre	PC sum	=	Prime Cost sum
l	=	litre	Prov sum	=	Provisional sum
kl	=	kilolitre	%	=	Per cent
MPa	=	megaspascal	kW	=	kilowatt
PS	=	Pipe Special number	V	=	Valve number

#### 4. Rates

- 4.1 The prices and rates to be inserted in the Bill of Quantities are to be full inclusive prices for the work described under such 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.

- 4.2 A price or rate is to be entered against each item in the Bill of Quantities, whether the quantities are stated or not. An item against which no price is entered or where a word or phrase such as “included” or “provided elsewhere” will be accepted as a rate of nil (R0,00) having been entered against such items and covered by the other prices or rates in the Schedule.

Any work executed to which such a pay item applies, shall be measured under the appropriate items in the Bill of Quantities and valued at a rate of nil (R0,00). The rate of nil shall be valid irrespective of any change in the quantities during the execution of the Contract.

- 4.3 The Tenderer shall fill in a rate against all items.
- 4.4 The Tenderer shall not group together a number of items and tender one rate for such group of items.
- 4.5 All rates and sums of money quoted in the Bill of Quantities shall be in rands and whole cents. Fractions of a cent shall be discarded.
- 4.6 All prices and rates entered in the Bill of Quantities must be excluding VAT. VAT will be added last on the summary page of the Bill of Quantities.
- 4.7 Should excessively high unit prices be tendered, such prices may be of sufficient importance to warrant rejection of a tender by the Employer.
- 4.7.1 Where the Contractor is required to furnish detailed drawings and designs or other information in terms of the Contract Documents and no specific payment item has been included for this, all associated costs shall be deemed to have been provided for and included in the unit rates and sum amounts tendered for the items scheduled in the Bill of Quantities, and separate additional payments will not be made.
- 4.8 Although not incorporated into the Bill of Quantities, the Contractor shall complete a Schedule of Rates (refer to Part C2.4 Schedule of Rates) against which the rate breakdown of individual components shall be recorded. This schedule shall be used to manage rate changes should sections of the Works have to undergo alterations to suite site specific conditions.

## 5. Labour-Intensive Construction

- 5.1 Those parts of the contract to be constructed using labour-intensive methods (if any) have been marked in the schedule of quantities with the letters LIC. The works, or parts of the works so designated are to be constructed using labour-intensive methods only in accordance with the *Guidelines for the implementation of Labour-Intensive Infrastructure Projects under the Extended Public Works Programme (EPWP)*. Although not bound into this document, the Contractor shall obtain its own copy of this guideline from the following website: [Guidelines for implementation of Labour Intensive Infrastructure Projects under the Expanded Public Works Programme | South African Government \(www.gov.za\)](http://www.gov.za)



The items marked LIC are not necessarily an exhaustive list of all the activities which must be done by hand, and this clause does not over-ride any of the requirements in the generic labour-intensive specification.

5.2 Payments for items which are designated to be constructed labour-intensively will not be made unless they are constructed using labour-intensive methods. Any unauthorised use of plant to carry out work which was to be done labour-intensively will not be condoned and any works so constructed will not be certified for payment.

**6. Pipe Schedule**

6.1 Pipes, fittings and specials are scheduled separately in the Pipe Schedules for each Section. The individual Pipe Schedule totals have to be carried forward to the relevant item in each Section.

6.2 The following abbreviations are used in the Pipe Schedule:

dia	- diameter	uPVC	- Unplasticised Polyvinyl Chloride
mat	- material	MS	- Mild Steel
SS	- Stainless Steel	AS	- As Specified
c to f	- centre to face	GMS	- Galvanised Mild Steel
d.f	- double flanged	o.a	- overall
p.f	- puddle flange	CI	- Cast Iron
NB	- Nominal Bore	w.t	- wall thickness

**CORRECTION OF ENTRIES MADE BY TENDERER**

Any entry made by the Tenderer in the Bill of Quantities, forms, etc, which the tenderer desires to change, shall not be erased or painted out. A line shall be drawn through the incorrect entry and the correct entry shall be written above in black ink and the full signature of the Tenderer shall be placed next to the correction.

**DECLARATION**

This page serves as a declaration that I, .....,  
in my capacity as,.....,  
have read through and ensured that my submission, in its entirety, conform to the requirements stipulated in the pricing instructions.

Date: .....

Name: .....

Signature: .....

*The undersigned, who warrants that he / she is duly authorised to do so on behalf of the enterprise, confirms that the contents of this schedule are within my personal knowledge and are to the best of my belief both true and correct.*

Person Authorized to sign Tender:

FULL NAME (BLOCK LETTERS):

SIGNATURE:

DATE:



## *DAWID KRUIJER MUNICIPALITY*

### **CONTRACT No: TN003/2026**

### **REPLACEMENT OF ABRAHAM HOLBORS SEPTEMBER WATER TREATMENT PLANT MOTOR CONTROL CENTRE**

#### **BUILD OF ELECTRICAL WORKS**

## **C2.2 SCHEDULE OF QUANTITIES**

Contract: TN003/2026  
Part C2:Pricing  
Data

Section C2.2: Bill of Quantities

Preliminary and General – Section A



Item	Payment Reference	Description	Unit	Qty	Rate (R)	Amount (R)
	<b>PPG</b>	<b><u>SCHEDULE NO. 1</u></b> <b><u>PRELIMINARY AND GENERAL</u></b>				
<b>1.</b>		<b><u>SCHEDULE NO: 1.1 - FIXED-CHARGE ITEMS</u></b>				
1.1.1	PPG 8.1.1	Contractual Requirements  <u>Establishment of Facilities on Site</u>	sum	1		
1.1.2	PPG 8.1.2	Facilities for the Contractor	sum	1		
1.1.3	PPG 8.1.3	Facilities for the Engineer	sum	0		
1.1.4	PPG 8.1.4	Contract Nameboard (1No)	sum	1		
1.1.5	PPG 8.1.5	Other fixed-charge obligations Transport	sum	1		
1.1.6	PPG 8.1.6	Removal of Contractor's site Establishment on Completion  <u>Occupational Health and Safety</u>	sum	1		
1.1.7	PPG 8.1.7	Compliance with Occupational Health and Safety Act (Act 85 of 1993) and its regulations and with the Employers Health and Safety Specification  <u>Environmental Management</u>	sum	1		
1.1.8	PPG 8.1.8	Compliance with Environmental Management Plan Act (Act 85 of 1993) and its regulations and with the Employers Health and Safety Specification	sum	0		
Carried Forward						

				Brought Forward		
<b>1.2</b>		<b><u>SCHEDULE NO: 1.2 - TIME-RELATED ITEMS</u></b>				
1.2.1	PPG 8.2.1	Contractual Requirements	months	7		
		<u>Operation and maintenance of facilities on the Site for the duration of construction</u>				
1.2.2	PPG 8.2.2	Facilities for the Contractor	months	7		
1.2.3	PPG 8.2.3	Facilities for the Engineer	months	7		
1.2.4	PPG 8.2.4	Supervision for duration of construction	months	7		
1.2.5	PPG 8.2.5	Company and head office overhead costs for the duration of the contract	months	7		
1.2.6	PPG 8.2.6	Other time-related obligations	months	7		
		<u>Occupational Health and Safety</u>				
1.2.7	PPG 8.2.7	Compliance with Occupational Health and Safety Act (Act 85 of 1993) and its regulations and with the Employers Health and Safety Specification	months	7		
		<u>Environmental Management</u>				
1.2.8	PPG 8.2.8	Compliance with Environmental Management Plan Act (Act 85 of 1993) and its regulations and with the Employers Health and Safety Specification	months	0		
<b>1.3</b>		<b><u>SCHEDULE NO: 1.3 - OTHER GENERAL CHARGES</u></b>				
1.3.1	PPG 8.3.2	Provision of as-built drawings and details	Sum	1		
1.3.2	PPG 8.3.3	Provide Operation and Maintenance Manuals	Sum	1		
1.3.3	PPG 8.3.4	Training	Sum	1		
	PPG 8.3.5	Allow for the management, coordination and payment of a locally appointed ECSA registered Professional Electrical Engineer for supervision and project management as nominated by the Employer. The all-inclusive fee for this service is				
1.3.4			P Sum	1	R1 500 000.00	

		R1,500,000. This sum is not subject to adjustment for the Contractor's profit or attendance and shall be paid directly to the nominated engineer upon receipt of their invoice by the Contractor.				
						Carried Forward
						Brought Forward
<b>1.4</b>		<b><u>SCHEDULE NO: 1.4 - SUMS STATED PROVISIONALLY BY THE ENGINEER</u></b>				
1.4.1	PPG 8.4.1	Maintenance Spares	P Sum	1	R100,000.00	
1.4.2		Overheads charges and profit on item 1.4.1	%			
1.4.3	PPG 8.4.3	Employers Health and Safety Officer	P Sum	1	R150,000.00	
1.4.4	PPG 8.4.4	PPE Equipment	P Sum	1	R50,000.00	
1.4.5		Overheads charges and profit on item 1.4.5	%			
		<b><u>TRIAL OPERATION</u></b>				
1.4.6	PPG 8.6	Trial Operation Period	Sum	1		
		<b>SCHEDULE NO. 1 PRELIMINARY AND GENERAL</b>				
						<b>Total Carried forward to Summary of Schedules</b>

Contract: TN003/2026  
 Part C2: Pricing Data  
 Section C2.2: Bills of Quantities



Motor Control Centres and Distribution

Boards

E1

Item	Payment Reference	Description	Unit	Qty	Rate (R)	Amount (R)
	<b>EMCC</b>	<b>BILL NO E1</b> <b>MOTOR CONTROL CENTRES AND DISTRIBUTION BOARDS</b>				
		-				
		<b>DESIGN, DRAWINGS AND GENERAL</b>				
E1.1		Provide motor control center design drawings and wiring diagrams (refer to particular specifications EMCC)	Sum	1		
E1.2		Provide operating and maintenance manuals and "as-built" drawings as specified (refer to particular specification EMCC)	Sum	1		
		-				
		<b>SUPPLY AND DELIVERY TO SITE</b>				
E1.3		Supply and delivery to site complete MCC (refer to project specification PSEMCC-6.A)	Each	1		
E1.4		Supply and delivery to site complete VFD (refer to project specification PSEMCC-6.B)	Each	4		
		<b>INSTALLATION</b>				
E1.5		Site installation to site complete MCC (refer to project specification PSEMCC-6.A)	Each	1		
E1.6		Site installation to site complete VFD (refer to project specification PSEMCC-6.B)	Each	4		
Carried Forward						

			Brought Forward		
		<b>COMMISSIONING</b>			
E1.7		Commissioning to site complete MCC (refer to project specification PSEMCC-6.A)	Each	1	
E1.8		Commissioning to site complete MCC (refer to project specification PSEMCC-6.B)	Each	4	
E1.9	a)	AHS WTW Prov. Sum HVAC System for Main MCC	Prov. Sum	1	R600,000.00
E1.11	b)	Overheads, charges and profit on above	%		
E1.13	a)	AHS Water Treatment Works – Provisional Sum: Removal of the existing MCC, relocation to the designated on-site position, and demolition of drywall sections to allow MCC entry. Include allowances for repainting and reinstating finishes to match the original condition. Additional costs to be included for cutting openings required for HVAC installations.	Prov. Sum	1	R120,000.00
E1.14	b)	Overheads, charges and profit on above	%		
		<b><u>BILL NO</u>      <u>E1</u></b> <b><u>MOTOR CONTROL CENTRES AND DISTRIBUTION BOARDS</u></b>			
			<b>Carried forward to Summary of Bills</b>		

Contract: TN003/2026  
Part C2: Pricing Data



Section C2.2: Bills of Quantities  
Programmable Logic Controllers

Item	Payment Reference	Description	Unit	Qty	Rate (R)	Amount (R)
	<b>EPLC</b>	<b>BILL NO E2</b> <b>PROGRAMMABLE LOGIC CONTROLLERS</b>				
		-				
		<b>DESIGN, DRAWINGS AND GENERAL</b>				
		-				
		The Contractor will provide the following design calculations, Drawings and wiring diagrams for approval by the Engineer:				
		b) Electrical Load lists in excel format of all PLC equipment				
		c) Engineer design drawings of network layout which contains all IP addresses, equipment and drawings				
		e) Input and Output schedules in excel format which contains all tag numbers, names, commands, and description of all I/O				
		g) Cable schedules in excel format which will include but limited to From, To, Distance and Tag numbers				
		j) Functional design specification which will include but not limited to all mimic diagrams, control procedures compared to control philosophy and a detail description how the PLC will control the entire system [broken down into each component].				
E2.1		(Refer to particular specifications)	Sum	1		
E2.2		Provide operating and maintenance manuals and "as-built" drawings as specified (refer to particular specification EPLC)	Sum	1		
		<b>SUPPLY AND DELIVERY TO SITE</b>				
E2.3		Supply and delivery to site complete PLC and peripheral equipment installed in or other specified enclosures, all as specified [refer to project specification PSEPLC-6.A]	Each	1		
E2.4		Supply and delivery to site complete UPS as specified [refer to project specification PSEPLC-6.A]	Each	1		
E2.5		Supply and delivery to site complete HMI as specified [refer to project specification PSEPLC-6.A]	Each	1		
					Carried Forward	

					Brought Forward	
		<b>INSTALLATION</b>				
E2.6		Site installation of a complete PLC and peripheral equipment installed in or other specified enclosures, all as specified [refer to project specification PSEPLC-6.A]	Each	1		
E2.7		Site installation of a complete UPS as specified [refer to PSEPLC-6.A]	Each	1		
E2.8		Site installation of a complete HMI as specified [refer to PSEPLC-6.A]	Each	1		
		<b>COMMISSIONING</b>				
E2.9		Commissioning of a complete PLC and peripheral equipment installed in or other specified enclosures, all as specified [refer to project specification PSEPLC-6.A]	Each	1		
E2.10		Commissioning of a complete UPS as specified [refer to project specification PSEPLC-6.A]	Each	1		
E2.11		Commissioning of a complete HMI as specified [refer to project specification PSEPLC-6.A]	Each	1		
E2.12		a) AHS WTW Prov. Sum for replacement and programming of the filter PLC system	Prov. Sum	2	R1,000,000.00	
E2.13		b) Overheads, charges and profit on above	%			
		<b>BILL NO</b>	<b>E2</b>			
		<b>PROGRAMMABLE LOGIC CONTROLLERS</b>				
					<b>Carried forward to Summary of Bills</b>	

Contract: TN003/2026

Part C2: Pricing Data

Section C2.2: Bills of Quantities

Electrical Distribution System

<b>ELECTRICAL DISTRIBUTION SYSTEM</b>
<b>ALL WORKS</b>
<b>E3</b>



Item	Payment Reference	Description	Unit	Qty	Rate (R)	Amount (R)
	<b>ECIS</b>	<b><u>BILL NO   E3</u></b> <b><u>ELECTRICAL DISTRIBUTION SYSTEM</u></b>				
		-				
		<b>DESIGN, DRAWINGS AND GENERAL</b>				
		-				
E3.1		Provide general layout drawings and wiring diagrams of the enclosure and instrumentation for approval [Refer to particular specification]	Sum	1		
E3.2		Provide operating and maintenance manuals, data sheets of all equipment and "as built" drawings	Sum	1		
		-				
		<b>SUPPLY AND DELIVERY TO SITE</b>				
		-				
E3.3		Supply and delivery to site a complete pressure transducer (refer to project specification PSECIS-2.A)	Each	1		
E3.4		Supply and delivery to site of electrical installation equipment at and in flow meter manholes (refer to project specification PSECIS-3.A)	Each	1		
E3.5		Supply and delivery to site of electrical installation equipment at and in flow meter manholes (refer to project specification PSECIS-3.B)	Each	1		
E3.6		Supply and delivery to site a complete level transducer and controller complete with mounting bracket (refer to project specification PS ECIS-4.A)	Each	1		
E3.7		Supply and delivery to site a complete level transducer and controller complete with mounting bracket (refer to project specification PS ECIS-4.B)	Each	1		
E3.8		Supply and delivery to site a complete level transducer and controller complete with mounting bracket (refer to project specification PS ECIS-4.C)	Each	1		
E3.9		Supply and delivery to site a complete level transducer and controller complete with mounting bracket (refer to project specification PS ECIS-4.D)	Each	1		
Carried Forward						

				Brought Forward		
E3.10		Supply and delivery to site a complete no-flow sensor and controller complete with mounting bracket (refer to project specification PS ECIS-5.A)	Each	1		
		<b>INSTALLATION</b>				
E3.11		- Installation on site a complete pressure transducer (refer to project specification PSECIS-2.A)	Each	1		
E3.12		Installation on site of electrical installation equipment at and in flow meter manholes (refer to project specification PSECIS-3.A)	Each	1		
E3.13		Installation on site of electrical installation equipment at and in flow meter manholes (refer to project specification PSECIS-3.B)	Each	1		
E3.14		Installation on site a complete level transducer and controller complete with mounting bracket (refer to project specification PS ECIS-4.A)	Each	1		
E3.15		Installation on site a complete level transducer and controller complete with mounting bracket (refer to project specification PS ECIS-4.B)	Each	1		
E3.16		Installation on site a complete level transducer and controller complete with mounting bracket (refer to project specification PS ECIS-4.C)	Each	1		
E3.17		Installation on site a complete level transducer and controller complete with mounting bracket (refer to project specification PS ECIS-4.D)	Each	1		
E3.18		Installation on site a complete no-flow sensor and controller complete with mounting bracket (refer to project specification PS ECIS-5,A)	Each	1		
		<b>COMMISSIONING</b>				
E3.19		- Commissioning of a complete pressure transducer (refer to project specification PSECIS-2.A)	Each	1		
				Carried Forward		

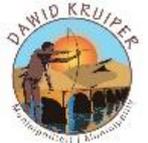
				Brought Forward		
E3.20		Commissioning of of electrical installation equipment at and in flow meter manholes (refer to project specification PSECIS-3.A)	Each	1		
E3.21		Commissioning of of electrical installation equipment at and in flow meter manholes (refer to project specification PSECIS-3.B)	Each	1		
E3.22		Commissioning of a complete level transducer and controller complete with mounting bracket (refer to project specification PS ECIS-4.A)	Each	1		
E3.23		Commissioning of a complete level transducer and controller complete with mounting bracket (refer to project specification PS ECIS-4.B)	Each	1		
E3.24		Commissioning of a complete level transducer and controller complete with mounting bracket (refer to project specification PS ECIS-4.C)	Each	1		
E3.25		Commissioning of a complete level transducer and controller complete with mounting bracket (refer to project specification PS ECIS-4.D)	Each	1		
E3.26		Commissioning of a complete no-flow sensor and controller complete with mounting bracket (refer to project specification PS ECIS-5,A)	Each	1		
		<b><u>BILL NO   E3</u></b> <b><u>ELECTRICAL DISTRIBUTION SYSTEM</u></b>				
<b>Carried forward to Summary of Bills</b>						

Contract: 3672-20-01

Part C2: Pricing Data

Section C2.2: Bills of Quantities

General and Miscellaneous



GENERAL AND MISCELLANEOUS

ALL WORKS

E4

Item	Payment Reference	Description	Unit	Qty	Rate (R)	Amount (R)
	<b>EG&amp;M</b>	<b>BILL NO   E4</b> <b>GENERAL AND MISCELLANEOUS</b>				
		-				
		<b>DESIGN, DRAWINGS AND GENERAL</b>				
E4.1		- Provide general layouts drawings, notice drawings and wiring diagrams for approval.	Sum	1		
E4.2		- Provide operating and maintenance manuals, data sheets of all equipment and "as built" drawings	Sum	1		
		-				
		<b>SUPPLY AND DELIVERY TO SITE</b>				
E4.3		- Supply and delivery to site of emergency stop stations [Refer to particular specification specification EG&M 10]	Each	2		
E4.4		Supply and delivery to site of emergency stop stations with built in motor cable termination box [refer to particular specification EG&M 10]	Each	1		
E4.5		Supply and delivery to site of complete fire extinguishers with outdoor bracket, enclosure and fire signage (refer to project specifications PS EG&M-9)	Each	4		
E4.6		Supply and delivery to site of complete all notices and all danger plates as may be required (refer to project specifications PS EG&M-8)	Sum	1		
		<b>INSTALLATION</b>				
E4.7		- Installation on site of emergency stop stations [refer to particular specification EG&M 10]	Each	2		
E4.8		Installation on site of emergency stop stations with built in motor cable termination box [refer to particular specification EG&M 10]	Each	1		
E4.9		Installation on site of fire extinguishers with outdoor bracket, enclosure and fire signage (refer to project specifications PS EG&M-9)	Each	4		
Carried Forward						

		Brought Forward		
E4.10	Installation on site of all notices and all danger plates as may be required (refer to project specifications PS EG&M-8)	Sum	1	
<b>COMMISSIONING</b>				
E4.11	- Commissioning of a complete of emergency stop stations [refer to particular specification EG&M 10]	Each	2	
E4.12	Commissioning of a complete of emergency stop stations with built in motor cable termination box [refer to particular specification EG&M 10]	Each	1	
E4.13	Commissioning of a complete of fire extinguishers  (refer to project specifications PS EG&M-9)	Each	4	
E4.14	Commissioning of a complete of all notices and all danger plates as may be required (refer to project specifications PS EG&M-8)	Sum	1	
<b><u>BILL NO   E4</u></b> <b><u>GENERAL AND MISCELLANEOUS</u></b>				
		<b>Carried forward to Summary of Bills</b>		

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Part C2: Pricing Data

Section C2.2: Bills of Quantities

Small Power and Lighting



SMALL POWER AND LIGHTING

ALL WORKS

E5

Item	Payment Reference	Description	Unit	Qty	Rate (R)	Amount (R)
	<b>ESPL</b>	<b><u>BILL NO   E5</u></b> <b><u>SMALL POWER AND LIGHTING</u></b>				
		-				
		<b>DESIGN, DRAWINGS AND GENERAL</b>				
		- Provide design drawings and wiring diagrams for approval [Refer to Motor Control centre and Distribution particular specification]	Sum	1		
E5.1						
		- Provide operating and maintenance manuals, data sheets of all equipment and "as built" drawings	Sum	1		
E5.2						
		-				
		<b>SUPPLY AND DELIVERY TO SITE</b>				
		- Supply and delivery to site of a complete electrical installation (refer to project specification PSESPL-A)	Sum	1		
E5.3						
		<b>INSTALLATION</b>				
		- Site Installation to site of a complete electrical installation (refer to project specification PSESPL-A)	Sum	1		
E5.4						
		<b>COMMISSIONING</b>				
		- Commissioning to site of a complete electrical installation (refer to project specification PSESPL-A)	Sum	1		
E5.5						
		<b><u>BILL NO   E5</u></b> <b><u>SMALL POWER AND LIGHTING</u></b>				
<b>Carried forward to Summary of Bills</b>						

Contract:  
TN003/2026

Part C2: Pricing  
Data

Section C2.2: Bills of Quantities

Multicore Cables and Earth Wires

MULTICORE  
CABLES AND  
EARTH WIRES

ALL WORKS

E6



Item	Payment Reference	Description	Unit	Qty	Rate (R)	Amount (R)
	<b>EMCA</b>	<b>BILL NO</b> <u>E</u> <u>6</u> <b>MULTICORE CABLES AND EARTH WIRES</b> -				
		<b>DESIGN, DRAWINGS AND GENERAL</b> -				
E6.1		The Contractor will provide the following design calculations, drawings, method statements, cable routes, cable schedules in excel format which will include but limited to From, To, Distance and Tag numbers all to the approval of the Engineer [Refer to particular specification EMCA 3.3.2, 8.7 & 17]	Sum	1		
E6.2		Provide operating and maintenance manuals, all data sheets [a) cables, b) joint kits, c) ladders, d) glands, conduit, fasteners and all that are used and etc] and furthermore the Contractor to supply as built" drawings	Sum	1		
		<b>SUPPLY AND DELIVERY TO SITE</b> -				
E6.3		Supply and delivery to site of multicore cables and earthwires and cable name tags for the following cables as per the particular specification:  120mm <sup>2</sup> 4C PVC SWA PVC Cu 600/1000V Cable (Red Stripe)	m	30		
E6.4		120mm <sup>2</sup> 3C PVC SWA PVC Cu 600/1000V Cable (Red Stripe)	m	30		
E6.5		70mm <sup>2</sup> 4C PVC SWA PVC Cu 600/1000V Cable (Red Stripe)	m	28		
E6.6		50mm <sup>2</sup> 4C PVC SWA PVC Cu 600/1000V Cable (Red Stripe)	m	28		
E6.7		35mm <sup>2</sup> 4C PVC SWA PVC Cu 600/1000V Cable (Red Stripe)	m	58		
E6.8		35mm <sup>2</sup> 3C PVC SWA PVC Cu 600/1000V Cable (Red Stripe)	m	30		
E6.9		25mm <sup>2</sup> 4C PVC SWA PVC Cu 600/1000V Cable (Red Stripe)	m	28		
					Carried Forward	

					Brought Forward	
E6.10		16mm <sup>2</sup> 4C PVC SWA PVC Cu 600/1000V Cable (Red Stripe)	m	28		
E6.11		10mm <sup>2</sup> 4C PVC SWA PVC Cu 600/1000V Cable (Red Stripe)	m	28		
E6.12		6mm <sup>2</sup> 4C PVC SWA PVC Cu 600/1000V Cable (Red Stripe)	m	28		
E6.13		2,5mm <sup>2</sup> 4C PVC SWA PVC Cu 600/1000V Cable (Red Stripe)	m	60		
E6.14		1,5mm <sup>2</sup> 3C PVC SWA PVC Cu 600/1000V Cable (Red Stripe)	m	60		
E6.15		1mm <sup>2</sup> x 1pr twisted PVC SWA PVC (individually and overall screened)	m	28		
E6.16		1mm <sup>2</sup> x 2pr twisted PVC SWA PVC (individually and overall screened)	m	28		
E6.17		1mm <sup>2</sup> x 4pr twisted PVC SWA PVC (individually and overall screened)	m	28		
E6.18		1mm <sup>2</sup> x 6pr twisted PVC SWA PVC (individually and overall screened)	m	28		
E6.19		1mm <sup>2</sup> x 8pr twisted PVC SWA PVC (individually and overall screened)	m	28		
E6.20		1mm <sup>2</sup> x 12pr twisted PVC SWA PVC (individually and overall screened)	m	28		
E6.21		4pr twisted PVC, Non-Woven Tape + alu Foil (Industrial CAT6)	m	140		
E6.22		4C PVC CST PVC Heavy Duty Fibre Optic Cable Multimode	m	150		
		Supply and delivery to site of all multicore cables and earthwires termination materials [equal or similar to Enviro Glands, neoprene shrouds, lugs, insulating, materials, cable ties and corrosion proof bolts, washers, spring washers, nuts, etc] to terminate the following cables as per the particular specification				
E6.23		120mm <sup>2</sup> 4C PVC SWA PVC Cu 600/1000V Cable (Red Stripe)	Each	1		
E6.24		120mm <sup>2</sup> 4C PVC SWA PVC Cu 600/1000V Cable (Red Stripe)	Each	1		
E6.25		70mm <sup>2</sup> 4C PVC SWA PVC Cu 600/1000V Cable (Red Stripe)	Each	14		
					Carried Forward	

					Brought Forward	
E6.26		50mm <sup>2</sup> 4C PVC SWA PVC Cu 600/1000V Cable (Red Stripe)	Each	14		
E6.27		35mm <sup>2</sup> 4C PVC SWA PVC Cu 600/1000V Cable (Red Stripe)	Each	15		
E6.28		35mm <sup>2</sup> 3C PVC SWA PVC Cu 600/1000V Cable (Red Stripe)	Each	1		
E6.29		25mm <sup>2</sup> 4C PVC SWA PVC Cu 600/1000V Cable (Red Stripe)	Each	14		
E6.30		16mm <sup>2</sup> 4C PVC SWA PVC Cu 600/1000V Cable (Red Stripe)	Each	14		
E6.31		10mm <sup>2</sup> 4C PVC SWA PVC Cu 600/1000V Cable (Red Stripe)	Each	14		
E6.32		6mm <sup>2</sup> 4C PVC SWA PVC Cu 600/1000V Cable (Red Stripe)	Each	14		
E6.33		2,5mm <sup>2</sup> 4C PVC SWA PVC Cu 600/1000V Cable (Red Stripe)	Each	2		
E6.34		1,5mm <sup>2</sup> 3C PVC SWA PVC Cu 600/1000V Cable (Red Stripe)	Each	2		
E6.35		1mm <sup>2</sup> x 1pr twisted PVC SWA PVC (individually and overall screened)	Each	14		
E6.36		1mm <sup>2</sup> x 2pr twisted PVC SWA PVC (individually and overall screened)	Each	14		
E6.37		1mm <sup>2</sup> x 4pr twisted PVC SWA PVC (individually and overall screened)	Each	14		
E6.38		1mm <sup>2</sup> x 6pr twisted PVC SWA PVC (individually and overall screened)	Each	14		
E6.39		1mm <sup>2</sup> x 8pr twisted PVC SWA PVC (individually and overall screened)	Each	14		
E6.40		1mm <sup>2</sup> x 12pr twisted PVC SWA PVC (individually and overall screened)	Each	14		
E6.41		4C PVC CST PVC Heavy Duty Fibre Optic Cable Multimode	Each	6		
		Supply and delivery to site of all multicore cables and earthwires jointing materials [equal or similar to HSJKL (PO-X) Standard Kits, inner heat shrink sleeves, outer heat srhink sleeves, ferrules, roll springs, and tinned copper braid , etc] to join the following cables as per the particular specification				
E6.42		120mm <sup>2</sup> 4C PVC SWA PVC Cu 600/1000V Cable (Red Stripe)	Each	1		
					Carried Forward	

					Brought Forward	
E6.43		120mm <sup>2</sup> 3C PVC SWA PVC Cu 600/1000V Cable (Red Stripe)	Each	1		
E6.44		70mm <sup>2</sup> 4C PVC SWA PVC Cu 600/1000V Cable (Red Stripe)	Each	14		
E6.45		50mm <sup>2</sup> 4C PVC SWA PVC Cu 600/1000V Cable (Red Stripe)	Each	14		
E6.46		35mm <sup>2</sup> 4C PVC SWA PVC Cu 600/1000V Cable (Red Stripe)	Each	15		
E6.47		35mm <sup>2</sup> 3C PVC SWA PVC Cu 600/1000V Cable (Red Stripe)	Each	1		
E6.48		25mm <sup>2</sup> 4C PVC SWA PVC Cu 600/1000V Cable (Red Stripe)	Each	14		
E6.49		16mm <sup>2</sup> 4C PVC SWA PVC Cu 600/1000V Cable (Red Stripe)	Each	14		
E6.50		10mm <sup>2</sup> 4C PVC SWA PVC Cu 600/1000V Cable (Red Stripe)	Each	14		
E6.51		6mm <sup>2</sup> 4C PVC SWA PVC Cu 600/1000V Cable (Red Stripe)	Each	14		
E6.52		2,5mm <sup>2</sup> 4C PVC SWA PVC Cu 600/1000V Cable (Red Stripe)	Each	1		
E6.53		1,5mm <sup>2</sup> 3C PVC SWA PVC Cu 600/1000V Cable (Red Stripe)	Each	1		
E6.54		1mm <sup>2</sup> x 1pr twisted PVC SWA PVC (individually and overall screened)	Each	14		
E6.55		1mm <sup>2</sup> x 2pr twisted PVC SWA PVC (individually and overall screened)	Each	14		
E6.56		1mm <sup>2</sup> x 4pr twisted PVC SWA PVC (individually and overall screened)	Each	14		
E6.57		1mm <sup>2</sup> x 6pr twisted PVC SWA PVC (individually and overall screened)	Each	14		
E6.58		1mm <sup>2</sup> x 8pr twisted PVC SWA PVC (individually and overall screened)	Each	14		
E6.59		1mm <sup>2</sup> x 12pr twisted PVC SWA PVC (individually and overall screened)	Each	14		
E6.60		Supply and delivery to site of all cable route markers	Each	2		
					Carried Forward	

					Brought Forward	
E6.61	Supply and delivery to site of all concrete cable slabs	Each	2			
	Supply, delivery to site of <b>Hot Dip Galvanised</b> heavy-duty cable ladder, perforated cable tray, trunking, welded wire mesh and accessories including all necessary supports, clamps strapping, brackets, reducer splice, hangers, threaded rods, trunking, bolts, nuts and anchor bolts etc as per the particular specification					
E6.62	150mm Wide cable ladder	m	10			
E6.63	200mm Wide heavy duty wire mesh	m	10			
	Supply, delivery to site of all <b>Hot Dip Galvanised</b> heavy-duty cable ladder supports, bolts, holders and etc that is required as per the particular specification					
E6.64		Sum	1			
E6.65	Supply and delivery to site of pump set sensor termination cubicles	Each	6			
	Equal or similar Pratley or CCG with solid cover IP68 including non sparking connectors, insulating sleeves, identification tag, mounting screws, locknuts , lockout device with lock, lid securing chain and all accessories					
E6.66	<b>Box 0</b>	Each	8			
E6.67	Compression Kits (Small)	Each	32			
E6.68	Compression Kits (large)	Each	32			
E6.69	Blanking Plugs	Each	16			
	<b>Box 1</b>					
E6.70	Reducing Glands [25-20]	Each	2			
E6.71	Compression Kits (Small)	Each	4			
E6.72	Compression Kits (Small)	Each	4			
E6.73	Compression Kits (large)	Each	4			
E6.74	Blanking Plugs	Each	4			
	<b>Box 2</b>					
E6.75	Reducing Glands [32-20]	Each	2			
E6.76	Reducing Glands [32-20]	Each	4			
E6.77	Reducing Glands [32-25]	Each	4			
E6.78	Compression Kits	Each	4			
E6.79	Blanking Plugs	Each	4			
					Carried Forward	

					Brought Forward	
E6.80	<b>Box 3</b>		Each	2		
E6.81	Reducing Glands [40-20]		Each	4		
E6.82	Reducing Glands [40-25]		Each	4		
E6.83	Reducing Glands [40-32]		Each	4		
E6.84	Compression Kits		Each	4		
E6.85	Blanking Plugs		Each	4		
E6.86	<b>Box 4</b>		Each	2		
E6.87	Reducing Glands [50-20]		Each	4		
E6.88	Reducing Glands [50-25]		Each	4		
E6.89	Reducing Glands [50-32]		Each	4		
E6.90	Reducing Glands [50-40]		Each	4		
E6.91	Compression Kits		Each	4		
E6.92	Blanking Plugs		Each	4		
<b>INSTALLATION</b>						
-						
Installation on site of multicore cables and earthwires and cable name tags for the following cables as per the particular specification:						
E6.93	120mm <sup>2</sup> 4C PVC SWA PVC Cu 600/1000V Cable (Red Stripe)		m	30		
E6.94	120mm <sup>2</sup> 3C PVC SWA PVC Cu 600/1000V Cable (Red Stripe)		m	30		
E6.95	70mm <sup>2</sup> 4C PVC SWA PVC Cu 600/1000V Cable (Red Stripe)		m	28		
E6.96	50mm <sup>2</sup> 4C PVC SWA PVC Cu 600/1000V Cable (Red Stripe)		m	28		
E6.97	35mm <sup>2</sup> 4C PVC SWA PVC Cu 600/1000V Cable (Red Stripe)		m	58		
E6.98	35mm <sup>2</sup> 3C PVC SWA PVC Cu 600/1000V Cable (Red Stripe)		m	30		
E6.99	25mm <sup>2</sup> 4C PVC SWA PVC Cu 600/1000V Cable (Red Stripe)		m	28		
E6.100	16mm <sup>2</sup> 4C PVC SWA PVC Cu 600/1000V Cable (Red Stripe)		m	28		
E6.101	10mm <sup>2</sup> 4C PVC SWA PVC Cu 600/1000V Cable (Red Stripe)		m	28		
E6.102	6mm <sup>2</sup> 4C PVC SWA PVC Cu 600/1000V Cable (Red Stripe)		m	28		
E6.103	2,5mm <sup>2</sup> 4C PVC SWA PVC Cu 600/1000V Cable (Red Stripe)		m	60		
E6.104	1,5mm <sup>2</sup> 3C PVC SWA PVC Cu 600/1000V Cable (Red Stripe)		m	60		
					Carried Forward	

					Brought Forward	
E6.105		1mm <sup>2</sup> x 1pr twisted PVC SWA PVC (individually and overall screened)	m	28		
E6.106		1mm <sup>2</sup> x 2pr twisted PVC SWA PVC (individually and overall screened)	m	28		
E6.107		1mm <sup>2</sup> x 4pr twisted PVC SWA PVC (individually and overall screened)	m	28		
E6.108		1mm <sup>2</sup> x 6pr twisted PVC SWA PVC (individually and overall screened)	m	28		
E6.109		1mm <sup>2</sup> x 8pr twisted PVC SWA PVC (individually and overall screened)	m	28		
E6.110		1mm <sup>2</sup> x 12pr twisted PVC SWA PVC (individually and overall screened)	m	28		
E6.111		4pr twisted PVC, Non-Woven Tape + alu Foil (Industrial CAT6)	m	140		
E6.112		4C PVC CST PVC Heavy Duty Fibre Optic Cable Multimode	m	150		
E6.113		Installation on site of all multicore cables and earthwires termination materials [equal or similar to Enviro Glands, neoprene shrouds, lugs, insulating, materials, cable ties and corrosion proof bolts, washers, spring washers, nuts, etc] to terminate the following cables as per the particular specification				
E6.113		120mm <sup>2</sup> 4C PVC SWA PVC Cu 600/1000V Cable (Red Stripe)	Each	1		
E6.114		120mm <sup>2</sup> 3C PVC SWA PVC Cu 600/1000V Cable (Red Stripe)	Each	1		
E6.115		70mm <sup>2</sup> 4C PVC SWA PVC Cu 600/1000V Cable (Red Stripe)	Each	14		
E6.116		50mm <sup>2</sup> 4C PVC SWA PVC Cu 600/1000V Cable (Red Stripe)	Each	14		
E6.117		35mm <sup>2</sup> 4C PVC SWA PVC Cu 600/1000V Cable (Red Stripe)	Each	14		
E6.118		35mm <sup>2</sup> 3C PVC SWA PVC Cu 600/1000V Cable (Red Stripe)	Each	14		
E6.119		25mm <sup>2</sup> 4C PVC SWA PVC Cu 600/1000V Cable (Red Stripe)	Each	14		
					Carried Forward	

					Brought Forward	
E6.120	16mm <sup>2</sup> 4C PVC SWA PVC Cu 600/1000V Cable (Red Stripe)	Each	14			
E6.121	10mm <sup>2</sup> 4C PVC SWA PVC Cu 600/1000V Cable (Red Stripe)	Each	14			
E6.122	6mm <sup>2</sup> 4C PVC SWA PVC Cu 600/1000V Cable (Red Stripe)	Each	14			
E6.123	2,5mm <sup>2</sup> 4C PVC SWA PVC Cu 600/1000V Cable (Red Stripe)	Each	2			
E6.124	1,5mm <sup>2</sup> 3C PVC SWA PVC Cu 600/1000V Cable (Red Stripe)	Each	2			
E6.125	1mm <sup>2</sup> x 1pr twisted PVC SWA PVC (individually and overall screened)	Each	14			
E6.126	1mm <sup>2</sup> x 2pr twisted PVC SWA PVC (individually and overall screened)	Each	14			
E6.127	1mm <sup>2</sup> x 4pr twisted PVC SWA PVC (individually and overall screened)	Each	14			
E6.128	1mm <sup>2</sup> x 6pr twisted PVC SWA PVC (individually and overall screened)	Each	14			
E6.129	1mm <sup>2</sup> x 8pr twisted PVC SWA PVC (individually and overall screened)	Each	14			
E6.130	1mm <sup>2</sup> x 12pr twisted PVC SWA PVC (individually and overall screened)	Each	14			
E6.131	4C PVC CST PVC Heavy Duty Fibre Optic Cable Multimode	Each	6			
	Site installation of all multicore cable and earthwires jointing materials [equal or similar to HSJKL (PO-X) Standard Kits, inner heat shrink sleeves, outer heat srhink sleeves, ferrules, roll springs, and tinned copper braid , etc] to join the following cables as per the particular specification					
E6.132	120mm <sup>2</sup> 4C PVC SWA PVC Cu 600/1000V Cable (Red Stripe)	Each	1			
E6.133	120mm <sup>2</sup> 4C PVC SWA PVC Cu 600/1000V Cable (Red Stripe)	Each	1			
E6.134	70mm <sup>2</sup> 4C PVC SWA PVC Cu 600/1000V Cable (Red Stripe)	Each	14			
E6.135	50mm <sup>2</sup> 4C PVC SWA PVC Cu 600/1000V Cable (Red Stripe)	Each	14			
					Carried Forward	

					Brought Forward	
E6.136	35mm <sup>2</sup> 4C PVC SWA PVC Cu 600/1000V Cable (Red Stripe)	Each	15			
E6.137	35mm <sup>2</sup> 3C PVC SWA PVC Cu 600/1000V Cable (Red Stripe)	Each	1			
E6.138	25mm <sup>2</sup> 4C PVC SWA PVC Cu 600/1000V Cable (Red Stripe)	Each	14			
E6.139	16mm <sup>2</sup> 4C PVC SWA PVC Cu 600/1000V Cable (Red Stripe)	Each	14			
E6.140	10mm <sup>2</sup> 4C PVC SWA PVC Cu 600/1000V Cable (Red Stripe)	Each	14			
E6.141	6mm <sup>2</sup> 4C PVC SWA PVC Cu 600/1000V Cable (Red Stripe)	Each	14			
E6.142	2,5mm <sup>2</sup> 4C PVC SWA PVC Cu 600/1000V Cable (Red Stripe)	Each	1			
E6.143	1,5mm <sup>2</sup> 3C PVC SWA PVC Cu 600/1000V Cable (Red Stripe)	Each	1			
E6.144	1mm <sup>2</sup> x 1pr twisted PVC SWA PVC (individually and overall screened)	Each	14			
E6.145	1mm <sup>2</sup> x 2pr twisted PVC SWA PVC (individually and overall screened)	Each	14			
E6.146	1mm <sup>2</sup> x 4pr twisted PVC SWA PVC (individually and overall screened)	Each	14			
E6.147	1mm <sup>2</sup> x 6pr twisted PVC SWA PVC (individually and overall screened)	Each	14			
E6.148	1mm <sup>2</sup> x 8pr twisted PVC SWA PVC (individually and overall screened)	Each	14			
E6.149	1mm <sup>2</sup> x 12pr twisted PVC SWA PVC (individually and overall screened)	Each	14			
E6.150	Installation on site of all cable route markers	Each	2			
E6.151	Installation on site of all concrete cable slabs	Each	2			
	Installation on site of <b>Hot Dip Galvanised</b> heavy-duty cable ladder, perforated cable tray, trunking, welded wire mesh and accessories including all necessary supports, clamps strapping, brackets, reducer splice, hangers, threaded rods, trunking, bolts, nuts and anchor bolts etc as per the particular specification					
					Carried Forward	

					Brought Forward	
E6.152		150mm Wide cable ladder	m	10		
E6.153		200mm Wide heavy duty wire mesh	m	10		
E6.154		Installation on site of all <b>Hot Dip Galvanised</b> heavy-duty cable ladder supports, bolts, holders and etc that is required as per the particular specification	Sum	1		
E6.155		Installation on site of pump set sensor termination cubicles	Each	6		
E6.156		Equal or similar Pratley or CCG with solid cover IP68 including non sparking connectors, insulating sleeves, identification tag, mounting screws, locknuts , lockout device with lock, lid securing chain and all accessories				
E6.156		<b>Box 0</b>	Each	8		
E6.157		Compression Kits (Small)	Each	32		
E6.158		Compression Kits (large)	Each	32		
E6.159		Blanking Plugs	Each	16		
E6.160		<b>Box 1</b>	Each	2		
E6.161		Reducing Glands [25-20]	Each	4		
E6.162		Compression Kits (Small)	Each	4		
E6.163		Compression Kits (large)	Each	4		
E6.164		Blanking Plugs	Each	4		
E6.165		<b>Box 2</b>	Each	2		
E6.166		Reducing Glands [32-20]	Each	4		
E6.167		Reducing Glands [32-25]	Each	4		
E6.168		Compression Kits	Each	4		
E6.169		Blanking Plugs	Each	4		
E6.170		<b>Box 3</b>	Each	2		
E6.171		Reducing Glands [40-20]	Each	4		
E6.172		Reducing Glands [40-25]	Each	4		
E6.173		Reducing Glands [40-32]	Each	4		
E6.174		Compression Kits	Each	4		
E6.175		Blanking Plugs	Each	4		
					Carried Forward	

					Brought Forward	
E6.176	<b>Box 4</b>		Each	2		
E6.177	Reducing Glands [50-20]		Each	4		
E6.178	Reducing Glands [50-25]		Each	4		
E6.179	Reducing Glands [50-32]		Each	4		
E6.180	Reducing Glands [50-40]		Each	4		
E6.181	Compression Kits		Each	4		
E6.182	Blanking Plugs		Each	4		
		<b>COMMISSIONING</b>				
E6.183	- Testing and commissioning of all cables as above mentioned		Sum	-		
E6.184	Updating, verifying and submission of Electronic Cable schedules with Tag numbers and final agreed lengths		Sum	-		
E6.185	Surveyor to mark-up as-built cable route plans and all mark-up must be on made on the AutoCAD format		Sum	-		
		<b><u>BILL NO</u></b>		<b><u>E</u></b>		
				<b><u>6</u></b>		
		<b><u>MULTICORE CABLES AND EARTH WIRES</u></b>				
					<b>Carried forward to Summary of Bills</b>	

Contract: TN003/2026  
 Part C2: Pricing Data  
 Section C2.2: Bill of Quantities



### UPINGTON WATER TREATMENT WORKS

Contract:  
 Summary of Schedules

Schedule No.	Description	Amount
1	PRELIMINARY & GENERAL	
E1	MOTOR CONTROL CENTRES AND DISTRIBUTION BOARDS	
E2	PROGRAMMABLE LOGIC CONTROLLERS	
E3	ELECTRICAL DISTRIBUTION SYSTEM	
E4	GENERAL AND MISCELLANEOUS	
E5	SMALL POWER AND LIGHTING	
E6	MULTICORE CABLES AND EARTH WIRES	
	<b>Sub-Total A</b>	
	Provisional sum: Allowance for Contingencies (10% of Sub-Total A)	
	<b>Total Construction Cost</b>	
	Value Added Tax at 15%	
	<b>Total Amount of Tender Carried Forward to Form of Bid</b>	



## *DAWID KRUIJER MUNICIPALITY*

**CONTRACT No: TN003/2026**

**REPLACEMENT OF ABRAHAM HOLBORS SEPTEMBER WATER TREATMENT  
PLANT MOTOR CONTROL CENTRE**

**BUILD OF ELECTRICAL WORKS**

**PORTION 2: CONTRACT**

**PART C3 SPECIFICATIONS**



## *DAWID KRUIJER MUNICIPALITY*

### **CONTRACT No: TN003/2026**

### **REPLACEMENT OF ABRAHAM HOLBORS SEPTEMBER WATER TREATMENT PLANT MOTOR CONTROL CENTRE**

#### **BUILD OF ELECTRICAL WORKS**

## **C3 SPECIFICATIONS**

### **INDEX (THIS DOCUMENT)**

<b>Section</b>	<b>Description</b>	<b>Page No.</b>
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PLANT MOTOR CONTROL CENTRE**

**BUILD OF ELECTRICAL WORKS**

### **C3.1 DESCRIPTION OF WORKS**



## **C3.1 DESCRIPTION OF THE WORKS**

### **C3.1.1 Employers Objectives**

It is the objective of the Employer to appoint suitably qualified and experienced contractor(s) for the:

- the construction of electrical related works, and;
- Final wiring diagrams design (workshop drawings), manufacture, supply, installation, and commissioning of the electrical equipment;

associated with the water treatment infrastructure associated with Dawid Kruiper Municipality, in terms of the FIDIC (Yellow Book) General Conditions of Contract as amended in the Contract Data.

Although it is the Employer's objective to implement the full scope of works as included in this tender, certain portions may be omitted at the discretion of the Employer.

### **C3.1.2 Overview of the Works**

The Works involve the replacement of the existing main motor control centre and programmable logic controllers and associated equipment all as described in the project specifications.

### **C3.1.3 Scope of the Works**

The scope of works covered by this Contract include the manufacturing, transport, handling, installation, testing, commissioning, and maintenance during a 12-month defects notification period of all electrical equipment associated with the Works, as described in the Specification and shown on the Drawings.

Drawings depicting the Employer's Requirements have been bound into this document and these shall be used for tendering purposes. Final layouts, detail design drawings and wiring diagrams shall be prepared by the Contractor for construction purposes.

### **C3.1.4 Location of the Works**

The Works will generally be located in and around Upington. Upington is situated north of the orange river along the N14 and falls inside the Dawid Kruiper Municipal area. Due to the nature of the Scope of Works, the Works will be located across multiple sites. The primary sites are listed below:

AHS WTP:  
 28°27'4.35"S  
 21°15'36.31"E



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### **C3.2 ENGINEERING**



## C3.2 ENGINEERING

### C3.2.1 Design Responsibilities

The Contractor shall be responsible for the detail design of all propriety plant, mechanical and electrical installations in order to ensure these are appropriately selected, specified, and installed to the meet the particular installation conditions on Site. This requirement shall be specifically applicable to any/all items of a mechanical and electrical nature including (but not limited to) piping and instrumentation equipment.

The Contractor shall submit General Arrangement (GA) and detail drawings of all mechanical and electrical systems and pipework for the Engineer's principle approval prior to manufacturing and procurement of the equipment.

To avoid confusion the following design responsibility matrix is shown:

Design stage	Responsible Entity
<b>Overall project</b>	
Concept, feasibility, and overall process	Employer (Engineer)
Basic engineering and detail layout to Proposal stage	Employer (Engineer)
<b>Electrical Works</b>	
Detailed design of works (Workshop Drawings)	Contractor
Temporary works	Contractor
Preparation of "record" drawings	Contractor

#### C3.2.1.1 Appointment of Employer's Agent (Supervising Engineer)

#### C3.2.1.2 Appointment and Role

Notwithstanding the inclusion of an allowance in the Bill of Quantities for the professional services of the Supervising Engineer. The Engineer so appointed is and shall at all times remain the **Agent of the Employer**.

The Engineer shall be referred to as the "**Employer's Agent**" throughout the Contract. The Contractor acknowledges that the Employer's Agent has no authority to alter the terms of the Contract or to relieve the Contractor of any of its obligations, except as expressly provided for in the Conditions of Contract.

#### Payment Mechanism

The sum included in the Bill of Quantities Item 1.3.4 for the "Provision and Payment of the Employer's Agent" is a **defined cost-reimbursable allowance**. This allowance shall be administrated as follows:

- The Contractor shall pay the Employer's Agent **directly** upon receipt of a valid tax invoice form the Employer's Agent, which has been certified by the Employer.
- The Contractor shall be reimbursed by the Employer for the exact amount of each certified invoice paid, **without the addition of any profit, attendance, or handling fee** by the Contractor.

- The Contractor's only obligations in this regard are to process the payment upon instruction and to provide proof of payment to the Employer. The Contractor accepts no financial risk for this allowance.

#### Independence and Duty of Care

The Contractor acknowledges and agrees that:

- The Employer's Agent's duty of care is owned solely to the Employer.
- The payment mechanism does not create any contractual relationship between the Contractor and the Employer's Agent, nor does it imply Employer's Agent is a subcontractor to the Contractor.

#### Statutory Requirement

The Employer's Agent shall be suitably qualified professional registered with the Engineering Council of South Africa (ECSA) in terms of the Engineering Profession Act, 2000 (Act No. 46 of 2000). The Contractor shall be provided with proof of such registration prior to the commencement of the works.

#### Instructions and Communications

All instructions, drawings, certificates and communications issued by the Employer's Agent shall be deemed to be issued by the Employer. The Contractor shall comply with such instructions in accordance with the provisions of the Main Contract.

### **C3.2.2 Drawings**

The Contractor shall provide **comprehensive documentation** for the Motor Control Centre (MCC) as part of the project submission requirements. This shall include, but not be limited to, the following:

- **General layout drawings** indicating the physical arrangement and dimensions of the MCC.
- **Manufacturer's drawings** detailing the construction, component layout, and internal configuration.
- **Complete data sheets** for all installed components, including switchgear, protection devices, control equipment, and instrumentation.
- **Detailed wiring diagrams** showing all power, control, and interconnection wiring within the MCC.
- **Single-line diagrams** clearly identifying all circuits, protective devices, and equipment ratings.

In addition to the wiring diagrams, the Contractor shall also submit **Programmable Logic Controller (PLC) connection diagrams** and **input/output (I/O) schedules** indicating all signal types, terminations, and interfaces to field instruments, telemetry, and supervisory systems.

All documentation shall be prepared in accordance with this specification and submitted for **review and approval prior to fabrication** to ensure compliance with the project's design, functional, and operational requirements.



### **C3.2.3 Alternative Offers**

The Contractor shall complete the tender in terms of the information provided and requested in the tender document. Failure to complete the tender document, including the schedule of quantities, may lead to the rejection of the bid.

In evaluating tenders received, and in accordance with its adopted procurement policy, the Employer is required to satisfy itself as to the competitiveness and cost effectiveness of each tender received. In addition, as a public entity, the Employer is required to ensure that its procurement process is fair, equitable and transparent at all times. Accordingly, except for alternatives requested in the tender documents, any tenderer wishing to submit (an) alternative offer(s) for the consideration of the Employer shall ensure that the competitiveness and cost effectiveness of the alternative can easily be determined by the Employer. Bids that are difficult to compare to the prescribed condition of tender and contract and/or to the specified technical requirements are likely to be rejected. Even if comparable, a tender that deviates from the specified conditions or requirements may not be acceptable to the Employer for reasons of risk apportionment or otherwise. Tenderers are therefore instructed to price the specified requirements and schedule of quantities before submitting any alternative offer for the Works.

### **C3.2.4 Design brief**

As described in Part C3.4 of the Scope of Works, the objective of this contract is to design, supply, manufacture, construct, and commission electrical works associated with the AHS WTW.

### **C3.2.5 Design procedures**

#### **C3.2.5.1 Contractor's documentation**

The Contractor's Documents which shall be submitted to the Engineer for review and approval in accordance with Clause 5.1 of the General Conditions of Contract, are listed in this section. However, the Contractor shall accept that the Contractor's Documents to be submitted shall include, but not be limited to in any way, the documents listed here. These documents also do not limit the Contractor's obligation in terms of the Contract in any way.

#### **C3.2.5.2 General**

All drawings and documentation submitted by the Contractor shall be in English and shall comply with the requirements prescribed below.

A register of the Contractors documents shall be provided with each submission made by the Contractor. The register shall indicate the title, date and revision of the documents submitted.

All the symbols used in the electrical drawings shall be in accordance with IEC Publication 60617 unless otherwise specified in the Project Specifications and the SI system of units shall be used throughout.



All designs shall be complete, accurate and geographically correct. The designs and drawings shall be sufficiently detailed to enable construction and installation to proceed without further need for additional drawings or documentation.

All drawings and documentation submitted shall be suitably identified and labelled by means of title blocks, page numbers and revision status.

All designs (including calculations), documents and drawings shall be submitted for the Engineer's approval prior to the commencement of equipment ordering, manufacturing, or construction on site. Approval by the Engineer of any design or drawing does not relieve the Contractor of his responsibility of any part of the works manufactured or constructed in accordance with the design or drawing. Designs approved by the Engineer shall not be altered without his written agreement.

The Contractor shall be responsible for all measurements on Site, final design, correct manufacturing and installation of all pipe items and specials to suit the installation. Any/all modifications on Site shall be handled in terms of the relevant Specifications for repairs to damaged corrosion protection. The Contractor shall also maintain suitable records of all such items for the Engineer to complete the as-built drawings at the completion of the works.

#### C3.2.5.3 List of Contractors documents to be provided as part of Contractors design obligations

The list of Contractor's Documents that shall form part of each submission for all mechanical and electrical equipment/components for the Sections of the Works listed above shall include, but not be limited to:

- a) Control system specifications and detailed control philosophy.
- h) Electrical Single Line Diagrams.
- i) Power and control cable routings.
- l) Earthing drawings.
- m) Instrument datasheets.
- o) Amendment proposal to O&M manual content.
- q) Contractor's document registers.

The date by which possession of the Site can be handed over to the Contractor and consequently the completion date of the Works, is dependent on the date of submission and acceptance of the documents referred to above. Cost resulting from delays in submission of the Contractor's Documents or in correcting errors or making changes on documents not approved by the Engineer shall be for the Contractor's account.

#### C3.2.5.2.3 Training documents

A training schedule shall be furnished prior to the Works reaching the Test on Completion milestone. Pre-commissioning testing documentation and commissioning plan shall be included in this submission.



#### C3.2.5.2.4 As-built Drawings

“As-Built” drawings shall be furnished on completion, and the relevant completion certificate shall not be issued until such drawings have been received and approved by the Engineer.

Final and approved as-built drawings shall be submitted to the Engineer in five-fold hard copy in A3 size accurately scaled. In addition, the Contractor shall also prepare one complete set of all drawings in digital format as specified above for submission to the Engineer.

#### C3.2.5.2.5 Operation and Maintenance Manuals

The submission of draft Operation and Maintenance (O&M) manuals is a prerequisite to commencing with the Tests on Completion. Two (2) copies of the draft manuals shall be submitted in terms of the format described below for the Engineer’s approval at least two weeks prior to the commencing of the Tests on Completion.

Once the Operating and Maintenance manuals have been approved by the Engineer, four (4) complete sets of the manuals shall be provided by the Contractor to the Engineer. The submission of these final manuals shall be before the Completion and before the works have been taken over by the Employer.

The manuals shall be printed on durable paper and be neatly and securely bound in A4 size hard-backed plastic/waterproof ring binders with clear pockets on the spine and front cover for insertion of title slips giving the contract number, scheme description and equipment supplied.

As-Built drawings in A3 size, index and other title pages shall be contained in separate pockets.

One (1) complete set of manuals shall also be submitted in electronic format via a USB drive.

##### Layout and content

The manual shall contain the following:

- 1) Title page
- 2) Contents list
- 3) List of drawings and appendices
- 4) Maintenance Schedule (summary)

The maintenance schedule shall be in table format and shall include a summary of all the maintenance actions required of all the different systems and functional units covered by the manual to give an overall summary of maintenance actions required for the complete works.

The schedule shall indicate daily, weekly, fortnightly, monthly and annual maintenance actions. A lubrication schedule shall also be included under this section.

A schedule indicating daily, weekly, fortnightly, monthly and yearly maintenance actions shall also be provided.



#### 5) Detailed Plant description

The main body of the manual shall be divided into sensible sections, each covering a system or functional units. Each section shall contain the following sub-sections:

- Plant Description (brief but detailed)
- Equipment Data Sheets containing as a minimum:
  - (a) Equipment Tag Number (for asset register purposes)
  - (b) Equipment Description
  - (c) Supplier Details
  - (d) Model and Make
  - (e) Cost of supply (at date of tendering)
  - (f) Equipment Technical Manuals

For each piece of equipment supplied, the following shall be provided under this sub-section:

- i) Supplier's Operation and Maintenance instructions
- ii) Parts list and data sheets
- iii) Calibration charts
- iv) Test certificates for hydraulic pressure tests, materials, non-destructive tests, coating, and lining details
- v) Applicable drawings and details

#### 6) As built drawings

Folded A3-size as built drawings correctly scaled.

#### C3.2.5.3 Test on Completion (Clause 8.1 of General Conditions of Contract)

The Contractor shall be furnished a comprehensive report containing detailed schedule and documentation to record all pre-commissioning test undertaken and the results of these, demonstrating that the Works have passed the pre-commissioning test.

Comprehensive report containing detailed schedule and documentation to record all commissioning test undertaken and the results of these, demonstrating that the works have passed the commissioning procedure and schedule of alarm messages, which shall additionally be inserted in the operation and maintenance manual.



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**BUILD OF ELECTRICAL WORKS**

### **C3.3 PROCUREMENT**



### **C3.3 PROCUREMENT**

#### **C3.3.1 Procurement Principles**

The Employer has adopted the Standard of Uniformity in Construction Procurement published by the Construction Industry Development Board (CIDB) for its procurement process.

The Standard for Uniformity in Construction Procurement establishes minimum requirements that:

- promote cost efficiencies through the adoption of a uniform structure for procurement documents, standard component documents and generic solicitation procedures;
- provide transparent, fair and equitable procurement methods and procedures in critical areas in the solicitation process;
- ensure that the forms of contract that are used are fair and equitable for all the parties to a contract; and
- enable risk, responsibilities, and obligations to be clearly identified.

#### **C3.3.2 Subcontracting**

The Contractor shall appoint such authorities and/or specialist subcontractors and suppliers as may be designated or nominated by the Employer or the Engineer for those portions of the Works specified in the Scope of Works.

As required by the Conditions of Contract, the Contractor shall be responsible for all work carried out by sub-contractors (whether nominated by the Employer or selected by the Contractor) on its behalf. The Engineer will not liaise directly with any such sub-contractor, nor will he become involved in any problems and/or disputes related to payments, programming, workmanship, etc, unless provided for in the Conditions of Contract. Such problems and/or disputes shall remain the sole concern of the Contractor and his sub-contractors.



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### **C3.4 SCOPE OF WORKS/CONSTRUCTION**



## **C3.4 CONSTRUCTION**

### **C3.4.1 GENERAL CLAUSES AND REQUIREMENTS**

These general clauses cover the general, administrative, legal and organizational requirements relating to quality of materials, installation, testing, commissioning and maintenance of the installation applicable to this Contract.

These clauses should be read together with all other sections and Standard and Particular Specifications included in the Contract documents or Standard Specifications mentioned in the Contract documents but separately available. The documents should be read and interpreted jointly in order to determine the full requirements of the Contract.

Any/all deviations from these general clauses or technical specifications shall be listed in writing as Deviations at tender stage. Where the Engineer does not approve of these deviations, the Contractor shall be responsible to conform to the requirements of these general clauses and technical specifications.

The general clauses have been sub-divided under four main headings viz Section A: General Contract Administration, Section B: General Technical Requirements, Section C: Testing and Commissioning and Section D: General.

#### **A. GENERAL CONTRACT ADMINISTRATION**

##### **C3.4.1.1 RELEVANT ACTS, REGULATIONS AND STANDARDS**

The whole of the installation shall comply, and the work shall be executed in accordance with the latest edition of the following:

- (a) The Occupational Health and Safety Act, 1993 (Act no 85 of 1993) and the latest applicable Regulations promulgated in terms of the Act;
- (b) The regulations and by-laws of the local authorities;
- (c) The applicable regulations of the relevant telecommunications authority;
- (d) The local Fire Department Regulations; and
- (e) The latest revisions of the relevant SANS, DIN, BS, IEC and ISO supporting specifications referred to in the Particular Specifications.

##### **C3.4.1.2 HEALTH AND SAFETY**

The Contractor shall allow in his Tender for compliance with the requirements of the Occupational Health and Safety Act, 1993 (Act no 85 of 1993) and the latest applicable Regulations promulgated in terms of the Act, especially the latest Construction Regulation promulgated in 2014.

From the date of site handover until the Taking-Over Certificates are issued, the Contractor shall be responsible for maintaining safe working conditions on Site as prescribed by the Occupational Health and Safety Act and the regulations promulgated in terms thereof. If the Site of the Works is managed by another contractor, the Contractor shall be expected to also adhere to the health and safety regulations prescribed by such contractor.



The Contractor shall be responsible for supplying and installing the required safety signs as determined by the Occupational Health and Safety Act, 1993 (Act no 85 of 1993) and the regulations promulgated in terms of the Act, both during the construction phase and the completed works. All safety signs shall comply with the requirements of the latest edition of SANS 1186-1 as applicable.

#### **C3.4.1.3 RESPONSIBLE PERSONS AND REPRESENTATION**

The Contractor shall, before establishing on site, appoint and submit to the Engineer in writing a project organisational chart, listing the name(s) of the responsible person(s) in terms of the Occupational Health and Safety Act, 1993 (Act no 85 of 1993) and the regulations promulgated in terms of the Act within 14 days from being appointed.

The Contractor shall submit to the Employer and Engineer within 14 days of the Commencement Date a list of addresses and telephone numbers of his Representative and key personnel who may be contacted both during and outside normal working hours in connection with the Works. The Contractor shall also refer to Sub-Clauses 4.3 and 6.8 of the Conditions of Contract.

#### **C3.4.1.4 QUALITY ASSURANCE AND CONTROL**

All materials and workmanship shall be of a suitable type and quality to ensure that the Works will operate satisfactorily in accordance with the Specifications.

The Contractor shall submit a Quality Assurance Plan outlining quality assurance policies and procedures to be used for the project relating to the areas such as materials, manufacturing, and installation and testing. A documented quality control and quality assurance system shall be maintained, which shall be in accordance with ISO 9000 or equivalent approved by the Engineer. The Contractor shall ensure that the same requirements is applied to products, systems, and services supplied by his sub-contractors and suppliers. The Contractor shall file all quality certification documents relating to the products and systems supplied for the Works. The Engineer shall have full access to such files.

Registration to ISO 9001:2000 is preferable and evidence of current registration to this or another acceptable quality management system shall be provided upon request.

#### **C3.4.1.5 DRAWINGS, DOCUMENTATION AND SAMPLES**

##### **C3.4.1.5.1 Engineer's Drawings and Documentation**

The Tender Drawings prepared by the Engineer and issued with the tender show the general layout and position of the electrical works to be supplied and installed under this Contract. These details may in some instances constitute schematic arrangements. These drawings, together with the Specification, are deemed to provide sufficient detail to enable the Contractor to determine the requirements of the Works and to price and schedule the supply, installation and commissioning of all associated Electrical and Mechanical Plant.

The Engineer's drawings are not dimensioned installation drawings and thus cannot be used for construction purposes and the preparation of workshop drawings.



### **C3.4.1.5.2 Contractor's Drawings and Documentation**

#### **C3.4.1.5.2.1 General**

All drawings and documentation submitted by the Contractor shall be in English and shall comply with the requirements prescribed below.

All the symbols used in the electrical drawings shall be in accordance with IEC Publication 60617 unless otherwise specified in the Project Specifications and the SI system of units shall be used throughout.

All designs shall be complete, accurate and geographically correct. The designs and drawings shall be sufficiently detailed to enable construction and installation to proceed without further need for additional drawings or documentation.

All drawings and documentation submitted shall be suitably identified and labelled by means of title blocks, page numbers and revision status.

All designs and drawings shall be submitted for the Engineer's approval prior to the commencement of equipment ordering, manufacturing or construction on site. Approval by the Engineer of any design or drawing does not relieve the Contractor of his responsibility of any part of the works manufactured or constructed in accordance with the design or drawing. Designs approved by the Engineer shall not be altered without his written agreement.

#### **C3.4.1.5.2.2 Preparation and Submission of Drawings**

All drawings shall be accurately scaled in terms of generally accepted scaling factors and submitted on A3 size sheets.

Electronic submissions of drawings shall in all instances comprise .PDF (Adobe Reader) format.

The Contractor may request a set of the Engineer's drawings in digital or paper format for modification and updating if necessary. These drawings shall be re-titled in accordance with the Contractor's system and shall thereafter be submitted as a Contractor's drawing.

The Contractor shall submit all drawings with reasonable promptness and in an orderly sequence as to cause no delay in the execution of any work directly or indirectly linked to the finalisation of the details contained in the drawings. The Engineer shall be given reasonable opportunity of at least 14 days to evaluate, comment on or approve the drawings. In the event that the Engineer does not respond within the said period, the Contractor shall notify the Engineer in writing of his acceptance that the drawings have been approved and that manufacturing and/or construction will commence in accordance with the drawings.

The Contractor shall make the corrections or provide additional information if requested by the Engineer and shall re-submit the corrected or updated drawings until approved. When re-submitting drawings, the Contractor shall specifically direct the Engineer's attention (in writing) on revisions other than the corrections required by the Engineer on previous submissions.



#### **C3.4.1.5.2.3 “As-Built’ Drawings**

“As-Built’ drawings shall be furnished on completion and the relevant completion certificate shall not be issued until such drawings have been received and approved by the Engineer.

Final and approved as-built drawings shall be submitted to the Engineer in five-fold hard copy in A3 size accurately scaled. In addition, the Contractor shall also prepare one complete set of all drawings in digital format as specified above for submission to the Engineer.

#### **C3.4.1.5.3 Operation and Maintenance Manuals**

The submission of draft Operation and Maintenance (O&M) manuals is a prerequisite to commencing with the Tests on Completion. Two (2) copies of the draft manuals shall be submitted in terms of the format described below for the Engineer’s approval at least two weeks prior to the commencing of the Tests on Completion.

Once the Operating and Maintenance manuals have been approved by the Engineer, four (4) complete sets of the manuals shall be provided by the Contractor to the Engineer. The submission of these final manuals shall not be later than four weeks after the works have been taken over by the Employer.

The manuals shall be printed on durable paper and be neatly and securely bound in A4 size hard-backed plastic/waterproof ring binders with clear pockets on the spine and front cover for insertion of title slips giving the contract number, scheme description and equipment supplied.

As-Built drawings in A3 size, index and other title pages shall be contained in separate pockets.

#### **Layout and content**

The manual shall contain the following:

- (1) Title page
- (2) Contents list
- (3) List of drawings and appendices
- (4) Maintenance and Lubrication Schedule (summary)

The maintenance schedule shall be in table format and shall include a summary of all the maintenance actions required of all the different systems and functional units covered by the manual to give an overall summary of maintenance actions required for the complete works.

The schedule shall indicate daily, weekly, fortnightly, monthly and annual maintenance actions. A lubrication schedule shall also be included under this section.



A schedule indicating daily, weekly, fortnightly, monthly and yearly maintenance actions shall also be provided.

(5) Detailed Plant description

- The main body of the manual shall be divided into sensible sections, each covering a system or functional units. Each section shall contain the following sub-sections:

- >> Plant Description (brief but detailed);
- >> Maintenance and Lubrication Schedule (in table format);
- >> Process and Instrumentation Diagrams (P&ID's);
- >> Operating instructions (including start-up and stopping procedures as well as manual and/or automatic operation)
- >> Fault Finding
- >> Equipment Data Sheets containing as a minimum:

- (a) Equipment Tag Number (for asset register purposes)
- (b) Equipment Description
- (c) Supplier Details
- (d) Model and Make
- (e) Cost of supply (at date of tendering)

>> Equipment Technical Manuals

For each piece of equipment and/or machine supplied, the following shall be provided under this sub-section:

- (i) Supplier's Operation and Maintenance instructions
- (ii) Parts list and data sheets
- (iii) Calibration charts
- (iv) Test certificates for hydraulic pressure tests, flame proof grading, materials, non-destructive tests, coating and lining details
- (v) Applicable drawings and details

(6) As built drawings

Folded A3-size as built drawings correctly scaled.

(7) Computer programmes and software

Digital copies of programmes and software as required by computerised systems installed on the project as required for maintaining, updating or altering the system by the Employer or Operator.

(8) Wiring diagrams of electrical installations (separate volume)



#### **C3.4.1.5.4 Documents to be submitted with Tender**

Apart from the documents required in terms of the Tender Data and Returnable Documents, the following information shall be submitted with the Tender, neatly bound in an A4 level-arch file and titled 'Proposal'. One original plus a full copy shall be provided with the tender.

- (1) Cover letter containing the tender price and well as comments on the compliance with the commercial terms of the tender, including confirmation of acceptance of proposed Contract Price Adjustment formulae;
- (2) List of items subject to variations in Rate of Exchange, including costs subject to variations, currency and rate of exchange applicable to the tender pricing;
- (3) Comments on technical compliance, recording any deviations from the specification by quoting the relevant clause number;
- (4) Reference list for all plant and equipment offered, including country of origin. All equipment offered shall have a minimum of 5 years proven record, shall have local agents carrying the necessary inventory of critical spares and equivalent installations locally or abroad;
- (5) Technical literature (supplier brochures, pump curves, technical pamphlets) relating to offered plant and equipment listed under (4);
- (6) Recommended list of critical spares and consumables with associated costs;
- (7) Company profile of tendering entities, including any/all sub-contractors;
- (8) Proof of Quality Management registration;
- (9) Preliminary Project Programme;
- (10) Reference list of previous projects of similar type indicating project description, size in terms of value of works, contractor's specific role in project, location and client.

#### **C3.4.1.5.5 Samples**

The Contractor shall, prior to placing orders, and if required by the Engineer, submit samples of all material and equipment to the Engineer for approval.

For large equipment such as high voltage switchgear, transformers, standby generators, pumps, compressors and lifts, catalogues and brochures shall be submitted for approval. Equipment and material shall only be approved in writing by the Engineer and the Contractor is responsible for obtaining such approval prior to commencing with the installation.

#### **C3.4.1.6 CONSTRUCTION PROGRAMME**

In addition to the requirements of Clause 8.3 of the General Conditions of Contract, the programme shall be compiled by means of MS Project in Gantt chart form.

The initial shall be approved by the Engineer in writing and shall constitute the baseline programme. The critical path shall be clearly indicated on the programme and shall be used to assess any claims by the Contractor for extension of time due to any reason whatsoever. No extension of time will be granted in the absence of an approved baseline programme, which may be updated from time to time as ordered by the Engineer. Any revisions of the baseline programme that influences the critical path shall be brought to the Engineer's attention in writing, also stating the reason for such changes.



### **C3.4.1.7 CONTRACTOR'S EQUIPMENT**

The Contractor's Equipment for construction and erection of the Works shall be adequate for the purpose required, of modern design and in good condition to carry out the Works expeditiously. Should the Engineer be of the opinion that the Contractor's Equipment is in anyway unsuitable for carrying out the Works in a manner or at a rate commensurate with the requirements of the Contract, he shall have the right to instruct the Contractor at any time during the Contract to provide additional or improved plant, tools and equipment in order to meet the specified requirements.

### **C3.4.1.8 SITE MEETINGS**

The Contractor or his authorized representative(s) shall attend all meetings held on the site with representatives of the professional team at dates and times to be determined by the Engineer.

Progress meetings shall be held at least once a month on Site from the Commencement Date to the date of Taking-over for coordination purposes and to evaluate the progress of the Contract.

Ad-hoc technical meetings will be arranged at a suitable venue as and when required.

The Contractor or his authorized representative(s) shall attend all steering committee meetings with the appointed Community Liaison Officer.

Weekly commissioning meetings shall be held during the testing and commissioning stages.

The Engineer will chair all progress and technical meetings, prepare and circulate minutes, as determined by him in consultation with the Employer. The Contractor shall chair the commissioning meetings and be responsible for associated administration.

The Contractor shall submit monthly progress reports as required by Sub-Clause 4.21 of the Conditions of Contract in a format to be agreed between the Contractor and Engineer.

### **C3.4.1.9 SUB-CONTRACTORS**

The Contractor's appointment of any sub-contractor shall be subject to the approval of the Engineer. All sub-contractors employed by the Contractor shall be suitably qualified and experienced to carry out its portion of the work.

### **C3.4.1.10 CONCURRENT CONSTRUCTION ACTIVITIES**

The installation of the electrical equipment will coincide with other construction activities on Site and the Contractor shall co-operate with any/all other contractors on site regarding final designs in order to determine areas of interface. These designs shall, when finalised, be submitted to the Engineer for approval. The Contractors shall also be required to co-operate with other contractors during the installation of equipment and shall carry out his work in such a manner to cause minimum interference and delays to other contractors.

### **C3.4.1.11 HANDLING AND STORAGE OF EQUIPMENT**

The Contractor must allow for an area in which the mechanical and electrical equipment may be stored on Site before it is installed. The Contractor shall arrange for any required off-site storage prior to delivery to the Site.



### **C3.4.1.12 TRAINING**

The Contractor shall be responsible for the initial training of the Plant Operator during the testing and commissioning of the Works, as well as on-going training during the defect's notification period. Training shall focus on the correct operation and maintenance of the Plant and shall address the following issues, amongst others:

- Start-up, shutdown and safety procedures;
- Maintenance requirements and relevant intervals;
- Troubleshooting and corrective actions;
- Understanding all processes, equipment and control methodology;
- Operation and maintenance of SCADA system (if applicable);
- Operating the works in manual mode in cases when SCADA is not available (if applicable);
- Execution of tests, relevant calculations and calibration of equipment;
- Maintenance and operation of instrumentation;
- Collection, interpretation and reporting of process data.

Once the training has been completed, all operators shall be examined by the Contractor to ensure that the subjects and training material covered has been adequately mastered. The Contractor shall subsequently compile a training report for the Engineer's approval stating the following:

- Training subjects and material covered;
- Name and ID number of all operators trained;
- Outcomes for examination of Operators;
- Final sign-off from Contractor that all training in terms of Specifications has been completed.

The Contractor's training staff shall be conversant in English and shall be knowledgeable and experienced in the manufacture, erection, testing, fault finding and maintenance of the equipment installed under the Contract.

### **C3.4.1.13 GUARANTEES**

All plant and equipment supplied under the Contract, shall be fully guaranteed against all defects arising from faults in the design, manufacture and workmanship for a period of at least **1 year** from the date of handing over.

## **B. GENERAL TECHNICAL REQUIREMENTS**

### **C3.4.1.14 DESIGN**

The Contractor shall be responsible for the detail design of all propriety plant, mechanical and electrical installations in order to ensure these are appropriately selected, specified, and installed to the meet the particular installation conditions on Site. This requirement shall be specifically applicable to any/all items of a mechanical and electrical nature including (but not limited to) piping and instrumentation equipment.

The Contractor shall submit General Arrangement (GA) and detail drawings of all mechanical and electrical systems and pipework for the Engineer's principle approval prior to manufacturing and procurement of the equipment.

To avoid confusion, the following design responsibility matrix is shown:



Design stage	Responsible Entity
<b>Overall project</b>	
Concept, feasibility, and overall process	Employer (Engineer)
Basic engineering and detail layout to Proposal stage	Employer (Engineer)
<b>Electrical Works</b>	
Detailed design of works (Workshop Drawings)	Contractor
Temporary works	Contractor
Preparation of "record" drawings	Contractor

#### **C3.4.1.15 STANDARDS**

All electrical equipment shall be of approved manufacture and its construction, design and testing shall be in accordance with the requirements of the most recent South African National Standards, British Standards or IEC publications including all amendments issued thereto up to the date of tender. The design and installation of the equipment shall also comply with the relevant clauses of the Occupational Health and Safety Act, 1993 (Act No 85 of 1993) and the regulations promulgated in terms of this Act, as well as the Code of Practice for the Wiring of Premises, SANS 0142.

For all material and equipment that are required to conform to any national or international specification or standard, the Contractor shall submit a certificate to the Engineer, issued by an accredited testing laboratory clearly stating that the material and equipment complies with the specific specification or standard.

Notwithstanding reference in this specification to the South African or British Standards and the IEC or ISO recommendations, the supplier may submit for approval by the Engineer, material and designs conforming to other technically equivalent national standards and shall submit documentary proof in English of actual compliance therewith.

#### **C3.4.1.16 QUALITY OF MATERIALS**

All material and equipment shall be new and suitable for the prevailing conditions at the Site, which shall include climatic conditions as well as the conditions under which materials and equipment are installed, stored and operated without distortion, deterioration or inducing undue stresses in any part such as to affect the efficiency and reliability of the plant and also without affecting the strength and suitability of the various parts for the duty which they have to perform.

All material and equipment shall conform in respect of quality, manufacture, tests and performance, with the relevant requirements of the SANS or where no such standards exist, with relevant current specification of the British Standards Institution and/or relevant IEC and/or ISO publications. Where applicable, the material shall bear the stamp of the relevant standards body.

Where proprietary materials and equipment are specified or required, approval of such materials or equipment shall be at the sole discretion of the Engineer once the appropriate samples or technical literature have been submitted.



#### **C3.4.1.17 ELECTROMAGNETIC INTERFERENCE**

All equipment installed under the Contract shall comply with the requirements of IEC 61000 Parts 1 to 6 *Electromagnetic Compatibility (EMC)*.

Any equipment found producing Electromagnetic interference subsequent to commissioning shall be suppressed or replaced to the satisfaction of the Engineer without any additional costs to the Employer.

#### **C3.4.1.18 CORONA, RADIO AND TV INTERFERENCE**

All plant and equipment shall be designed so as to minimize corona or electrical discharge and radio and TV interference, and shall comply with national rules and regulations in respect to radio and TV interference.

Any equipment found producing radio or TV interference subsequent to commissioning shall be suppressed or replaced to the satisfaction of the Engineer without any cost to the Employer.

#### **C3.4.1.19 INTERCHANGEABILITY**

Corresponding parts throughout the works shall be made to accurate tolerances that similar components or spares shall be fully interchangeable without any further alterations or adjustments being necessary.

#### **C3.4.1.20 BOLTS AND NUTS**

Unless otherwise specified in the Project or Particular Specifications, the following general requirements shall be applicable:

- (a) The threads of all bolts, nuts and studs shall be in accordance with SANS 1700-7-3, 1700-7-5, 1700-14-3, 1700-14-4 (in part);
- (b) No brass bolt or stud shall have a diameter of less than 6mm;
- (c) Two washers shall be installed underneath each bolt and nut;
- (d) Each bolt shall protrude by at least three threads but not more than five threads through the nut with all washers in position;
- (e) The Contractor shall supply to the Employer any special tool required for any nut, bolt, screw or other fastener used in a position which is not accessible using conventional tools. This also applies where the size or shape of the fastener is not conventional.

#### **C3.4.1.21 GALVANISING**

Unless otherwise specified in the Project or Particular Specifications, the following general requirements shall be applicable:

- (a) Where galvanising is specified or a requirement of the design, such galvanising shall be performed by the hot-dip process to SANS EN 10240 in part and SANS ISO 1461;
- (b) For all parts, other than wires, the equivalent zinc coating thickness shall not be less than 455g of zinc per square metre of surface;
- (c) The galvanising must be clean, smooth, of uniform thickness, unblemished and free from defects;
- (d) All drilling, welding, cutting, sawing, punching, filing and bending shall be complete and the metal shall be cleaned of any machining blemishes, mill scale, rust and lubricants, before galvanising;



- (e) Galvanised areas must be kept free of lubricants. Surfaces which are in contact with oil shall not be galvanised or cadmium plated;
- (f) Electrolytic deposition of zinc is not acceptable.

#### **C3.4.1.22 WELDING**

Unless otherwise specified in the Project or Particular Specifications, the following general requirements shall be applicable:

- (a) All welding shall comply with the appropriate international standards such as BS 1856 (General Specification) and BS 709 (methods of testing);
- (b) Welding shall be executed in accordance with modern accepted practice and shall be sound, full strength and free from undercut and slag inclusions. Crater effects at the end of weld runs shall be eliminated;
- (c) Intermittent welding and incomplete penetration butt-welding will not be accepted;
- (d) All fabricated items shall be stress relieved after welding.

#### **C3.4.1.23 LABELS AND NOTICES**

Unless otherwise specified in the Project or Particular Specifications, the following general requirements shall be applicable:

- (a) Identification labels shall be attached to all equipment, motors, control gear and all panels and equipment contained therein;
- (b) All labels and plates shall be of an approved non-corrosive material and shall be fixed with stainless steel or nickel-plated screws of ISO metric thread form;
- (c) Labels shall have a matt or satin finish to minimise reflection;
- (d) Labels shall have black lettering on a white background. Danger plates shall have white lettering on a red background;
- (e) Cables shall be labelled at both ends, at through joints and at regular intervals;
- (f) Cables shall be labelled on both sides where the cable passes through a permanent obstruction;
- (g) All lettering shall be in uppercase letters, except where standard abbreviations of units are used such as kVA, kWh or MPa.

### **C. TESTING AND COMMISSIONING**

#### **C3.4.1.24 FACTORY ACCEPTANCE TESTS**

Manufacturer type or factory acceptance tests (FAT's) shall be performed on all equipment at described in the Project or Particular Specifications.

For equipment manufactured outside the borders of South Africa, the requirement for witnessing factory acceptance tests by a representative(s) of the Engineer and the Employer shall be clearly specified in the Project Specification and a separate payment item provided in the schedule of quantities for attendance of such tests.

The Engineer or a duly appointed third party inspectorate reserves the right to be present at all/any tests conducted on any equipment to be supplied under the Contract.

For any factory acceptance test, at least one (calendar) weeks' notice shall be given to the Engineer of such test in writing.



No equipment shall be dispatched to site prior to approval of the factory test results by the Engineer.

### C3.4.1.25 TESTS ON COMPLETION

Notwithstanding any requirements of Clause 9 [*Tests on Completion – Contractor's Obligations*] of the General Conditions of Contract (Fidic Yellow Book), the following tests on completion shall be executed by the Contractor:

#### C3.4.1.25.1 Testing before energizing

### Pre-Energization Testing and Inspection Procedure

#### 1. Objective

To ensure all electrical and control components of the Motor Control Centre (MCC), including motor starters, Programmable Logic Controllers (PLC), Uninterruptible Power Supply (UPS), and cables, are installed, connected, and tested correctly before applying power.

#### 2. Scope

This procedure applies to all MCC panels, associated motors, field cables, PLC control systems, UPS units, and their interconnections prior to energization.

#### 3. Safety Precautions

- Ensure all circuits remain **isolated and locked out** during testing.
- Display “**Do Not Energize**” tags on all incoming and outgoing circuits.
- Use **calibrated instruments** for all testing.
- Only **authorized personnel** may perform testing.
- Verify **earthing continuity** before any insulation or continuity test.

#### 4. Visual Inspection

Before any testing, perform a thorough inspection:

1. Verify the MCC installation is complete, clean, and free of debris.
2. Confirm all busbars, terminations, and components are properly tightened and labelled.
3. Ensure all protective devices (MCCBs, MCBs, contactors, relays) are correctly rated and installed.
4. Check all wiring for correct routing, identification, and gland sealing.
5. Verify that all control and power cables are properly terminated and identified.
6. Confirm correct earthing of panels, cable screens, and metallic parts.
7. Ensure correct polarity and phase sequence markings.

#### 5. Cable Testing

Perform the following tests before connecting cables to equipment:

- **Continuity Test:** Verify each conductor and ensure no open circuits.
- **Insulation Resistance Test:** Measure between phases and between phase to earth using a megger (typically 500V or 1000V for LV circuits).
  - Minimum acceptable value: **>1 MΩ**.
- **Phase Sequence Test:** Verify correct phase rotation on incoming supply cables.

#### 6. MCC and Component Testing

1. Check all breakers and contactors for mechanical operation.
2. Verify overload relays are correctly set to motor full-load current.
3. Test control circuits manually for functionality (e.g., start/stop circuits, interlocks).



4. Confirm that indicator lamps, pushbuttons, selector switches, and meters function correctly.
5. Verify all protective relays and fuses are correctly rated and installed.
6. Measure insulation resistance of MCC busbars and internal wiring.

## 7. PLC and Control System Testing

1. Verify correct wiring of all I/O modules according to the latest drawings.
2. Perform insulation and continuity tests on all I/O control cables before connecting to PLC terminals.
3. Check power supply to PLC (24VDC or as specified).
4. Load and verify the correct PLC program, including input/output assignments.
5. Test manual operation and interlocks via PLC simulation mode (without energizing outputs).
6. Confirm communication with HMI/SCADA and all network devices.

## 8. UPS System Testing

1. Verify correct installation, polarity, and grounding of the UPS and batteries.
2. Check incoming and outgoing voltage.
3. Perform battery voltage and capacity test.
4. Simulate power failure to verify automatic changeover and restoration.
5. Confirm alarm and monitoring functionality.

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## 8. Functional Testing (Prior to Energization)

- Perform “dry-run” checks using control voltage only (no power to motors).
- Test all interlocks, sequencing, and protection trips.
- Simulate start/stop commands to verify correct PLC logic.
- Confirm motor direction arrows and wiring match control logic.

## 9. Energization Procedure

Once all above tests are satisfactory and approved:

1. Obtain **written authorization** to energize from the responsible engineer.
2. Ensure all personnel are clear of equipment.
3. Energize incoming supply at MCC main breaker.
4. Check for abnormal conditions (noise, smell, heat, or tripping).
5. Test operation of each motor one at a time, verifying correct direction and performance.
6. Record voltage, current, and power factor for each load.

## 10. Documentation

- Record all test results, including insulation readings and phase sequence.
- Attach as-built cable schedules and termination drawings.
- Submit a **Pre-Commissioning Report** signed by the responsible technician and supervising engineer.

### C3.4.1.25.2 Commissioning and testing as part of construction

Once the dry testing of all equipment in terms of the above has been completed, each process and system will be wet commissioned, which shall include the same operations as for dry commissioning tests but with the equipment loaded.



To verify that the complete system—comprising the MCC, motor starters, PLC control system, UPS, and associated field equipment—operates correctly, safely, and in accordance with the design intent under live (energized) conditions.

## 2. Prerequisites

Before commencing commissioning:

- All **pre-energization inspections and tests** must be completed and approved.
- **All equipment must be cleared for energization** by the responsible engineer.
- **Lockout/Tagout procedures** must be lifted under controlled supervision.
- All relevant **test instruments are calibrated** and available.
- All safety barriers and signage must remain in place during live testing.

## 3. Safety Precautions

- Only **authorized and qualified personnel** may perform live commissioning.
- Use **appropriate PPE** (arc-rated clothing, insulated gloves, safety glasses).
- Keep **emergency stop circuits functional** throughout testing.
- Ensure **communication** between control and field teams is clear and continuous.
- Be prepared to **isolate supply immediately** in case of abnormal conditions (smoke, vibration, excessive current, incorrect direction, etc.).

## 4. Energization and Initial Checks

1. **Energize the MCC incomer** under supervision and observe:
  - No abnormal sound, smell, or tripping.
  - Correct **phase sequence and voltage** at MCC busbars.
  - Verify **control voltage** and **UPS supply** are stable.
2. **Check individual feeders:**
  - Measure voltage at outgoing terminals.
  - Confirm control circuit functionality (indicator lamps, selector switches, alarms).
3. **Check PLC and communication networks:**
  - Confirm PLC is powered and communicating with all remote I/O, VFDs, and HMI/SCADA.
  - Verify that all tags and feedback signals are live and correct.

## 5. Motor Testing and Verification

Perform tests one motor at a time.

1. **Jog Test / Direction Check**
  - Briefly energize motor to verify rotation direction.
  - Reverse any incorrect phase sequence at motor terminals.
2. **No-Load Run Test**
  - Run each motor individually without load.
  - Record line voltages, current per phase, and check for balance.
  - Observe for vibration, noise, and bearing temperature rise.
  - Ensure overloads, contactors, and protection relays operate correctly.
3. **Loaded Run Test (if applicable)**
  - Operate each motor under process load.
  - Record current, power factor, and performance data.
  - Check for stable operation and ensure all interlocks, trips, and feedbacks function correctly.

## 6. Protection and Interlock Testing

Verify all safety and interlocking logic through live operation or simulated inputs:

1. **Overload Trip Test** – Simulate overload or use test button.
2. **Emergency Stop Test** – Activate E-stop and confirm complete system isolation.
3. **Fault Simulation** – Test response to phase failure, under/over-voltage, and earth fault.
4. **Interlock Verification** – Ensure all motors and equipment start/stop in correct sequence.



5. **PLC Alarms and Events** – Verify correct alarm messages and SCADA indications.

## 7. PLC and Control System Verification

### 1. Logic Verification

- Test each input and output with live signals.
- Confirm logic performs as per design and cause-effect matrix.

### 2. HMI / SCADA Checks

- Verify live data update, trend displays, and alarm functionality.
- Confirm manual, automatic, and remote operation modes.

### 3. Parameter Verification

- Check all timers, setpoints, and analog scaling values.
- Save final program and backup to the approved repository.

## 8. UPS and Control Power Checks

1. Verify that UPS supplies stable voltage under load.
2. Disconnect mains supply to confirm automatic changeover to battery.
3. Check system alarms and recovery after mains restoration.
4. Record UPS battery voltage and autonomy time.

## 9. System Integration Tests

Perform overall system functional testing:

1. **Sequential Start-Up Test** – Verify that equipment starts in correct process order.
2. **Auto/Manual Mode Test** – Confirm control transfer between modes works as designed.
3. **Emergency Shutdown Test** – Simulate an emergency stop or power failure scenario.
4. **Data Logging and Trending** – Confirm real-time data and historical logs are accurate.

## 10. Final Settings and Calibration

- Adjust overload relay settings according to actual motor full-load current (FLC).
- Set PLC analog input scaling (pressure, flow, level, temperature).
- Configure alarm thresholds and delay timers.
- Verify MCC main and feeder breaker trip settings (short-circuit and thermal).
- Calibrate any measuring instruments (voltmeters, ammeters, transducers).

## 11. Final Acceptance and Documentation

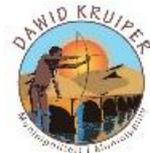
1. Record all measured test results (voltages, currents, trip times, insulation values).
2. Update as-built wiring diagrams and I/O lists with any modifications made.
3. Obtain **signed commissioning certificates** from electrical, control, and client representatives.
4. Submit a **Commissioning Report**, including:
  - Test sheets and calibration records
  - PLC program backup
  - UPS test report
  - Motor data sheets and current readings
  - Final settings and interlock verification sheets

## 12. Handover

Once all tests have been successfully completed and approved:

- Hand over the system to operations under normal running conditions.
- Provide operator training and emergency shutdown procedures.
- Close out punch list items prior to final acceptance.

After successful completion of the Commissioning of all equipment and processes and the Works as a whole, the Trial Operation Period as defined below shall commence.



#### C3.4.1.25.3 Trial Operation Period

After successful completion of the wet commissioning phase and submission of the draft Operation & Maintenance manuals in the prescribed format, a 2-week Trial Operation Period shall commence during which the motor control centre shall be operated under the auspices of the Contractor. The Contractor shall provide full-time attendance for the duration of the Trial Operation Period during normal working hours (07h00 to 18h00) and shall have an individual(s) on standby during non-working hours for any/all emergencies.

The purpose of the Trial Operation Period is to (a) prove the functionality of all electrical equipment installed under the Contract, to (b) do final adjustment and optimization of relevant operational settings and to (c) prove the improvement and ultimate compliance of the final effluent.

The Trial Operation Period shall be declared successful if/when the plant operates as intended without any electrical failure for a continuous period of 2(No) consecutive weeks, at which time the Taking-Over Certificate shall be issued signifying the start of the 12-month defect's liability and maintenance period.

#### C3.4.1.25.4 At the end of the Defects Notification Period

All equipment and items supplied under this Contract shall be **serviced** and **tested** at the end of the **12-month** Defects Notification Period, to prove that it complies with the Specifications prior to the issuance of the Performance Certificate signifying final completion and acceptance of the Works.

### **C3.4.1.27 TEST PLAN AND REPORTS**

Method statements and test reports shall be submitted prior to and after the successful completion of each testing phase. The following documents shall be submitted in writing to the Engineer:

- Overall testing plan, including method statements and schedule of testing activities prior to commencing with Testing before energizing;
- Progressive testing reports as detailed in the testing plan;
- Tests on completion:
  - Testing before energizing report;
  - Commissioning report;
- Method statement for the execution of the Trial Operation Period;
- Performance test report at end of Defects Notification Period;
- Failure investigation reports (where necessary) during Defects Notification Period.

## **D. GENERAL**

### **C3.4.1.28 SITE FACILITIES AND SERVICES AVAILABLE**

#### C3.4.1.28.1 Location of site camp and depot

The site of the existing works is constrained in terms of space and thus it is not envisaged that the site camp and depot can be accommodated within the perimeter of the works. The Contractor shall thus be expected to make the necessary arrangements with the local municipality for a suitable site camp in close proximity to the Site and shall carry all costs associated with such arrangements. The requirements for the site camp are described in Particular Specification PPG.



#### C3.4.1.28.2 Access to Site

The Contractor may make use of the existing access road to and within the Site, but shall be responsible to restore these roads to a similar or better condition that prevailed at the Commencement Date and at his expense. If the Contractor requires additional access to and within the Site, these shall be constructed at his own expense. Proper access control shall be instituted by the Contractor to prevent any unauthorised entry.

#### C3.4.1.28.3 Water supply

Potable water is available on Site and the Contractor shall be responsible under the Contract for the supply and distribution at his Cost of all water that he may require for purposes of construction, testing and commissioning of the Works. Accordingly, the Contractor shall pay all consumption charges, and at his cost provide all connections, consumption meters, pipework, storage tanks, transport and other items associated with the supply of water for construction activities. All connections to pipelines of the Employer shall be in accordance to standards approved by the Employer and the Engineer.

Water for construction activities and domestic use at the Contractor's camp will be charged at R 8.00/kl and amounts shall be payable to the Employer.

#### C3.4.1.28.4 Power supply

Electricity is available on Site for construction activities and the Contractor shall be responsible for the supply and distribution at his Cost of all electricity that he may require for the purposes of constructing the Works. Accordingly, the Contractor shall pay all consumption charges, and at his Cost provide all connections, transformers, consumption meters, cables, distribution boards and other items that are associated with the supply of electricity for construction of the Works.

The Contractor shall, subject to the approval of the Engineer, make the necessary arrangements with the Plant Operator for the required electrical connection. The distribution of electricity shall be in accordance with the applicable bylaws and regulations of the Rustenburg Local Municipality and electrical consumption shall be billed at 228.5c/kWhr subject to any increase by the Energy Regulator.

#### C3.4.1.28.5 Rail facilities

The nearest goods handling station is in Rustenburg, approximately 18 km from the Site. The Contractor shall make the necessary arrangements to utilize the railway service.

#### C3.4.1.28.6 Sanitation

The Contractor shall provide the necessary ablution facilities for his camp and depot. Pit latrines shall not be allowed and the Contractor shall provide a connection to the treatment works or install a conservancy tank, which will be removed once construction has been completed.

### **C3.4.1.29 EXISTING SERVICES AND STRUCTURES**

The position and details of all existing services and structures known to the Engineer are shown on the Drawings or on the as-builts of previous construction activities that shall be issued to the Contractor on award of the Contract. Although the Engineer has endeavoured to indicate the position of the services and structures as accurately as possible, it will remain the responsibility of the Contractor to prove the exact position of all services impacted by construction activities prior to commencing with such activity.



Any/all services and structures damaged during the construction period due to construction activities shall be repaired by the Contractor as soon as practically possible at the Contractor's expense. In emergency situations, the Employer or its mandated agent may undertake critical repairs at the cost of the Contractor should this be deemed necessary.

It must be highlighted that the majority of construction activities will be undertaken in and around an existing water treatment facility and it is a specific requirement of this Contract that the construction of the new infrastructure shall have no or minimal impact on the operation of the plant. It may be necessary for Contractor to schedule certain activities during low flow conditions i.e. typical in the dry season (winter) and/or during the night.

In the event that the Contractor deems it necessary to make alterations to the existing services or structures, such alteration shall be approved by the Engineer prior to execution.

#### **C3.4.1.30 FIRE-RISK**

The Contractor shall be responsible to safeguard the plant and areas adjacent to the Contractor's camp against fire caused in any way by the construction activities on Site. The Contractor shall be responsible for any damage or loss suffered in this regard.

#### **C3.4.1.31 CONDITIONS OF EMPLOYMENT OF LOCAL LABOUR**

In accordance with the Conditions of Contract the Contractor shall be responsible to engage all staff and labour, local (including CLO's) or otherwise, collectively the Contractor's Personnel. A contract of employment or subcontract shall be signed between the Contractor and each of his employees or sub-contractors as the case may be. Likewise contracts of employment must be entered into between each such sub-contractor and each of the specific subcontractor's employees. Although the Contractor shall adhere to the minimum wage rates described below he is at liberty to negotiate additional incentive payments based on performance.

Contracts of employment or sub-contracts should provide for the following basic conditions:

- (a) The minimum wage payable will be determined in terms of latest applicable (at the time of tendering) legislation and shall, as a minimum, adhere to section 56(1) of the Basic Conditions of Employment Act (Act 75 of 1997), Sectorial Determination 2: Civil Engineering Sector as published by the Department of Labour.
- (b) The Contractor shall adhere to the provisions for payment method and intervals, overtime and pay for work on Sundays and public holidays (if required) in the Basic Conditions of Employment Act (Act 75 of 1997).
- (c) The Contractor shall register all labourers employed on the Contract with the Workmen's Compensation Commissioner and the Unemployment Insurance Fund, as applicable. The Contractor shall obtain the Unemployment Insurance Fund and Workmen's Compensation registration cards.
- (d) Workers shall be entitled to one (1) day sick leave with full pay per month worked. This will accumulate if the leave is not used.
- (e) Annual leave shall be calculated as published in terms of (the latest edition of) section 56(1) of the Basic Conditions of Employment Act (Act 75 of 1997), Sectorial Determination 2: Civil Engineering Sector as published by the Department of Labour.



- (f) Upon termination of the Contract, each locally employed labourer shall be entitled to receive his/her Unemployment Insurance Fund and the Workmen's Compensation registration cards as well as a Certificate of Employment from the Contractor clearly stating the following:
- i) The type of work done.
  - ii) The duration of employment.
  - iii) The number of days absent from work.
  - iv) The Contractor's general impression of the quality of work done.
- (g) The Occupational Health and Safety Act must be adhered to with reference to the safety of all employees employed by the Contractor. Suitable safety equipment and clothing shall be issued and maintained by the Contractor for the duration of construction.
- (h) Should any of the above conditions be less favourable than any bargaining council agreement or Act applicable to the Contractor, the more favourable condition shall apply.

#### **C3.4.1.32 SURVEY AND SETTING OUT**

Benchmarks are available on Site and shall be used for construction purposes.

The Engineer has shown the position of the permanent survey beacons on the relevant Drawings. If these beacons are existing, the relevant position (X/Y coordinates) as well as the elevation (Z coordinate) will be shown on the Drawings.

#### **C3.4.1.33 SECURITY OF THE SITE**

The attention of the Contractor is drawn to the necessity of securing his Site, in particular his construction camp and depot. The Contractor shall allow at all times for the necessary security and watching to prevent theft or damage to Materials, Plant and Contractor's Equipment, and to ensure the safety of both the Contractor's Personnel and the Employer's Personnel.

The construction of the plant is situated in close proximity to an area of volatility and unrest and hence the necessary measures must be put in place by the Contractor to secure the Site and any entrance to the Employer's existing assets required for construction activities.

A provision has been allowed for specialised site security services by a PSiRA registered, competent service provider in order to ensure that the site, all personnel, visitors, equipment, materials etc. are safe for the duration of the Contract. Submissions for the appointment of said service provider to be approved by the Engineer prior to appointment.

It is in the interest of the Contractor to establish and maintain healthy community liaison and employment structures throughout the duration of the Contract as healthy structures will serve to elicit the support of affected communities in detecting and prosecuting criminal activity.

#### **END OF SECTION**



## *DAWID KRUIJER MUNICIPALITY*

**CONTRACT No: TN003/2026**

**REPLACEMENT OF ABRAHAM HOLBORS SEPTEMBER WATER TREATMENT  
PLANT MOTOR CONTROL CENTRE**

**BUILD OF ELECTRICAL WORKS**

### **C3.4.2 PROJECT SPECIFICATIONS**



## **DAWID KRUIJER MUNICIPALITY**

### **CONTRACT No: TN003/2026**

### **REPLACEMENT OF ABRAHAM HOLBORS SEPTEMBER WATER TREATMENT PLANT MOTOR CONTROL CENTRE**

#### **BUILD OF ELECTRICAL WORKS**

#### **SECTION 3.4.2 PROJECT SPECIFICATIONS FOR ELECTRICAL AND ELECTRONIC WORKS**

The various documents listed in section **C3.4.2** shall be treated as mutually explanatory. However, should any requirement of section **C3.4.3** conflict with any requirement of the Standardised or Particular Specifications, then the requirement of section **C3.4.2** shall prevail.

The Contractor shall be responsible to ensure that the rates provided allow for all cost associated with delivering a Plant operating as per its intended use and fit for purpose. Where the Contractor wishes to specify specific items, not listed in the payment schedules he/she may do so in the open spaces allowed for under the heading “other”. These pay items shall generally be priced per system or as a “Sum” (unless specified otherwise), or as the Contractor deems fit.

##### **C3.4.2.1 General Requirements**

It should be noted that whether or not additional items are priced under this section of the Schedules does not remove any responsibility from the Contractor to supply a fully operational Plant operating as per its intended use, fit for purpose. If a specific pay item is not allowed for the relevant payment scheduled it shall be accepted that any additional cost required have been distributed throughout the other rates listed in the payment schedules.

##### **C3.4.2.1.1 General – Reputable suppliers**

Any equipment supplied without established local representation and servicing capability in the Republic of South Africa will not be accepted unless agreed in writing by the Employer.

Equipment of all manufacturers must be in accordance with these specifications and plans. The approval of a supplier or manufacturer does not eliminate the responsibility of the Contractor to providing equipment in compliance with the specifications forming part of this Contract. Any deviations without sufficient evidence that the equipment/system is of equal or superior quality shall be rejected without further review or comment.



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## **PSEGEN.A ABBREVIATIONS**

AI	Analogue Inputs
AO	Analogue Outputs
C&I	Control and Instrumentation
COC	Certificate of Compliance
CPU	Central Processing Unit
DB	Distribution Board
DI	Digital Input
DO	Digital Output
EC&I	Electrical, Control and Instrumentation
FT	Flow Transmitter
GA	General Arrangement
HMI	Human Machine Interface
LT	Level Transmitter
LV	Low Voltage
FDS	Functional Description Specification
FM	Flow Meter
MCC	Motor Control Centre
MV	Medium Voltage
O&M	Operations & Maintenance
OHL	Overhead Line
PLC	Programmable Logic Controller
PST	Primary Settling Tank
PT	Pressure Transmitter
RCC	Regulatory Conformance Certificate
RIO	Remote I/O
SABS	South African Bureau of Standards
SLD	Single Line Diagram
SOW	Scope of Work
SST	Secondary Settling Tank
TB	Turbidity sensor
TT	Temperature Transmitter
VSD	Variable Speed Drive
WTW	Water Treatment Works
WWTW	Wastewater Treatment Works
S/S	Substation
M/S	Miniature Substation



## **PSEGEN.D TESTING**

For all equipment provided, the correct operation of the equipment and the achievement of the specified performance requirements shall be demonstrated to the Engineer prior to the commissioning of the Works. Specific testing requirements are specified under each equipment specification (if required or applicable) as well as in Volume 3.

## **PSEGEN.E MEASUREMENT AND PAYMENT**

The method for measurement and payment shall be done according to the following method, unless specified otherwise:

<b>Pay item</b>	<b>Unit</b>
-----------------	-------------

### **PSEGEN.E.1 DESIGNS, DRAWINGS AND GENERAL**

Provide design drawings and design information as specified, inclusive of general layout, wiring diagrams and Process and Instrumentation Diagrams (P&IDs).Sum

### **PSEGEN.E.2 MANUFACTURING, SUPPLY AND DELIVERY ON SITE**

Rate tendered to include for all material, equipment, plant, testing apparatus, labour, manufacturing, factory applied corrosion protection, factory acceptance testing if applicable, transport, import duties, handling and possibly double handling, delivery to and off-loading at Site as well as temporary storage prior to installation.

### **PSEGEN.E.2 INSTALLATION WORK**

Rate tendered to include for all plant, tools, labour, rigging, handling, placing into position, aligning, fixing, grouting, repair to damaged corrosion protection and getting ready for testing and commissioning.



### **PSEGEN.E.3 TESTING AND COMMISSIONING**

Rate tendered to include for the drafting of the necessary testing and commissioning plans, attendance of required local and/or overseas specialists, testing apparatus, instruments and equipment, any/all chemicals and consumables required for testing purposes and to prove performance, any/all temporary works, any/all sampling and analysis and compilation of final commissioning report.

#### **PSEGEN. FGENERAL**

When design drawings are produced for electrical switchboards a detailed circuit schematic shall be produced for every incomer, feeder or motor circuit. The provision of typical circuits shall not be accepted.

A protection and grading study shall be carried out for substations and according to the requirements of the particular specification.

The contractor shall be responsible for liaising with Eskom, to determine the upstream protection relay settings and values to grade with. These values shall be included within the grading study and shall form the basis for determining all relay settings.

The grading study and all settings shall be well documented and available for checking if called for by the engineer. Arc flash detection shall be provided for the entire switchboard as per the general specification requirements.

The upgrade of the medium voltage equipment will require planned shut down procedures to ensure certain parts of the upgrade can be implemented. Careful planning, methodologies and shall be necessary to limit the supply outages to a minimum to prevent plant operation disruptions as far as possible. The contractor shall submit a detail method statement of the shutdown and detailed program to the Engineer for approval before any work may commence. It is the responsibility of the contractor to submit the method statement at the start of the contract.

Workplan and proposed methodologies shall also be required for electrical equipment transport and entry to all the buildings.

#### **PSEGEN. G SCOPE OF WORK**

Design, Supply, Installation and Commissioning of all Electrical and Electronic System, whereas the mechanical equipment will be supplied under the Mechanical scope of work.

An existing Klockner Moeller Motor Control Centre (MCC) is currently installed on site, with overall dimensions of 6,150 mm (length) × 650 mm (width) × 2.6 m (height). The MCC consists of eight (8) tiers arranged in a back-to-back configuration, providing a dual-sided operational layout. Most sections conform to the standard width of 650 mm; however, certain tiers are slightly wider to accommodate larger control components, motor starters, and associated electrical equipment. The MCC room housing the unit measures 9.7 m (length) × 4.0 m (width) × 3.1 m (height), providing sufficient space for the MCC, cabling, and operator access.

As part of the upgrade works, the existing MCC will be completely removed from site. The contractor shall plan and coordinate the removal and installation activities carefully to ensure minimal downtime. Adequate teams must be deployed to dismantle, remove, and replace the MCC as efficiently as possible.



The new MCC installation must be completed and commissioned in the shortest feasible time to restore electrical power and resume plant operations. Given the MCC's critical function in plant control and power distribution, its replacement and energization will form a key component of the overall project planning and sequencing strategy.

#### Communication [Programmable Logic Controller]

The electrical subcontractor will be responsible for the design, supply and delivery, installation, testing and commissioning of a SCADA system, Fibre Optic communication, Programmable logic controllers, network, managed Network Switches and associated instrumentation.

The aim of this specification entails the connection and subsequent control and monitoring of the different PLC Units installed in the different areas [substations, MCC and miniature substations] off to a central SCADA system, which shall all be connected via a multimode Fibre Optic communication cable.

#### **PSEGEN. H ELECTRICAL AND ELECTRONIC SERVICING OF MECHANICAL EQUIPMENT**

Although the Engineer has taken precautions to ensure that all mechanical equipment are serviced in terms of the required electrical and electronic systems the nature of the Contract will require the Contractor to familiarise himself with the equipment and ensure that these allowances are sufficient. Should any equipment require additional electrical and electronic systems, or if the Contractor intends to provide additional equipment, it shall be accepted that his tender offer has made provision for this. The Contract will take full responsibility to ensure that all equipment offered or required for operation as per the intended use shall be serviced in full of the required electrical and electronic equipment. If there is no specific allowance made in the detailed specifications the Contract shall use an equivalent specification contained in this document, or where no such equivalent is available, inform the Engineer in writing and request that such a specification be made available.



## PSEMCC MOTOR CONTROL CENTRES AND DISTRIBUTION BOARDS

### PSEMCC -1 Scope of Works

Tenderer shall allow for the proper liaison with all other contractors to ensure proper functioning of all equipment supplied, installed and commissioned under this Contract.

Distribution Boards shall be installed in the positions indicated on the drawings and shall comply with SANS 1765. Electrical Contractors are advised to order their distribution boards from a reputable manufacturer, as inferior-quality boards will not be accepted.

All equipment offered under this Contract shall be selected to be equal (or better) of make as far as possible. The tenderer shall provide equipment for motor starter panels that is at least Type 2 coordinated. If moulded case circuit breakers and miniature circuit breakers are cascaded, supportive documentation must be supplied with the tender and the tenderer shall allow for the proper labelling as required by SANS.

Motor control centres (MCC) and distribution boards (DB) as specified shall be provided in the following locations.

NUMBER	DESCRIPTION	LOCATION
A	Motor Control Centre [Phase No.1 MCC No.1]	MCC Room
B	VFD Drive	MCC Room



## **PSEMCC -6. A Motor Control Centre [Phase No.2 MCC No.1]**

### **Existing MCC:**

An existing Klockner Moeller Motor Control Centre (MCC) is installed, measuring 6,150 mm in length, 650 mm in width, and 2.6 m in height.

The MCC comprises eight (8) tiers arranged back-to-back, forming a dual-sided configuration. While most sections maintain a standard width of 650 mm, certain tiers are slightly wider to accommodate larger components and equipment.

The MCC room has overall dimensions of 9.7 m (length) × 4.0 m (width) × 3.1 m (height).

### **Front Section Layout**

Tier No. 1 – Distribution Section 1:

Equipped with Filter No. 1 to No. 8, each protected by 25 A 3-pole (3P) circuit breakers.

Tier No. 2 – Distribution Section 2:

Includes a 250 A 3P feeder supplying power to Tiers No. 1 and No. 2, as well as:

1 × 25 A 3P breaker

6 × 2 A 1-pole (1P) breakers

3 × 10 A 1P breakers

Tiers No. 3 to No. 6 – Motor Starters:

Contain four (4) × 255 kW Allen Bradley soft starters, retrofitted to replace the original units.

Tiers No. 7 and No. 8 – Main Incomers:

Each fitted with 2,000 A 3P circuit breakers, serving as the main incoming supply to the MCC.

### **Rear Section Layout**

At the rear of the incomer section, a bus section interconnects the two main incomers (Tier No. 9 and Tier No. 10).

Tier No. 11 – Irrigation Pumps:

Houses 2 × 75 kW soft starters for the irrigation pump sets.

Tier No. 12 – Backwash and Blower Starters:

Includes 2 × 45 kW soft starters for the backwash pumps

Tier No. 13 – Backwash and Blower Starters:

Includes and 2 × 30 kW star/delta starters for the air blowers.

Tier No. 14 – Clariflocculator Tanks 1–4:

Provides 4 × 7.5 kW DOL feeders for the mixers and bridge drives. The mixers and bridge drives are supplied via a cubicle located on the bridge.

Tier No. 15 – External Feeds:

Supplies power to external facilities through:

315 A 3P feeder breaker for the New Filter Building MCC, and

80 A 3P feeder breaker for the Chemical Building MCC.

Tier No. 16 – Irrigation Pump 3:

Equipped with 1 × 75 kW soft starter for the third irrigation pump.

Type: These specification shall be considered as minimum design requirement in terms of the Contractor's Tender offer. The Electrical and Electronic Contractor(s) shall coordinate with the Mechanical Contractor to ensure sufficient allowance is made in their tender offer to provide a fit for purpose unit/system.

The new Motor Control Centre (MCC) shall be designed and constructed to accommodate future installation of two (2) × 2000 kVA transformers, configured in a duty and standby arrangement.

The motor control centre or distribution board shall be manufactured accordance to Particular Specification. The equipment referenced below does not relieve the contractor of his responsibilities in terms of quality, dimensions and proper functioning of the system.



The motor control centre board or distribution board shall be of the free-standing floor mounted type with a minimum IP rating of 42 (insect proofed enclosure). The motor control centre or distribution board shall be constructed with a minimum of 2mm 3CR12 stainless steel which will rest on a 3CR12 stainless steel rigid channel and shall be bolted down in position by means of M16 high tensile stainless-steel bolts grouted into the concrete floor, the bolts shall be inside the board.

The panel door shall be provided with a locking system suitable for padlocking. The locking system shall consist of a 3CR12 stainless steel 3-way locking mechanism locking the door at the top, middle and bottom. The unit doors shall be capable of being opened at least 110 degrees.

Sufficient provision for ventilation and heat dissipation as per the equipment ratings and manufacturers requirements shall be allowed for. Screwed-on engraved labels in English shall be provided below all switchgear and equipment on and in the panels, to facilitate identification. All unpainted parts shall be plated for corrosion resistance.

**Supply:** Existing Cables (Will be claimed on the multicore and cables schedule)

**Colour:** Painted Light Orange – B26 (SANS 1091:2012) external, White arc-free internal (see Painting and Finishing).

**Fault Level:** 50kA Minimum.

**Sectioning:** Multi-section, Form 3b or Form 4 to SANS IEC 60439.

**Future:** 10% for future extensions space.

**Cable Entry:** Incoming and Outgoing – Bottom. MCC gland plates shall be 3CR12 sheet steel, unpainted or aluminium (see Glanding Section particular specification).

**Base:** Single 100x50x6mm thick channel iron base with mitred corners and cross-bracing between every 2nd tier, which shall be per Particular Specification.

Contract: TN003/2026  
 Volume 2: Scope of Works  
 Portion 2: Contracts  
 Part C3.4.2: Project Specifications – Electrical Works (Volume 2)



QTY	DESCRIPTION	IDENTIFICATION
<b>Two</b>	<b>Panels comprising the following</b>	<b>Incomer No.1-No.2</b>
1	<p>3000Amp continuous current rated TP (triple pole) draw out type air circuit breaker complete with opening / closing release with sufficient auxiliary contacts and complete with:</p> <p>Control unit with adjustable overload and short circuit protection with time discrimination micrologic unit,</p> <p>Electrical operating mechanism for remote closing of circuit breaker, 231V AC operation,</p> <p>Minimum Micrologic Active 2.0</p> <p>Modbus Communication</p> <p>Key Switch</p> <p>Operation Counter</p> <p>Electric Motor for closing and opening</p> <p>Electrical and mechanical interlocks.</p> <p>Separate panel mounted circuit breaker close push button equal or similar to Schneider Electric: Plus</p>	Main Circuit Breaker
Set	3000/1 Amp current transformer: Plus	Current inputs
3	2 Amp HRC fuse holders and fused links: Plus	Voltage inputs
1	Front panel mounted LCD digital display supply network analyzer comprising of combined voltage, current, maximum demand power measurement and power factor correction measurement complete with network card: Plus	Network analyser
4	3000Amp tinted copper bus bars: Plus	3 Phase + N
1	2000Amp tinted copper bus bars: Plus	Earth
4	315Amp continuous current rated HRC fuse holders and fused links: Plus	Surge arrestors connection fuses
1	Three Phase combined class 1&2 surge arrester unit connection type 2 as per SANS 10142-1 with remote indicator panel & remote signalling contacts connected to the SCADA: Plus	Surge arrester plus signals
3	2Amp continuous current rated HRC fuse holders and fused links: Plus	Indicator Lamp Protection

QTY	DESCRIPTION	IDENTIFICATION
3	Robust LED indicator lamps connected load side of the circuit breaker.	Indicators for 3 Phase (Red , White and Blue Indications)
1	Front panel mounted "chicken switch" socket for switching of circuit breaker from a safe distance [Tender shall select all components to preferred manufacturers]	Chicken switch
1	Relay for under voltages, phase sequence, and phase loss in three phase Plus	Protection relay
One	Panels comprising the following	Busbar Section
1	3000Amp continuous current rated TP (triple pole) draw out type air circuit breaker complete with opening / closing release and sufficient auxiliary contacts and complete with:  Control unit with adjustable overload and short circuit protection with time discrimination micrologic unit,  Electrical operating mechanism for remote closing of circuit breaker, 231V AC operation,  Separate panel mounted circuit breaker close push button equal or similar to Schneider Electric: Plus	Main Circuit Breaker
4	2500Amp tint copper bus bars: Plus	3 Phase + N
1	2500Amp tint copper bus bars: Plus	Earth
6	2Amp continuous current rated HRC fuse holders and fused links: Plus	Indicator Lamp Protection Left and Right Busbars
3	Robust LED indicator lamps connected load side of the circuit breaker.	Indicators for 3 Phase (Red , White and Blue Indications) Left and Right Busbars
1	Front panel mounted "chicken switch" socket for switching of circuit breaker from a safe distance [Tender shall select all components to preferred manufacturers]	Chicken switch
All	Relays, auxiliary contacts, indicating lights, wiring and reset buttons necessary for the following	Interlocks
	Mechanical and electrical interlocks that all busbars fed from Transformer No 1	
	Mechanical and electrical interlocks that all busbars fed from Transformer No 2	
	Mechanical and electrical interlocks that Busbar 1 fed from Transformer No 1; Busbar 2 fed from Transformer No 2	
	Mechanical and electrical interlocks that prevent paralleling the system.	
One	Panels comprising the following:  [Cascaded]	Distribution Section

QTY	DESCRIPTION	IDENTIFICATION
1	630Amp TP continuous current rated MCCB with door interlock (setting set to Amp) including electronic trip unit [Cascaded Section]: Plus	Main
4	630Amp copper bus bars: Plus	3 Phase + N
1	400Amp copper bus bar: Plus	Earth
9	25Amp TP continuous current rated MCCB: Plus	Filter Feeder Breakers
6	2Amp 1P continuous current rated MCB: Plus	Breakers
3	10Amp 1P continuous current rated MCB: Plus	Breakers
1	16Amp 2P continuous current rated MCB: Plus	UPS Feeder Breaker
1	320Amp continuous current rated MCCB with door interlock (setting set to Amp) including electronic trip unit: Plus	New Filter Feeder
1	100Amp continuous current rated MCCB with door interlock (setting set to Amp) including electronic trip unit: Plus	Chemical MCC Feed
1	60Amp continuous current rated MCCB with door interlock (setting set to Amp) including electronic trip unit: Plus	Local DB feeder
30%	Spare Allowance	Allowance for future breakers.
Two	Panel comprising the following:	Backwash Pump No.1 – No.2
1	45kW TP continuous current rated motor protection MCCB complete with extended rotary handle for door interlocking [Mechanical operating handle for circuit-breaker, including door interlock, self-aligning spindle and padlocking facility] (Estimated and shall be coordinated with mechanical contractor to ensure correct supplies to mechanical equipment): Plus	Main
Set	Continuous current rated core balanced current transformers: Plus	Current inputs
3	2 Amp HRC fuse holders and fused links: Plus	Voltage inputs
1	45kW three phase heavy duty vector control variable frequency drive complete preferred by the client to be Schneider Electric ATV 630 with 1) Programmable cards, 2) Communication card & 3) Encoder interface card. All necessary harmonic filters shall be included, EMC filter, line choke motor chokes and sinus filters all shall be inclusive.  The following minimum protection parameters shall be available on the Variable frequency drive:  Thermal Output Phase loss Drive overheat Over voltage	Variable frequency drive

QTY	DESCRIPTION	IDENTIFICATION
	Under voltage Frequency meter Locked rotor Phase rotation Under current  (Estimated and shall be coordinated with mechanical contractor to ensure correct supplies to mechanical equipment): Plus	
All	A separate door mountable display and programming control unit shall be front door mounted.	Separate display unit for VSD Drives with all parameters
All	Communications module must be provided, communication links with PLC/DCS Units. The communication interface must comply with either of the following: Profibus-DP Profinet Industrial Ethernet Modbus TCP/IP  Under no circumstances, shall the use of proprietary protocols be allowed: Plus	Communication module for VSD
1	6Amp continuous current rated SP MCB: Plus	Variable frequency drive fans supply
All	Extraction fans in panel door for cooling of variable speed drives in accordance with manufacturers specifications: Plus	Fans for Variable Speed
All	Reset push button for pump casing temperature trip condition: Plus	Pump casing temperature trip reset (If provided on pump sets)
All	Thermistor relay: Plus	(If provided on pump sets)
All	Thermistor trip indication: plus	(If provided on pump sets)
All	Thermistor reset button: Plus	(If provided on pump sets)
1	Running hour meter: Plus	Running Hour Meter
All	All equipment necessary for remote emergency stop device	All
1	Manual-off-auto-remote selector switch: Plus	Selector Switch
All	Monitoring and control equipment: Plus	Control & Monitoring functions
1	10Amp continuous current rated SP MCB: Plus	Heater Supply
1	Continuous current rated Ammeter: Plus	Heater ammeter
All	All equipment necessary for remote emergency stop device	All necessary equipment

QTY	DESCRIPTION	IDENTIFICATION
All	Relays and auxiliary contacts necessary for:	
All	Refer to Common Control cubicle	Refer to common control
One	Cubicle comprising the following: [Common Control - Backwash Pump No.1 – No.2]	Backwash Pump No.1 – No.2
1	10Amp sized continuous current rated SP + N door interlocked MCB: Plus	Main Circuit Breaker
1	Manual – Off - Auto selector switch: Plus	Selector Switch
1	Backwash will be operated as One duty and One standby unit. A timer shall be provided for duty rotation of pump sets after a 24-hour period of time. In the event of a pump failure the duty cycle must be transferred to the next available pump set. Timer will be disabled in the event when one pump set is out of commission: Plus	Timer control in manual mode
1	Duty rotation timer and flip-flop relay that will rotate duty cycle between duty and standby pump sets on a daily basis. If standby pump set is not available duty pump set will remain in operation: Plus	Duty rotation in manual mode
All	The following Indication lights (LED type); Red – 'Motor Stopped'; Green - 'Motor Running'; Yellow – 'Motor Tripped: Plus	Indication lights
All	All equipment necessary for remote motor status, speed monitoring and control.	Control and monitoring
All	Relays, auxiliary contacts, indicating lights, wiring and reset buttons necessary for the following	
All	Interlocking with emergency stop stations on all motors to lockout main circuit breaker, if emergency stop is pressed the standby pump must automatically start: Plus	All motors shall have E-Stops
All	Interlock timer & relays to limit starts per hour, per the manufacturer's requirements, predetermined starts per hour allowed: Plus	Starts per Hour
All	Interlock motor sets as One duty and One standby unit in manual as well as automatic mode of operation: Plus	Interlocks duty and standby.
All	Extraction fans in panel door for cooling in accordance with manufacturers specifications. If the Fans do not work in manual as well as automatic mode of operation, the start shall be interlocked to not to be able to start. Unhealthy status will displayed on indication: Plus	Extraction fan interlocks
All	Interlock pump in manual as well as automatic mode of operation with level control system. A predetermined low level will stop the pump: Plus	Level protection
All	Interlock motor with pressure sensors in common delivery and common suction pump line in automatic	Pressure sensors

QTY	DESCRIPTION	IDENTIFICATION
	mode of operation. Predetermined low pressure will stop the duty motor and predetermined high pressure will stop the duty motor. If a predetermined pressure is not obtained the duty motor sets, will stop and will ramp down. During start up and shut down this function must be bypassed for a predetermined period. Motor sets will only be able to start once pressure trip has been manually been reset: Plus	
All	Interlock motor with no-flow sensor in suction pipeline. During start up this function must be bypassed for a predetermined period of time: Plus	No-flow sensor
All	All RTD sensors shall be interlocked in manual and in automatic mode of operation to protect motors.	RTD Protection
All	Interlock all predetermined temperature settings in manual and auto mode of operation. The temperature settings shall be as per the manufacturer's recommendations: Plus	If supplied by mechanical Contractor - Temperature Protection
All	All Interlocks as described under operation of plant [PSEPLC-15]	Additional interlocks and writeup
All	Remote stop/start of backwash water pumps at filter plant control consoles in the event of a PLC communication failure and manual starting and stopping: Plus	Manual Starting capability
All	All motor/pump information and signals statuses shall be available on the PLC system: Plus.	Signals statuses
Two	Panel comprising the following:	Blowers No.1 – No.2
1	30kW TP continuous current rated motor protection MCCB complete with extended rotary handle for door interlocking [Mechanical operating handle for circuit-breaker, including door interlock, self-aligning spindle and padlocking facility] (Estimated and shall be coordinated with mechanical contractor to ensure correct supplies to mechanical equipment): Plus	Main
Set	Continuous current rated core balanced current transformers: Plus	Current inputs
3	2 Amp HRC fuse holders and fused links: Plus	Voltage inputs
1	30kW (3) phase heavy duty vector control variable frequency drive complete with preferred by the client to be Schneider Electric ATV 630 1) Programmable cards, 2) Communication card & 3) Encoder interface card. All necessary harmonic filters shall be included, EMC filter, line choke motor chokes and sinus filters all shall be inclusive. The following minimum protection parameters shall be available on the Variable frequency drive: Thermal Output Phase loss Input phase loss Drive overheat Over voltage Under voltage Locked rotor	Variable frequency drive

QTY	DESCRIPTION	IDENTIFICATION
	Phase rotation Under current  (Estimated and shall be coordinated with mechanical contractor to ensure correct supplies to mechanical equipment): Plus	
All	A separate door mountable display and programming control unit shall be front door mounted.	Separate display unit for VSD Drives with all parameters
All	Communications module must be provided, communication links with PLC/DCS Units. The communication interface must comply with either of the following: Profibus-DP Profinet Industrial Ethernet Modbus TCP/IP  Under no circumstances, shall the use of proprietary protocols be allowed: Plus	Communication module for VSD
1	6Amp continuous current rated SP MCB: Plus	Variable frequency drive fans supply
1	Mains operated timer to limit starts per hour: Plus	Limit Starts
All	Extraction fans in panel door for cooling of variable speed drives in accordance with manufacturers specifications: Plus	Fans for Variable Speed
All	Reset push button for pump casing temperature trip condition: Plus	Pump casing temperature trip reset (If provided on pump sets)
All	Thermistor relay: Plus	(If provided on pump sets)
All	Thermistor trip indication: plus	(If provided on pump sets)
All	Thermistor reset button: Plus	(If provided on pump sets)
1	Running hour meter: Plus	Running Hour Meter
All	All equipment necessary for remote emergency stop device	All
All	Monitoring and control equipment: Plus	Control & Monitoring functions
1	10Amp continuous current rated SP MCB: Plus	Heater Supply
1	Continuous current rated Ammeter: Plus	Heater ammeter
All	Relays and auxiliary contacts necessary for:	

QTY	DESCRIPTION	IDENTIFICATION
All	Refer to Common Control cubicle	Refer to common control
One	Cubicle comprising the following: [Common Control - Blowers No.1 – No.2]	Blowers No.1 – No.2
1	10Amp sized continuous current rated SP + N door interlocked MCB: Plus	Main Circuit Breaker
1	Manual – Off - Auto selector switch: Plus	Selector Switch
1	Blowers will be operated as One duty and One standby unit. A timer shall be provided for duty rotation of pump sets after a 24-hour period of time. In the event of a pump failure the duty cycle must be transferred to the next available pump set. Timer will be disabled in the event when one pump set is out of commission: Plus	Timer control in manual mode
1	Duty rotation timer and flip-flop relay that will rotate duty cycle between duty and standby pump sets on a daily basis. If standby pump set is not available duty pump set will remain in operation: Plus	Duty rotation in manual mode
All	The following Indication lights (LED type); Red – 'Motor Stopped'; Green - 'Motor Running'; Yellow – 'Motor Tripped: Plus	Indication lights
All	All equipment necessary for remote motor status, speed monitoring and control.	Control and monitoring
All	Relays, auxiliary contacts, indicating lights, wiring and reset buttons necessary for the following	
All	Interlocking with emergency stop stations on all motors to lockout main circuit breaker, if emergency stop is pressed the standby pump must automatically start: Plus	All motors shall have E-Stops
All	Interlock timer & relays to limit starts per hour, per the manufacturer's requirements, predetermined starts per hour allowed: Plus	Starts per Hour
All	Interlock motor sets as One duty and One standby unit in manual as well as automatic mode of operation: Plus	Interlocks duty and standby.
All	Extraction fans in panel door for cooling in accordance with manufacturers specifications. If the Fans do not work in manual as well as automatic mode of operation, the start shall be interlocked to not to be able to start. Unhealthy status will displayed on indication: Plus	Extraction fan interlocks
All	Interlock motor with pressure sensors in common delivery and common suction pump line in automatic mode of operation. Predetermined low pressure will stop the duty motor and predetermined high pressure will stop the duty motor. If a predetermined pressure is not obtained the duty motor sets, will stop and will ramp down. During start up and shut down this function must be bypassed for a predetermined period. Motor sets will only be able to start once pressure trip has been manually been reset: Plus	Pressure sensors

<b>QTY</b>	<b>DESCRIPTION</b>	<b>IDENTIFICATION</b>
All	All RTD sensors shall be interlocked in manual and in automatic mode of operation to protect motors.	RTD Protection
All	Interlock all predetermined temperature settings in manual and auto mode of operation. The temperature settings shall be as per the manufacturer's recommendations: Plus	Temperature Protection
All	All Interlocks as described under operation of plant [PSEPLC-15]	Additional interlocks and writeup
All	Remote stop/start of blowers at filter plant control consoles in the event of a PLC communication failure and manual starting and stopping: Plus	Manual Starting capability
All	All motor/pump information and signals statuses shall be available on the PLC system: Plus.	Signals statuses
Three	Panel comprising the following:	Irrigation Pump No.1 – No.3
1	75kW TP continuous current rated motor protection MCCB complete with extended rotary handle for door interlocking [Mechanical operating handle for circuit-breaker, including door interlock, self-aligning spindle and padlocking facility] (Estimated and shall be coordinated with mechanical contractor to ensure correct supplies to mechanical equipment): Plus	Main
Set	Continuous current rated core balanced current transformers: Plus	Current inputs
3	2 Amp HRC fuse holders and fused links: Plus	Voltage inputs
1	75kW three phase heavy duty vector control variable frequency drive complete with preferred by the client to be Schneider Electric ATV 630 1) Programmable cards, 2) Communication card & 3) Encoder interface card. All necessary harmonic filters shall be included, EMC filter, line choke motor chokes and sinus filters all shall be inclusive.  The following minimum protection parameters shall be available on the Variable frequency drive:  Thermal Output Phase loss Drive overheat Over voltage Under voltage Frequency meter Locked rotor Phase rotation Under current  (Estimated and shall be coordinated with mechanical contractor to ensure correct supplies to mechanical equipment): Plus	Variable frequency drive
All	A separate door mountable display and programming control unit shall be front door mounted.	Separate display unit for VSD Drives with all parameters

QTY	DESCRIPTION	IDENTIFICATION
All	Communications module must be provided, communication links with PLC/DCS Units. The communication interface must comply with either of the following: Profibus-DP Profinet Industrial Ethernet Modbus TCP/IP  Under no circumstances, shall the use of proprietary protocols be allowed: Plus	Communication module for VSD
1	6Amp continuous current rated SP MCB: Plus	Variable frequency drive fans supply
All	Extraction fans in panel door for cooling of variable speed drives in accordance with manufacturers specifications: Plus	Fans for Variable Speed
All	Reset push button for pump casing temperature trip condition: Plus	Pump casing temperature trip reset (If provided on pump sets)
All	Thermistor relay: Plus	(If provided on pump sets)
All	Thermistor trip indication: plus	(If provided on pump sets)
All	Thermistor reset button: Plus	(If provided on pump sets)
1	Running hour meter: Plus	Running Hour Meter
All	All equipment necessary for remote emergency stop device	All
1	Manual-off-auto-remote selector switch: Plus	Selector Switch
All	Monitoring and control equipment: Plus	Control & Monitoring functions
1	10Amp continuous current rated SP MCB: Plus	Heater Supply
1	Continuous current rated Ammeter: Plus	Heater ammeter
All	All equipment necessary for remote emergency stop device	All necessary equipment
All	Relays and auxiliary contacts necessary for:	
All	Refer to Common Control cubicle	Refer to common control
One	Cubicle comprising the following: [Common Control - Irrigation Pump No.1 – No.3]	Irrigation Pump No.1 – No.3
1	10Amp sized continuous current rated SP + N door interlocked MCB: Plus	Main Circuit Breaker
1	Manual – Off - Auto selector switch: Plus	Selector Switch

QTY	DESCRIPTION	IDENTIFICATION
1	Irrigation Pump No.1 – No.3 will be operated as Two duty and One standby unit. A timer shall be provided for duty rotation of pump sets after a 24-hour period of time. In the event of a pump failure the duty cycle must be transferred to the next available pump set. Timer will be disabled in the event when one pump set is out of commission: Plus	Timer control in manual mode
1	Duty rotation timer and flip-flop relay that will rotate duty cycle between duty and standby pump sets on a daily basis. If standby pump set is not available duty pump set will remain in operation: Plus	Duty rotation in manual mode
All	The following Indication lights (LED type); Red – 'Motor Stopped'; Green - 'Motor Running'; Yellow – 'Motor Tripped: Plus	Indication lights
All	All equipment necessary for remote motor status, speed monitoring and control.	Control and monitoring
All	Relays, auxiliary contacts, indicating lights, wiring and reset buttons necessary for the following	
All	Interlocking with emergency stop stations on all motors to lockout main circuit breaker, if emergency stop is pressed the standby pump must automatically start: Plus	All motors shall have E-Stops
All	Interlock timer & relays to limit starts per hour, per the manufacturer's requirements, predetermined starts per hour allowed: Plus	Starts per Hour
All	Interlock motor sets as Two duty and One standby unit in manual as well as automatic mode of operation: Plus	Interlocks duty and standby.
All	Extraction fans in panel door for cooling in accordance with manufacturers specifications. If the Fans do not work in manual as well as automatic mode of operation, the start shall be interlocked to not to be able to start. Unhealthy status will displayed on indication: Plus	Extraction fan interlocks
All	Interlock pump in manual as well as automatic mode of operation with level control system. A predetermined low level will stop the pump: Plus	Level protection
All	Interlock motor with pressure sensors in common delivery and common suction pump line in automatic mode of operation. Predetermined low pressure will stop the duty motor and predetermined high pressure will stop the duty motor. If a predetermined pressure is not obtained the duty motor sets, will stop and will ramp down. During start up and shut down this function must be bypassed for a predetermined period. Motor sets will only be able to start once pressure trip has been manually been reset: Plus	Pressure sensors
All	Interlock motor with no-flow sensor in suction pipeline. During start up this function must be bypassed for a predetermined period of time: Plus	No-flow sensor
All	All RTD sensors shall be interlocked in manual and in automatic mode of operation to protect motors.	RTD Protection

QTY	DESCRIPTION	IDENTIFICATION
All	Interlock all predetermined temperature settings in manual and auto mode of operation. The temperature settings shall be as per the manufacturer's recommendations: Plus	If supplied by mechanical Contractor - Temperature Protection
All	All Interlocks as described under operation of plant [PSEPLC-15]	Additional interlocks and writeup
All	Remote stop/start of backwash water pumps at filter plant control consoles in the event of a PLC communication failure and manual starting and stopping: Plus	Manual Starting capability
All	All motor/pump information and signals statuses shall be available on the PLC system: Plus.	Signals statuses
Four	Panel comprising the following:	Clearwater Pump No.1 – No.4 Feeder Breakers
1	255kW TP continuous current rated motor protection MCCB complete with extended rotary handle for door interlocking [Mechanical operating handle for circuit-breaker, including door interlock, self-aligning spindle and padlocking facility] (Estimated and shall be coordinated with mechanical contractor to ensure correct supplies to mechanical equipment): Plus	Main
Set	Continuous current rated core balanced current transformers: Plus	Current inputs
3	2 Amp HRC fuse holders and fused links: Plus	Voltage inputs
3	500/1 Amp continuous current rated current transformers: Plus	Local current
1	Ammeter scaled 0-500Amp: Plus	Ammeter
1	3 Position Selector switch	R-W-B phase indication
1	Running hour meter: Plus	Running Hour Meter
All	All Indication lights as specified under particular specification PMC 6.2 – 6.5 including healthy, start delay indication, heater and E-Stop engaged: Plus	Indication lights
1	Manual-off-auto-remote selector switch: Plus	Selector Switch
One	Cubicle comprising the following: [Common Control - Clearwater Pump No.1 – No.4]	Clearwater Pump No.1 – No.4
1	10Amp sized continuous current rated SP + N door interlocked MCB: Plus	Main Circuit Breaker
1	2 x Duty Motors – 3 x Duty Motors - Auto selector switch (Future): Plus	Selector Switch
1	Clearwater Pump No.1 – No.4 will be operated as 2 x Duty Motors – 3 x Duty Motors duty and One or two standby unit. A timer shall be provided for duty rotation of pump sets after a 24-hour period of time. In the event of a pump failure the duty cycle must be	Timer control in manual mode

QTY	DESCRIPTION	IDENTIFICATION
	transferred to the next available pump set. Timer will be disabled in the event when one pump set is out of commission: Plus	
1	Duty rotation timer and flip-flop relay that will rotate duty cycle between duty and standby pump sets on a daily basis. If standby pump set is not available duty pump set will remain in operation: Plus	Duty rotation in manual mode
All	The following Indication lights (LED type); Red – 'Motor Stopped'; Green - 'Motor Running'; Yellow – 'Motor Tripped: Plus	Indication lights
All	All equipment necessary for remote motor status, speed monitoring and control.	Control and monitoring
All	Relays, auxiliary contacts, indicating lights, wiring and reset buttons necessary for the following	
All	Interlocking with emergency stop stations on all motors to lockout main circuit breaker, if emergency stop is pressed the standby pump must automatically start: Plus	All motors shall have E-Stops
All	Interlock timer & relays to limit starts per hour, per the manufacturer's requirements, predetermined starts per hour allowed: Plus	Starts per Hour
All	Interlock motor sets as described above duty and described above standby unit in manual as well as automatic mode of operation: Plus	Interlocks duty and standby.
All	Extraction fans in panel door for cooling in accordance with manufacturers specifications. If the Fans do not work in manual as well as automatic mode of operation, the start shall be interlocked to not to be able to start. Unhealthy status will displayed on indication: Plus	Extraction fan interlocks
All	Interlock pump in manual as well as automatic mode of operation with level control system. A predetermined low level will stop the pump: Plus	Level protection
All	Interlock motor with pressure sensors in common delivery and common suction pump line in automatic mode of operation. Predetermined low pressure will stop the duty motor and predetermined high pressure will stop the duty motor. If a predetermined pressure is not obtained the duty motor sets, will stop and will ramp down. During start up and shut down this function must be bypassed for a predetermined period. Motor sets will only be able to start once pressure trip has been manually been reset: Plus	Pressure sensors
All	Interlock motor with no-flow sensor in suction pipeline. During start up this function must be bypassed for a predetermined period of time: Plus	No-flow sensor
All	All RTD sensors shall be interlocked in manual and in automatic mode of operation to protect motors.	RTD Protection
All	Interlock all predetermined temperature settings in manual and auto mode of operation. The temperature	If supplied by mechanical Contractor - Temperature Protection

QTY	DESCRIPTION	IDENTIFICATION
	settings shall be as per the manufacturer's recommendations: Plus	
All	All Interlocks as described under operation of plant [PSEPLC-15]	Additional interlocks and writeup
All	Remote stop/start of backwash water pumps at filter plant control consoles in the event of a PLC communication failure and manual starting and stopping: Plus	Manual Starting capability
All	All motor/pump information and signals statuses shall be available on the PLC system: Plus.	Signals statuses
One	Panel comprising the following:	PLC Equipment as specified under PLC descriptions
One	Panel comprising the following:	UPS Equipment as specified under UPS descriptions



## **PSEMCC -6.B Four [X4] Variable Frequency Drives Tiers Situated MCC Building**

Type: These specification shall be considered as minimum design requirement in terms of the Contractor's Tender offer. The Electrical and Electronic Contractor(s) shall coordinate with the Mechanical Contractor to ensure sufficient allowance is made in their tender offer to provide a fit for purpose unit/system.

The floor standing variable speed drives shall be of the free-standing floor mounted type with a minimum IP rating of 42 (insect proofed enclosure).

The panel door shall be equipped with a locking system suitable for padlocking. This system shall consist of a 3-way 3CR12 stainless steel mechanism securing the door at the top, middle, and bottom. The unit doors shall be capable of opening to at least 110 degrees. The panel shall also include a top-mounted fan system designed for variable speed operation, as well as a front bottom-mounted fan suitable for use with a variable frequency drive.

The board shall be provided with readily removable, sectionalized, rigidly supported unpainted 3CR12 cable end support gland plates along the entire length of the board and at least 230 mm above floor level.

Sufficient provision for ventilation and heat dissipation as per the equipment ratings and manufacturers requirements shall be allowed for. The contractor shall prove to the Engineer by means of Anemometer or Differential that the requirements and manufacturer's requirements are met.

Screwed-on engraved labels in English shall be provided below all switchgear and equipment on and in the panels, to facilitate identification. All unpainted parts shall be plated for corrosion resistance.

**Supply:** 2 x 70mm<sup>2</sup> 4C CU PVC SWA PVC cables in parallel plus a 70mm<sup>2</sup> Bare copper cable feeder from Inlet Works MCC.

**Colour:** Painted Light Orange – B26 (SANS 1091:2012) external, White arc-free internal (see Painting and Finishing below).

**Fault Level:** 50kA.

**Sectioning:** Multi-section, Form 3b or Form 4 to SANS IEC 60439.

**Cable Entry:** Incoming and Outgoing – Bottom. MCC gland plates shall be 3CR12 sheet steel, unpainted or aluminium (see Glanding Section in City of Cape Town specification).

QTY	DESCRIPTION	IDENTIFICATION
Four [x4]	<b>Panels comprising the following</b>	<b>Clearwater Pumps No.1 – No.4</b>
1	255kW continuous current rated TP door interlocked motor protection MCCB [thermal magnetic] with opening / closing release contacts including adjustable electronic trip relay. The motor circuit breaker shall be IEC 60947 certified and shall have type 2 coordinated capabilities complete spreaders, door interlock and all accessories. door interlock and all accessories. (Estimated and shall be coordinated with mechanical contractor to ensure correct supplies to mechanical equipment): Plus	Variable Speed Drive Tier Main Breaker

QTY	DESCRIPTION	IDENTIFICATION
Set	Continuous current rated current transformers: Plus	Current inputs
3	2 Amp HRC fuse holders and fused links: Plus	Voltage inputs
1	<p>255kW (3) phase heavy duty vector control variable frequency drive complete with 1) Programmable cards, 2) Communication card &amp; 3) Encoder interface card. The variable speed drive shall come complete with braking, resistors, line chokes, filters, additional EMC input filters and all necessary harmonic sinus filters all shall be inclusive. Preferred by the client to be Schneider Electric ATV 680 low harmonic drive.</p> <p>The following minimum protection parameters shall be available on the Variable frequency drive:</p> <p>Thermal Output Phase loss Input phase loss Drive overheats Over voltage Under voltage Frequency meter Locked rotor Phase rotation Under current Torque detection for motor on bridge Speed or torque control Braking unit via re-injection to the line supply Integrated Motor Overload Protection Metering Real Time Clock Motor Winding Heater Function Diagnostic Faults and Alarms Automatic Tuning of Motor Parameters Protection and diagnostics [Amps, volts, kW, kWh, MW, MWH, elapsed time, power factor, motor thermal capacity usage] Alarms [Overload, underload, undervoltage, overvoltage, unbalance, jam, stall, and ground fault] Pump Control [starting and stopping period. Starting time is adjustable. Stopping time is adjustable]. Onboard RTD detection and alarm Continuous heavy duty VSD Drive application</p> <p>: Plus</p> <p>Communications module must be provided, communication links with PLC/DCS Units. The communication interface must comply with either of the following [Network Communications]: Profibus-DP Profinet Industrial Ethernet Modbus TCP/IP</p> <p>Under no circumstances, shall the use of proprietary protocols be allowed: Plus</p> <p>(Estimated and shall be coordinated with mechanical contractor to ensure correct supplies to mechanical equipment): Plus</p>	Variable Speed Drive
1	6Amp continuous current rated SP MCB: Plus	Ventilation fans supply

QTY	DESCRIPTION	IDENTIFICATION
All	A separate door mountable display and programming control unit shall be front door mounted.	Separate display unit for VSD Drives with all parameters
All	Communications module must be provided, communication links with PLC/DCS Units. The communication interface must comply with either of the following:  Profibus-DP Profinet Industrial Ethernet Modbus TCP/IP  Under no circumstances, shall the use of proprietary protocols be allowed: Plus	Communication module for VSD
1	Turn knob speed adjustment by means of current source (4-20mA): Plus	Manual speed control
1	Set of Stop/Start push buttons: Plus	Stop/Start Push Buttons
1	Mains operated timer to limit starts per hour: Plus	Limit Starts
All	Extraction fans in panel door for cooling of variable speed drives in accordance with manufacturers specifications: Plus	Fans for Soft Starter
1	Digital [Resettable] Running hour meter: Plus	Running Hour Meter
1	Pump sets will be operated as Three duty and One standby unit. A timer shall be provided for duty rotation of pump sets after a 24-hour period of time. In the event of a pump failure the duty cycle must be transferred to the next available pump set. Timer will be disabled in the event when one pump set is out of commission: Plus	Timer control in manual mode
1	Duty rotation timer and flip-flop relay that will rotate duty cycle between duty pump sets and standby pump sets on a daily basis. If standby pump set is not available duty pump set will remain in operation: Plus	Duty rotation in manual mode
1	Starting delay timer for sequence starting on motors: Plus	Sequence starting
9	Front panel mounted (48x48mm) digital microprocessor based local soft key programmable RTD controllers with non-volatile EEPROM based memory and 9mm high 8-character two-line display unit. A "lock" facility shall permits browsing of the monitored parameters without unauthorised changes. An isolated retransmit 4-20mA facility shall be available on the unit for SCADA system motor temperature display: Plus	All protection to be monitored for example, temperature DE, NDE, and vibration etc.
1	Resettable Running hour meter: Plus	Running Hour Meter
1	Manual-off-auto-remote selector switch: Plus	Selector Switch
1	10Amp continuous current rated SP MCB cascaded with main circuit breaker: Plus	Heater supply
1	Ammeters scaled 0-10Amp: Plus	Heater ammeter

QTY	DESCRIPTION	IDENTIFICATION
1	Pressure delay timer to prevent pump set to trip during start-up: Plus	Start delay timer during start-up
1	Indication light that shows trip indication of pressure sensor: Plus	Pressure trip Indication light
1	Reset push button for Pressure trip condition: Plus	Pressure trip reset button
1	High performance surface mounted strobe and siren combination for pre-starting conditions warning: Plus	Pre-Start Siren & Strobe
1	Pre-Start delay timer to prevent pump sets from starting until Pre-Start Siren and Strobe finished: Plus	Start Delay timer during start-up
All	All equipment necessary for remote motor status, speed monitoring and control.	Control and monitoring
All	Interlocks which include all relays and auxiliary contacts which are necessary and required as described below:	Relays, timers and interlocks
All	Interlock timer shall be provided for duty rotation of after a 24-hour period of time [this will be confirmed as one set of pumps must operate more than the others]. Timer will be disabled in the event when motor is out of commission: Plus	Duty rotation for timer
All	Interlock with emergency stop to trip and lock out the starter, available standby pump set to become duty pump set: Plus	Emergency stop
All	Interlock motors to prevent simultaneously starting of all motors in the automatic mode of operation after a power failure: Plus	Delay for automatic starting
All	Interlock pump set in manual as well as automatic mode of operation with level control system. A predetermined low level will stop the duty motor: Plus	Level protection
All	Interlock motor sets as four duties and zero standby unit in manual as well as automatic mode of operation: Plus	Interlocks duty and standby.
All	Extraction fans in panel door for cooling of soft starter in accordance with manufacturers specifications. If the Fans do not work in manual as well as automatic mode of operation, the motor must interlocked not be able to start. Unhealthy status will display on indication: Plus	Extraction fan interlocks
All	Interlock motor with pressure sensors in common delivery and common suction pump line in automatic mode of operation. Predetermined low pressure will stop the duty motor sets and predetermined high pressure will stop the duty motor sets. If a predetermined pressure is not obtained the duty motor sets, will stop and will ramp down. During start up and shut down this function must be bypassed for a predetermined period. Motor sets will only be able to start once pressure trip has manually been reset: Plus	Pressure sensors
All	Interlock high lift pump sets [train] with strobe and siren in automatic and manual mode of operation. Siren and strobe will sound for predetermined time. Automatic and	Pre-start siren and strobe

QTY	DESCRIPTION	IDENTIFICATION
	manual mode of operation will be that the siren and strobe will first be finished, and normal starting procedure will occur: Plus	
All	All RTD sensors shall be interlocked in manual and in automatic mode of operation to protect motors.	RTD Protection
All	Interlock pump sets with flume No.1 – No.3 combined flow rate. The combined inlet flow will control the amount of pumps that will operate as well as the speed the motors operate. Therefore, the control the duty pumps which will vary depending on the incoming flow rates achieved.	



## PSEPLC PROGRAMMABLE LOGIC CONTROLLERS

### PS EPLC-1 Scope

Programmable logic controllers shall be provided in MCC enclosure (with glass panel) and as specified in the following locations:

Tenderer shall allow for the proper liaison with all other contractors to ensure proper functioning of all equipment supplied, installed and commissioned under this Contract.

In the event of there being conflicting specifications between the specifications in this section with regard to mechanical equipment required and electrical control equipment specified, this must be brought to the attention of the Engineer not later than one week before the tender close, who will duly clarify the matter or issue an addendum in this regard.

All equipment offered under this Contract shall be selected to be equal (or better) of make as far as possible.

Programmable Logic Controllers (PLC's), Uninterruptable Power Supply (UPS's) and Human Machine Interfaces (HMI) shall be provided in the following locations.

NUMBER	DESCRIPTION	LOCATION
A	Motor Control Centre [Phase No.2 MCC No.2] PLC	MCC Building

### PSEPLC-6. Programmable Logic Controllers Hardware

#### PSEPLC-6. A Motor Control Centre [MCC No.1] PLC

**Type:** The motor control centre panel builder shall allow a minimum of a full tier for programmable logic controller equipment as specified below. The equipment referenced below does not relieve the contractor of his responsibilities in terms of quality, dimensions and proper functioning of the system.

**Colour:** Purple powder coated

**Fault level:** 6kA Cascaded

**Equipment:** UPS, CPU, I/O modules and HMI

**Protocol:** Ethernet

Equipment will be the following:

QTY	DESCRIPTION	IDENTIFICATION
One	Panel comprising the following: (Panel door shall be purple powder coated)	UPS supply
1	10Amp sized continuous current rated SP + N door interlocked protection MCB (Estimated and shall be confirmed by contractor and all calculations shall be supplied to Engineer for approval): Plus	Main Circuit Breaker UPS
1	Selector switch for normal/UPS power selection: Plus	Maintenance purposes

QTY	DESCRIPTION	IDENTIFICATION
1	<p>Estimated Industrial 3kVA Pure Sine Wave UPS equal or similar to APC line, the UPS shall provide battery standby power for at least 3-hour back-up. The UPS (Estimated and shall be confirmed by contractor and all calculations shall be supplied to Engineer for approval). Batteries shall be rated at 60% load during a power failure. The UPS shall come complete with communication interface and shall comply with either of the following:</p> <p>Profibus-DP Profinet Industrial Ethernet Modbus TCP/IP</p> <p>Under no circumstances, shall the use of proprietary protocols be allowed: Plus</p> <p>Contractor to allow for powder coated mild steel cage and locks to be supplied and installed under this contract. The cage shall be lockable and protect the UPS from theft. It can be Inside or outside the PLC, both options are acceptable: Plus</p>	UPS with 3-hour back-up to cater for all instrumentation, HMI and PLC. Warranty shall be a minimum of 2 years. With minimum of Lead acid batteries.
All	Relays and contactors for automatic transfer to UPS power once the UPS power is restored: Plus	Automatic change over
All	Termination blocks necessary for signal cable connections from motors and instrumentation equal and similar to Weidmuller: Plus	All Terminals
All	Halogen free wiring ducts, covers, fix-O-Rapid, rapid clip for din rails, rapid clip for base plate shall be used: Plus	All
All	UPS monitoring functions as specified: Plus	UPS
1	6Amp continuous current rated SP MCB (Estimated and shall be confirmed by contractor and all calculations shall be supplied to Engineer for approval): Plus	PLC supply
1	2Amp continuous current rated SP MCB (Estimated and shall be confirmed by contractor and all calculations shall be supplied to Engineer for approval): Plus	HMI supply
1	6Amp continuous current rated SP MCB (Estimated and shall be confirmed by contractor and all calculations shall be supplied to Engineer for approval): Plus	CCTV supply
1	2Amp continuous current rated SP MCB (Estimated and shall be confirmed by contractor and all calculations shall be supplied to Engineer for approval): Plus	Alarm supply
8	2Amp continuous current rated SP MCB (Estimated and shall be confirmed by contractor and all calculations shall be supplied to Engineer for approval): Plus	Instrumentation
One	Panel comprising the following: (Panel door shall be purple powder coated)	PLC
1	6Amp continuous current rated SP door interlocked protection MCCB (Estimated and shall be confirmed by contractor and all calculations shall be supplied to Engineer for approval): Plus	Main Circuit Breaker PLC
1	230V/24DC stabilized power supply for 24V DC inputs to PLC input modules. (Power supply shall have adequate capacity for the application) (Estimated and shall be confirmed by contractor and all calculations shall be supplied to Engineer for approval): Plus	Power Supply

QTY	DESCRIPTION	IDENTIFICATION
1	An industrial Layer 2 managed Ethernet switch, suitable for the intended application, shall be provided. The switch shall support 100/1000 Mbps data rates and include a minimum of two (2) fibre optic ports. To ensure full compatibility and seamless integration, the PLC and network switch shall be supplied by the same manufacturer or be equivalent in specification and performance to the Moxa industrial range: Plus	Communications with Fiber Optic cable
1	PLC processor unit complete with CPU base plate, bus terminators, Ethernet communication with I/O modules that will satisfy the application with at least the following minimum specifications:  Discrete I/O processor capacity 1024 I/O Multi-rack configuration capability, Analogue I/O processor capacity 256 I/O multi-rack configuration capability, Execution time per instruction 0.12 µs Boolean 0.17 µs double-length words 0.25 µs single-length words 1.16 µs floating points Number of instructions per ms 6.4 Kinst/ms 65 % Boolean + 35 % fixed arithmetic 8.1 Kinst/ms 100% Boolean Embedded communication service: Bandwidth management & Ethernet TCP/IP Application structure 1 cyclic/periodic master task 1 periodic fast task System overhead 0.13ms for fast task 0.7ms for master task Shall comply with the following standards: IEC 61131-2 UL 508 EN 61131-2 CSA C22.2 No 142 CSA C22.2 No 213 Class I Division 2  The CPU selected shall be provided with 50% additional spare capacity for the plant: Plus	PLC CPU
All	High performance signal modules for digital and analog I/O plus provide 10% Spare I/O capacity for plant equal or similar to Schneider Electric.: Plus	Input and Output modules
All	Interposing relays for surge protection of field statuses to PLC : Plus	Surge Protection
All	Provide terminal blocks for all signal cable connections from motors and instrumentation, equal or similar in quality to Weidmüller. All terminal blocks connected to the PLC shall be fused.: Plus	All Terminals
All	Halogen free wiring ducts, covers, fix-O-Rapid, rapid clip for din rails, rapid clip for base plate shall be used: Plus	All
All	5% of all All signals shall be protected with digital and analog Surge arrestor modules equal or similar to Blitzductor from DEHNguard. All Digital and Analogue signals leaving the main structure and are outside the main lighting and earthing protection must be protected via signal arrestors similar and equal to Blitzconductor from Dehnguard. For tender purposes the tenderer shall allow for all I/O to protected as detailed below: Plus	Surge Protection for all signals
One	Panel comprising the following: (Panel door shall be purple powder coated)	HMI

<b>QTY</b>	<b>DESCRIPTION</b>	<b>IDENTIFICATION</b>
1	10Amp continuous current rated SP door interlocked protection MCCB (Estimated and should be confirmed): Plus	Main Circuit Breaker PLC
1	230V/24DC stabilized power supply for HMI unit; Plus	Supply
1	Ethernet field bus connection: Plus	Field bus
1	Human machine interface advanced touchscreen panel HD pixels VGA- 22" TFT - 96 MB graphic Terminals" colour touch screen with sufficient flash memory, soft function and static function keys and Ethernet communication port. Software as may be required shall be provided:	HMI
All	Software programming for indication of the following monitoring functions on the HMI display and all I/O as indicated in schedule of supervisory and control I/O's underneath.	
All	1.Alarm history page: Plus	Alarm history
All	2.Alarm setup page: Plus	Setup page
All	3.Graphic displays shall be used for variable parameter indications: Plus	Displays
All	4.Animated mimic displays shall be used for equipment displays: Plus	Displays
All	5.Password protected settings: Plus	Protection
All	6.All information protection settings, control and monitoring functions shall be displayed: Plus	Displays
All	7.All Instrumentation settings, monitoring and control functions: Plus	Displays
All	8.All monitoring and control functions as indicated schedule of supervisory and control I/O's underneath: Plus	Displays

**PS EPLC-6. A Schedule of Supervisory and Control I/O's Motor Control Centre [Phase No.2 MCC No.1] PLC**

DESCRIPTION	RTD IN	ANALOG IN	ANALOG OUT	24V DC IN	24V DC OUT	VOLT FREE OUT	NETWORK LINK		
							SCADA	HMI	PLANT
Power Analyzer values to be captured in PLC and displayed on plant and SCADA, HMI and distributed through plant and linked to other power analyzers– Apparent Power, Power, Reactive Power, line and phase Voltages, Line and phase Currents, Power Factor, all billing information.	All	All	All	All	All	All	All	All	All
Incomer No.1 - No.2 Circuit Breaker Open / Close				2			2	2	2
Incomer No.1 - No.2 Circuit Breaker Trip [Trip condition must be displayed]				12			12	12	12
Incomer No.1 - No.2 Supply Power Lost				2			2	2	2
Ring Feeder No.1 - No.2 Circuit Breaker Open / Close				2			2	2	2
Ring Feeder No.1 - No.2 Circuit Breaker Trip [Trip condition must be displayed]				12			12	12	12
Ring Feeder No.1 - No.2 Supply Power Lost				2			2	2	2
UPS healthy [Allowance]							All	All	All
UPS trip [Allowance]							All	All	All
UPS Normal/Fail [Allowance]							All	All	All
UPS Low Battery [Allowance]							All	All	All
UPS DC voltage below recommended voltage [Allowance]							All	All	All
Backwash Pump No.1 – No.2 motor run/stop							4	4	4
Backwash Pump No.1 – No.2 motor run/stop							4	4	4
Backwash Pump No.1 – No.2 motor healthy							4	4	4
Backwash Pump No.1 – No.2 man-off-auto				2			2	2	2
Backwash Pump No.1 – No.2 motor trip							2	2	2
Backwash Pump No.1 – No.2 variable speed control		2					2	2	2
Backwash Pump No.1 – No.2 E-Stop							2	2	2
Backwash Pump No.1 – No.2 Common Pressure		1					1	1	1
Backwash Pump No.1 – No.2 No-Flow				2			2	2	2
Backwash Water Flow		1					1	1	1
Blower No.1 – No.2 motor run/stop							4	4	4
Blower No.1 – No.2 motor run/stop							4	4	4
Blower No.1 – No.2 motor healthy							4	4	4
Blower No.1 – No.2 man-off-auto				2			2	2	2
Blower No.1 – No.2 motor trip							2	2	2
Blower No.1 – No.2 variable speed control		2					2	2	2
Blower No.1 – No.2 E-Stop							2	2	2
Blower No.1 – No.2 Common Pressure		1					1	1	1
Blower No.1 – No.2 No-Flow				2			2	2	2
Clearwater Pump No. 1 – No.4 healthy				4			4	4	4

DESCRIPTION	RTD IN	ANALOG IN	ANALOG OUT	24V DC IN	24V DC OUT	VOLT FREE OUT	NETWORK LINK		
							SCADA	HMI	PLANT
Clearwater Pump No. 1 – No.4 trip					4		4	4	4
Clearwater Pump No. 1 – No.4 run/stop					9		9	9	9
Clearwater Pump No. 1 – No.4 E-Stop				4			4	4	4
Clearwater Pump No. 1 – No.4 Manual / Auto / Off				12			12	12	12
Clearwater Pump No. 1 – No.4 DE bearing temperature	4						4	4	4
Clearwater Pump No. 1 – No.4 NDE bearing temperature	4						4	4	4
Clearwater Pump No. 1 – No.4 DE gland temperature	4						4	4	4
Clearwater Pump No. 1 – No.4 NDE gland temperature	4						4	4	4
Clearwater Pump No. 1 – No.4 DE bearing temperature	4						4	4	4
Clearwater Pump No. 1 – No.4 NDE bearing temperature	4						4	4	4
Clearwater Pump No. 1 – No.4 red winding temperature	4						4	4	4
Clearwater Pump No. 1 – No.4 white winding temperature	4						4	4	4
Clearwater Pump No. 1 – No.4 blue winding temperature	4						4	4	4
Clearwater Pump No. 1 – No.4 DE bearing vibration	4						4	4	4
Clearwater Pump No. 1 – No.4 DE bearing vibration	4						4	4	4
Clearwater Pump No. 1 – No.4 suction pressure		4					4	4	4
Clearwater Pump No. 1 – No.4 delivery pressure		4					4	4	4
Clearwater Pump No. 1 – No.4 Common suction pressure		4					4	4	4
Clearwater Pump No. 1 – No.4 Common delivery pressure		4					4	4	4
Clearwater Pump No. 1 – No.4 flow rate		4					4	4	4
Clearwater Pump No. 1 – No.4 control valve position		4					4	4	4
Clearwater Pump No. 1 – No.4 power consumption		4					4	4	4
Clearwater Pump No. 1 – No.4 suction flow totalization				1	1		2	2	2
Clearwater Pump No. 1 – No.4 suction rate of flow		1					1	1	1
Clearwater Pump No. 1 – No.4 suction valve open/close				4	4		8	8	8
Clearwater Pump No. 1 – No.4 delivery valve open/close				4	4		8	8	8
Clearwater Pump No. 1 – No.4 delivery control valve position open/intermediate/close				4	4		8	8	8
Clearwater Pump No. 1 – No.4 casing temperature high				4			4	4	4
Clearwater Pump No. 1 – No.4 suction pipeline no-flow				4			4	4	4



## **PSEPLC-15 OPERATION OF PLANT**

### **PSEPLC-15.1 Operation and control philosophy**

The detailed Control Philosophy will be developed and submitted once the final Contractor has been appointed.

### **PSEPLC-15.2 Clearwater Pumpstation**

#### **Abraham Holbors September Pump Station – Operational Description**

The Abraham Holbors September Pump Station is equipped with four (4) pumps configured in a duty/standby arrangement. Seasonal demand determines pump utilization:

Summer operation: Three (3) pumps are typically required to meet increased flow demand.

Winter operation: Two (2) pumps are sufficient for reduced flow requirements.

#### **1. Motor Control Centre & PLC Functions**

The Main Motor Control Centre (MCC) is located on the upper gallery floor of the combined filter and administration building. The Primary Programmable Logic Controller (PLC) is housed within the MCC and serves as the central control unit for:

Pump operations.

Blowers No.1 and No.2.

Washwater systems No.1 and No.2.

Irrigation pumps No.1–No.3.

Various auxiliary services.

Feeder breakers.

The PLC provides two primary control options:

Manual Control: Via the Human-Machine Interface (HMI) on the MCC or through local manual operation.

Automatic Control: System-controlled operation with operator input to select summer or winter modes.

#### **2. Automatic Mode of Operation**

When operating in automatic mode, Pump No.1 and Pump No.4 serve as the primary duty/standby pair, with sequencing managed by the PLC.

Duty/Standby Selection

Operators initiate start commands via the HMI or SCADA.

The system prompts the operator to select the required configuration:

1 Duty + 3 Standby

2 Duty + 2 Standby

3 Duty + 1 Standby

Based on this selection, the PLC will start the appropriate pumps in sequence.

#### **Start-Up Process**

##### **Pump Ramp-Up**

The first duty pump starts and ramps to 1,200 rpm.

Once stable, subsequent pumps (if selected as duty) are started and ramped to the same speed.

After all duty pumps reach 1,200 rpm, they are jointly accelerated to the rated operating speed.

#### **System Monitoring**

Both common and individual pressure sensors continuously monitor pump line performance.

Flow and pressure values are controlled against setpoints.

Pressure and flow settings are password-protected and adjustable via the HMI (and future SCADA).

#### **Commissioning Adjustments**

During commissioning, parameters can be fine-tuned via the HMI by authorized personnel.



## **Startup Sequence**

### **Pre-Start Safety Warning**

A strobe light and siren activate for at least 10 seconds prior to motor start-up.

### **Motor Ramp-Up**

Motors accelerate gradually to the programmed flow rate ( $Q_{max}$  determined during commissioning).

Once stabilized, the discharge valve opens automatically.

### **Protection Measures**

Suction pressure sensors and no-flow switches monitor conditions.

During startup, these protections are bypassed temporarily to avoid nuisance trips.

If suction pressure falls below threshold or no flow is detected, the PLC halts the pump and performs a controlled shutdown.

Electrical protection (current, voltage, phase failure, and phase rotation) must be configured in both the PLC and each Variable Frequency Drive (VFD).

### **Delivery Pipe Monitoring**

A delivery pipe pressure sensor monitors upstream pressure continuously.

If pressure exceeds the preset limit, the PLC initiates an orderly shutdown sequence.

## **3. Shutdown & Duty Cycling**

Duty pumps remain operational until one of the following occurs:

Delivery pressure reaches the configured setpoint.

Reservoirs No.1 and No.2 are full.

The operator manually issues a stop command.

If the reservoir level signal fails, delivery pressure serves as the backup shutdown trigger.

### **Shutdown Process**

The standby pump transitions to duty status.

The previously active duty pump reverts to standby.

A gradual ramp-down ensures smooth deceleration, minimizing surge pressure and water hammer.

### **Additional PLC Monitoring**

RTD temperature sensor data.

Motor current and voltage.

Startup counts, in accordance with manufacturer specifications.

Flow rates will be determined and adjusted on site. Operators can configure flow setpoints via the HMI, and the VSD will automatically adjust pump speeds to maintain required conditions.

## **4. SCADA & Control Limitations**

SCADA programming and configuration are not included in this contract.

The contractor must ensure that the PLC is programmed to receive and process reservoir level signals from the existing telemetry system.

## **5. Mimic Screen & Control Modes**

The HMI mimic screen provides two operational control modes:

Reservoir Level Control (Default Mode)

Duty/standby sequencing is automatically managed based on reservoir level inputs.

Flow Control (Password-Protected Mode)

Reservoir level control is disabled.

Duty pump(s) must be started manually via the HMI.

A confirmation pop-up requires operators to:

Verify reservoir manual valves are closed.

Confirm all required valves are secured.

Each selection event is logged in PLC memory.

Returning to Level Control Mode:

Operators must verify reservoir valves are open before switching back.

All date, time, and control mode changes are logged in PLC memory for auditing.



## **6. Manual Mode of Operation**

In manual mode, Pump No.1 and Pump No.4 can be started per PLC-programmed parameters.

A hardwired interlock prevents pump activation if the PLC fails, ensuring protection of equipment and system integrity.

Manual mode must incorporate safeguards to prevent more than three pumps operating in duty simultaneously.

## **7. Pump No.1 & Future Pump No.4**

Pump No.1 and the future Pump No.4 will operate in a duty/standby configuration.

Control signals will be received from Reservoirs No.1 and No.2.

The operational logic will remain identical to the logic applied to Pump No.1 and Pump No.4 under current programming.

Although Pump No.4 has not yet been installed, provisions are included to facilitate seamless integration when installed.



## PS ECIS ELECTRICAL DISTRIBUTION SYSTEM

### PS ECIS-1 Scope of Works

Equipment shall be provided as specified and indicated on the drawings on the site of the Works.

### PS ECIS-2 Pressure Sensors

Electronic pressure transducers reading the suction or delivery pressure of a pipeline shall be supplied and installed under this contract where specified. The suction pressure transducers will serve the dual function of producing an alarm at low suction pressure and trip the pump-set via the PLC and will be hardwired to the motor panel. The alarm will be triggered when the pump suction pressure drops to 1,3 times the 3% NPSH of the pump and will power the pumps down through the normal shut down procedure when the pressure drops to 1,1 times the 3% head loss at cavitation level.

Pressure transmitters shall be equal to or better than that described in the relevant Particular Specification.

### PS ECIS-2. A Pressure Sensors

Type: Outdoor powder coated 316 stainless steel frame mounted with lockable front door and transparent window for meter reading purposes. Transparent window must be covered with top hinged powder coated 316 stainless steel cover for ultraviolet protection of controller.

**Supply:** 1mm<sup>2</sup> x 2pr twisted PVC SWA PVC (individually and overall screened).

**Colour:** Electric orange

Equipment will be the following:

QTY	DESCRIPTION	IDENTIFICATION
1	Supply and install absolute and gauge pressure sensor and probes. The transmitter shall be equal and similar or better to Absolute and gauge pressure Cerabar PMC21 from Endress and Hauser with extended probes to the pipeline. The transmitter will be installed inside the enclosure.: Plus	Controller
All	Pipe connections to pipeline and coordination with mechanical contractor: Plus	Mechanical Contractor coordination
All	Fused Terminals and interconnecting monitoring and control wiring: Plus	Connection and monitoring
All	Earthing and bonding across the probes.	Earthing

### PS ECIS-3 Flow Meter Equipment

Magnetic and turbine type flow meters will be supplied and installed by the mechanical or civil contractor. The above-mentioned flow meter controllers as free issue items will have to be installed under this contract in flow meter kiosks complete with a supply of electricity, surge protection and earthing system.



Clamp on flow meters will be supplied and installed under this contract. The Contractor shall coordinate with the mechanical contractor if all requirements are met regarding the clamp on flow meters.

### PS ECIS-3. AMag Flow Meter

**Type:** Outdoor powder coated 3CR12 kiosk. The kiosk shall be steel frame mounted with lockable front door and transparent window for meter reading purposes. The enclosure / kiosk shall be designed and submitted for approval to the Engineer and will be so designed to easily accommodate the equipment described below. The controller, surge arrestor, terminals shall be mounted inside the enclosure. The transparent window must be covered with a top hinged powder coated 3CR12 cover for ultraviolet protection of the controller display. The enclosure shall be ventilated by means of vent plug. The Contractor shall design and supply a rigid channel iron frame or support structure to lift the kiosk so that the centre of the panel is 1500mm above final floor level. The channel support structure shall be fixed to the precast plinth structure with adequate number of fasteners and the entire support shall be subject to approval by the Engineer. The plinth is part of the entire installation and shall be supplied as complete package.

The vent plug shall incorporate an internal PTFE-membrane, designed to balance internal enclosure temperature with external ambient temperature, avoiding internal condensation without compromising the IP rating of the enclosure.

**Protection degree:** IP68-10

**Influent pressure:** >5 Bar

**Temperature:** -50°C... +120°C

Nylon or Nickel-plated brass

**Supply:** 2.5mm<sup>2</sup> x 3 core PVC SWA PVC cable plus 10mm<sup>2</sup> bare copper earth plus 1mm<sup>2</sup> x 4pr twisted PVC SWA PVC (individually and overall screened)

**Colour:** Electric orange

**Fault level:** 5kA

Equipment will be the following:

QTY	DESCRIPTION	IDENTIFICATION
1	10Amp Continues Rated SP + N MCB: Plus	Main
All	Single Phase class 2 surge arrestor unit connection type 2 as per SANS 10142-1: Plus	Surge arrestor
All	Front panel mounted LCD display for instantaneous flow and totalized flow counter.	Display
All	The Magnetic Flow Meter will be installed by the mechanical contractor. The electrical contractor shall provide the required enclosure and coordinate with the mechanical contractor to ensure that the Mag-Flow Controller is handed over along with a suitably long cable from the supplier. The electrical contractor shall then install the controller within the specified enclosure. The Mag-Flow Controller is a free-issue item supplied by the mechanical contractor: Plus	Mag-flow
All	Fused Terminals and interconnecting monitoring and control wiring: Plus	Connection and monitoring

QTY	DESCRIPTION	IDENTIFICATION
All	Signal & Data Surge protection unit suitable for the application equal or similar to Blitzductor XT from DEHNguard.	Signal & Data Surge Protection

### PS ECIS-3. B TURBINE FLOW METER INSTALLATION

**Type:** Outdoor powder coated 3CR12 kiosk. The kiosk shall be steel frame mounted with lockable front door and transparent window for meter reading purposes. The enclosure / kiosk shall be designed and submitted for approval to the Engineer and will be so designed to easily accommodate the equipment described below. The controller, surge arrestor, terminals shall be mounted inside the enclosure. The transparent window must be covered with a top hinged powder coated 3CR12 cover for ultraviolet protection of the controller display. The enclosure shall be ventilated by means of vent plug.

The vent plug shall incorporate an internal PTFE-membrane, designed to balance internal enclosure temperature with external ambient temperature, avoiding internal condensation without compromising the IP rating of the enclosure.

**Protection degree:** IP68-10

**Influent pressure:** >5 Bar

**Temperature:** -50°C...+120°C

Nylon or Nickel-plated brass

**Supply:** 2.5mm<sup>2</sup> x 3 core PVC SWA PVC cable plus 10mm<sup>2</sup> bare copper earth plus 1mm<sup>2</sup> x 4pr twisted PVC SWA PVC (individually and overall screened).

**Colour:** Electric orange

**Fault level:** 6kA

Equipment will be the following:

QTY	DESCRIPTION	IDENTIFICATION
1	10Amp Continues Rated SP+ N MCB: Plus	Main
All	Single phase class 2 surge arrestor unit connection type 2: Plus	Surge arrestor
1	Meinecke type FM1 D/K frequency converter complete with opto-pulser at flow meter position: Plus	Conversion
1	Din-rail mounted LCD instantaneous flow display in l/s: Plus	Additional Display Unit
All	Terminals and interconnecting monitoring and control wiring: Plus	Connection and monitoring
All	Signal & Data Surge protection unit suitable for the application equal or similar to Blitzductor XT from DEHNguard.	Signal & Data Surge Protection
All	Earthing and bonding across the probe [across the turbine].	Earthing

### PS ECIS-4ELECTRONIC LEVEL CONTROL

An electronic intelligent level transducers shall be supplied and installed on a grade 316 stainless steel brackets and a ball type level sensor as indicated.

Field mounted level sensors shall be installed complete with local surge protection and earthing system. The level controllers shall be installed inside kiosk and mounted as specified. Stainless steel brackets, onto which the level sensors shall be screwed, shall be bolted to the

### PS ECIS-4. A ULTRASONIC LEVELS

**Type:** Wall or Tank mounted



Supply: 1mm<sup>2</sup> x 2pr twisted PVC SWA PVC (individually and overall screened).

Equipment will be the following:

QTY	DESCRIPTION	IDENTIFICATION
All	Ultrasonic level transducer equal and similar to FMU30 mounted on grade 304 stainless steel bracket inside a ventilated grade 304 stainless steel enclosure on top of the structure as per manufacturer recommendations for level measurement including cabling and all accessories: Plus	Level Controller & Transducer [weir type flow meter]
All	Level type transducer. The Contractor to allow for 2m cable to be to including cabling and all accessories. The cable shall be connected into IP68 enclosure and from the enclosure to the PLC twisted PVC SWA PVC (individually and overall screened) shall be used.	Transducer

#### PS ECIS-4. B Ultra-Sonic Level Transducer and Controller

**Type:** Outdoor powder coated 3CR12 kiosk. The kiosk shall be steel frame mounted with lockable front door and transparent window for meter reading purposes. The enclosure / kiosk shall be designed and submitted for approval to the Engineer and will be so designed to easily accommodate the equipment described below. The controller, surge arrestor, terminals shall be mounted inside the enclosure. The transparent window must be covered with a top hinged powder coated 3CR12 cover for ultraviolet protection of the controller display. The enclosure shall be ventilated by means of vent plug. The Contractor shall design and supply a rigid channel iron frame or support structure to lift the kiosk so that the centre of the panel is 1500mm above final floor level. The channel support structure shall be fixed to the precast plinth structure with adequate number of fasteners and the entire support shall be subject to approval by the Engineer. The plinth is part of the entire installation and shall be supplied as complete package.

The vent plug shall incorporate an internal PTFE-membrane, designed to balance internal enclosure temperature with external ambient temperature, avoiding internal condensation without compromising the IP rating of the enclosure.

**Protection degree:** IP68-10

**Influent pressure:** >5 Bar

**Temperature:** -50°C... +120°C

Nylon or Nickel-plated brass

**Supply:** 10mm<sup>2</sup> bare copper earth plus 1mm<sup>2</sup> x 4pr twisted PVC SWA PVC (individually and overall screened).

Equipment will be the following:

QTY	DESCRIPTION	IDENTIFICATION
1	10Amp Continues Rated SP + N MCB: Plus	Main
All	Single Phase class 2 surge arrestor unit connection type 2 as per SANS 10142-1: Plus	Surge arrestor
All	An ultrasonic level controller, equal and similar to the FMU90 from Endress and Hauser, shall be provided along with Two Ultra-Sonic Level Transducers sensor unit mounted on a	Level Controller & Two Transducer Level

QTY	DESCRIPTION	IDENTIFICATION
	Grade 316 stainless steel bracket. The two external transducers shall be housed within a ventilated Grade 316 stainless steel enclosure [transducer shall be protected from direct sunlight], installed in accordance with the manufacturer's instructions for accurate Differential level measurements. The two transducers shall be supplied complete with all required cabling and accessories to ensure a fully functional and complete installation: Plus	
All	Weir type flow meter transducer. The Contractor to allow for 10m cable to be to including cabling and all accessories.	Transducer
All	Fused Terminals and interconnecting monitoring and control wiring: Plus	Connection and monitoring
All	Signal & Data Surge protection unit suitable for the application equal or similar to Blitzductor XT from DEHNguard..	Signal & Data Surge Protection



### PS ECIS-4.C Radar Level Kiosks

**Type:** Wall or Tank mounted

**Supply:** 1mm<sup>2</sup> x 2pr twisted PVC SWA PVC (individually and overall screened).

Equipment will be the following:

QTY	DESCRIPTION	IDENTIFICATION
1	Radar level transducer, equal or similar to the Endress+Hauser Micropilot FMR60B, shall be provided. The transducer shall be installed within a ventilated Grade 316 stainless steel enclosure to protect it from direct sunlight and mounted on the appropriate structure for accurate level measurement. It shall be supplied complete with all necessary cabling and accessories to ensure a fully functional and complete installation: Plus	Level Transducer
All	The Contractor to allow for 2m cable to be to including cabling and all accessories. The cable shall be connected into IP68 enclosure and from the enclosure to the PLC twisted PVC SWA PVC (individually and overall screened) shall be used.	Transducer

### PS ECIS-4. D BALL TYPE LEVEL CONTROL

**Type:** The float switch equal or similar to FTS20 Endress and Hauser for point level detection, all accessories, 304 stainless steel clamp, wall bracket, float switch hanger, weight, cable and all bolts and nuts to complete the installation: Plus

**Supply:** 1mm<sup>2</sup> x 1pr twisted PVC SWA PVC (individually and overall screened)

Equipment will be the following:

QTY	DESCRIPTION	IDENTIFICATION
All	Ball-type level sensor equal and similar to K FTS20 Endress and Hauser made from high impact and shock resistant material. All accessories, 304 stainless steel clamp, wall bracket, float switch hanger, weight, cable and all bolts and nuts to complete the installation: Plus	Ball type level for manual stop
All	The Contractor to allow for 2m cable to be to including cabling and all accessories. The cable shall be connected into IP68 enclosure and from the enclosure to the PLC twisted PVC SWA PVC (individually and overall screened) shall be used.	Transducer



## PS ECIS-5NO-FLOW SENSORS

The electromagnetic flow monitor shall be pipe socket mounted and shall be easy to calibrate for specific no-flow conditions and shall be reliable in service.

The no-flow sensor shall be steel pipe mounted and shall be supplied complete with a weld stub to ensure correct immersion into the measuring liquid. The weld stub shall be adapted according to the flow measuring pipe diameter.

Pressure transmitters shall be equal and similar as specified under the particular specification.

### PS ECIS-5. ANo-Flow Sensors

**Type:** Pipe mounted

**Supply:** 10mm<sup>2</sup> bare copper earth plus 1mm<sup>2</sup> x 2pr twisted PVC SWA PVC (individually and overall screened) from Main MCC

Equipment will be the following:

QTY	DESCRIPTION	IDENTIFICATION
1	Supply and install No-flow sensor on the pipe suction. The no-flow sensor shall be equal and similar to Magphant Electromagnetic flow meter from Endress and Hauser.: Plus	Controller
All	Pipe connections to pipeline and coordination with mechanical contractor: Plus	Mechanical Contractor coordination
All	The Contractor to allow for 2m cable to be to including cabling and all accessories. The cable shall be connected into IP68 enclosure and from the enclosure to the PLC twisted PVC SWA PVC (individually and overall screened) shall be used.	Transducer



## **PS EG&M GENERAL AND MISCELLANEOUS**

### **PS EG&M-3 Emergency Stop Push Buttons and Weatherproof Isolators**

Grade 316 stainless steel pedestal mounted emergency stop stations shall be provided at all motor installations as specified.

Emergency stop pedestals at submersible pump sets shall be installed on a wider than normal grade 316 stainless steel emergency stop pedestal that will house the motor cable terminations as specified in the Particular Specification.

### **PS EG&M-8 Notices and Danger Plates**

This specification deals with the provision of Notices and Danger Plates and signage as required in terms of the Occupational Health and Safety Act No. 85 of 1993, as well as any other notices that may be required by law or by the nature of the finished Works.

All building signage on equipment's shall be covered under this contract; it is the Contractor responsibility to familiarize himself with applicable standards referred in particular specification and supply all necessary signage.

### **PS EG&M-8.2 Materials and Finish**

Outdoor signs shall be either of vitreous enameled type or of cast aluminum with raised or embossed letters.

The colours and sizes of letters and colours of background shall be in accordance with requirements of SANS 0140 and as approved by the Engineer.

Symbolic signs shall conform to the requirements of SANS 1186.

The following building names shall be added under the Notices and Danger Plates:

Motor Control Room No.1 (2 signs)

### **PS EG&M-9 Fire Extinguishers**

5kg CO<sub>2</sub> and powder fire extinguishers shall be supplied and installed in all pump stations and treatment plant buildings in accordance with the requirements of the Local Authority. Each fire extinguisher shall have extinguisher cabinet, mounting bracket, tags, seals, inspection label, tags, and double-sided signage above the extinguisher.

The following locations shall be fitted with fire extinguishers:

MCC Room (2 Units, mounted next to substation)



## **PS ESPLSMALL POWER AND LIGHTING IN BUILDINGS**

### **PS ESPL-1 SCOPE**

The scope of work for the distribution board sections shall include the complete provision of a small power distribution and lighting system. The distribution board shall be designed to accommodate both single-phase and three-phase power supplies to serve various equipment on site.

The Engineer has allowed for the main incoming supply cable to the distribution board. However, the Contractor shall allow for all outgoing small power circuits from the distribution board, including final connections to light points and power outlets, as detailed below.

This specification shall take precedence over the drawings. The Contractor is required to comply fully with the provisions of this specification and particular specification, regardless of any discrepancies with the drawings.

### **PS ESPL-4 LIGHT FITTINGS**

**Note:** All luminaires must be approved by the Engineers representative prior to the installation of or any order being placed. Only light fittings as well as all light fitting components carrying the SABS mark of approval will be acceptable. All fluorescent light fittings shall be equipped with electronic control gear.

The contractor submission process mandates that each of the skilled labourers and the contractor undergo comprehensive training to acquire certification in the precise installation procedures outlined in the contract documents. As an integral component of the technical submission, the contractor is obligated to verify that all personnel have successfully completed courses at the supplier's premises, thereby gaining the necessary experience and knowledge to proficiently install and commission all luminaires as specified in the agreement.

A critical facet of this commitment is for the contractor to maintain a meticulous record, detailing the individuals responsible for the installation, along with the specific dates and locations where each luminaire was installed. Quality control measures are imperative to ensure that the designated personnel assume accountability for the luminaires they have installed, thereby upholding the standards outlined in the contract. This comprehensive approach not only guarantees the adherence to installation specifications but also underscores the contractor's commitment to excellence in executing the project. The Contractor shall ensure that the ingress protection of the proposed fittings is not compromised under any circumstances as part of his installation. CCG or Pratley equipment, SABS-certified, shall be used to maintain full compliance with the specifications and proposed equipment. All IP-rated fittings shall come with a minimum of 1.5 meters of double-insulated silicone cable pre-installed by the manufacturer.



- Type A : 55W LED enclosed dust, moisture, vandal and corrosion proof luminaire. The luminaire shall consist of a high-pressure die-cast marine grade aluminium body with a robust clear polycarbonate diffuser and shall be designed to operate 55W LED's lamps. Equal or similar to Roughguard from Beka
- Type B : 55W LED enclosed dust, moisture, vandal and corrosion proof luminaire. The luminaire shall consist of a high-pressure die-cast marine grade aluminium body with a robust clear polycarbonate diffuser and shall be designed to operate 55W LED's lamps. Equal or similar to Roughguard from Beka plus 1hour EMG maintained (emergency).
- Type C : 27W fluorescent enclosed dust, moisture, vandal and corrosion proof Zone 2 luminaire. The luminaire shall consist of an Injection-moulded, flame-retardant polycarbonate with a robust clear polycarbonate diffuser and shall be designed to operate LED's of up to 65W, and fluorescent lamps up to 80W. Equal or similar to Vapourline from Beka.
- Type D : 27W fluorescent enclosed dust, moisture, vandal and corrosion proof Zone 2 luminaire. The luminaire shall consist of an Injection-moulded, flame-retardant polycarbonate with a robust clear polycarbonate diffuser and shall be designed to operate LED's of up to 65W, and fluorescent lamps up to 80W. Equal or similar to Vapourline from Beka plus 1hour EMG maintained (emergency).
- Type E : 55W LED enclosed dust, moisture, vandal and corrosion proof luminaire. The luminaire shall consist of a high-pressure die-cast marine grade aluminium body with a robust clear polycarbonate diffuser and shall be designed to operate 55W LED's lamps. Equal or similar to Roughguard from Beka.
- Type F : 55W LED enclosed dust, moisture, vandal and corrosion proof luminaire. The luminaire shall consist of a high-pressure die-cast marine grade aluminium body with a robust clear polycarbonate diffuser and shall be designed to operate 55W LED's lamps. Equal or similar to Roughguard from Beka plus 1hour EMG maintained (emergency).
- Type G : 18W LED Bulkhead warm white enclosed dust, moisture, vandal and corrosion proof luminaire. The luminaire shall consist of a high-pressure die-cast marine grade aluminium body with a robust clear polycarbonate diffuser and shall be designed to operate 18W LED's lamps. Equal or similar to Bekabulk from Beka.
- Type H : 18W LED Bulkhead warm white enclosed dust, moisture, vandal and corrosion proof luminaire. The luminaire shall consist of a high-pressure die-cast marine grade aluminium body with a robust clear polycarbonate diffuser and shall be designed to operate 18W LED's lamps. Equal or similar to Bekabulk from Beka plus 1hour EMG maintained (emergency).
- Type I : 19W LED Bulkhead warm white enclosed dust, moisture, vandal and corrosion proof luminaire. The luminaire shall consist of a high-pressure die-cast marine grade aluminium body with a robust clear polycarbonate diffuser and shall be designed to operate 19W LED's lamps. Equal or similar to Roughguard Beka.

- Type J : 19W LED Bulkhead warm white enclosed dust, moisture, vandal and corrosion proof luminaire. The luminaire shall consist of a high-pressure die-cast marine grade aluminium body with a robust clear polycarbonate diffuser and shall be designed to operate 19W LED's lamps. Equal or similar to Roughguard Beka plus 1hour EMG maintained (emergency).
- Type K : 100W HPS Street Light robustly constructed, weatherproof, hailproof, corrosion proof and vandal resistant luminaire. The luminaire gear compartment shall be manufactured from high-pressure die-cast aluminium to ensure excellent heat dissipation and optimum strength. It shall be covered by a hinged non-corrosive lid which allows access to the control gear and spigot mounting. The luminaire shall be designed designed to operate 250/400-Watt mercury vapour and 150/250/400-Watt high-pressure sodium lamps. Equal or similar to Bekasun from Beka.
- Type L : 135W Neutral White LED Floodlight. The luminaire consists of an LED engine, power supply and spigot compartment. It shall be secured by stainless steel latches and an access screw. The LED engine, consisting of the LED light source and the power supply, shall be easily replaceable. Both compartments are rated IP66. Electronic temperature monitoring prevents overheating of LEDs and power supply, positioned directly next to LEDs. The luminaire housing shall be manufactured of marine grade aluminium. Equal or similar to Omistar from Beka.
- Type M : 135W Neutral White LED Floodlight. The luminaire consists of an LED engine, power supply and spigot compartment. It shall be secured by stainless steel latches and an access screw. The LED engine, consisting of the LED light source and the power supply, shall be easily replaceable. Both compartments are rated IP66. Electronic temperature monitoring prevents overheating of LEDs and power supply, positioned directly next to LEDs. The luminaire housing shall be manufactured of marine grade aluminium. Equal or similar to Omistar from Beka.
- Type N : 52W LEDNOVA Zone 2 Surface Mounted luminaire. IP 66 rating is supported by a certified SABS test report. Equal or similar to Lednova from Beka
- Type O : 52W LEDNOVA Zone 2 Surface Mounted luminaire. IP 66 rating is supported by a certified SABS test report. Equal or similar to Lednova from Beka plus 1hour EMG maintained (emergency).
- Type P : 601mm x 601mm surface mounted decorative, stylish LED luminaire with clean lines and low glare specular louvre. Equal or similar to Lascon LPM-S.
- Type Q : 601mm x 601mm surface mounted decorative, stylish LED luminaire with clean lines and low glare specular louvre. Equal or similar to Lascon LPM-S plus 1hour EMG maintained (emergency).
- Type R : 11W Decorative recessed LED downlight equal and similar to Lascon Futura 2 - IP downlight IP54.
- Type S : 11W Decorative recessed LED downlight equal and similar to Lascon Futura 2 - IP downlight IP54 plus 1hour EMG maintained (emergency).



## PS ESPL-AMCC BUILDING

### PSESPL- A.4.1 Light Switches

NUMBER	DESCRIPTION	LOCATION
S1 – S2	One lever 1-way indoor 16Amp light switch all to the Particular Specification	1.25m above the final floor level

### PSESPL-A.4.2 Light Fittings

Light fittings shall be equal and similar to the requirements specified above. Pricing shall include the luminaire, all fasteners and equipment to supply, install and commission the luminaire as specified. All distribution is covered under the schedule of quantities.

NUMBER	LOCATION	TYPE
L1 – L4	Luminaires shall be mounted as per drawings	A
L5– L8	Luminaires shall be mounted as per drawings	B

### PSESPL-A.5.1 Socket Outlets

Socket outlets shall be equal and similar to the requirements as specified. Pricing shall include the socket outlet, all fasteners and equipment to supply, install and commission the switched socket outlet as specified. All distribution is covered under the schedule of quantities.

NUMBER	DESCRIPTION	LOCATION
P1 – P2	16Amp indoor double switch socket outlet all to the Particular Specification.	1.25m above the final floor level
P3 – P4	16Amp indoor single switch socket outlet all to the Particular Specification.	0.3m inside two-tier power skirting

### PSESPL-5.2.1 Isolators Installation

Isolators shall be equal and similar to the requirements as specified. Pricing shall include the isolator, all fasteners and equipment to supply, install and commission the isolator as specified. All distribution is covered under the schedule of quantities.

NUMBER	DESCRIPTION	LOCATION
I01 – I04	Stainless steel enclosed AISI 304 32Amp double pole [SP + N] series enclosed switch disconnectors that are supplied in robust, heavy-duty IP65 enclosure. The enclosures shall incorporate a red/yellow operating handle mechanically interlocked with a cover in the "ON" position and pad-lockable (3 padlocks) in the "OFF" position. Equal and similar ElectroMechanica	2.5m above the final floor level next to Electrocuter

### PS ESPL-A.6.1 Wall-Mounted Distribution Boards (Surface Mounted Type)

**Type:** This specification shall be considered as a minimum design requirement in terms of the Contractor's Tender offer. The Electrical and Electronic Contractor(s) shall coordinate with the Civil Contractor to ensure sufficient allowance is made in their tender offer to provide a fit-for-purpose unit/system.



The motor control centre or distribution board shall be manufactured in accordance with the Particular Specification. The equipment referenced below does not relieve the contractor of his responsibilities in terms of quality, dimensions and proper functioning of the system.

The motor control centre board or distribution board shall be of the surface-mounted type with a minimum IP rating of 54 (insect-proofed enclosure). The motor control centre or distribution board shall be constructed with a minimum of 2mm 3CR12 stainless steel and shall be bolted into position by means of M16 high tensile stainless-steel bolts grouted into the wall, the bolts shall be inside the board.

The panel door shall be provided with a locking system suitable for padlocking. The locking system shall consist of a 3CR12 stainless steel 3-way locking mechanism locking the door at the top, middle and bottom. The unit doors shall be capable of being opened at least 110 degrees.

The board shall be provided with readily removable, sectionalized, rigidly supported unpainted 316 cable end support gland plates along the entire length of the board.

Sufficient provision for ventilation and heat dissipation as per the equipment ratings and manufacturer's requirements shall be allowed for. Screwed-on engraved labels in English shall be provided below all switchgear and equipment on and in the panels, to facilitate identification. All unpainted parts shall be plated for corrosion resistance.

**Supply:** 25mm<sup>2</sup> 4C Cu PVC SWA PVC cable plus 16mm<sup>2</sup> Bare Copper Earth Cable from the MCC.

**Colour:** Painted Light Orange – B26 (SANS 1091:2012) external, White arc-free internal (see Painting and Finishing).

**Fault Level:** 6kA [15kA Main MCC] – Cascading Distribution Breakers shall be added in MCC to reduce at the DB to 6kA.

**Sectioning:** Multi-section, Form 3b or Form 4 to SANS IEC 60439.

**Future:** 30% for future extension space.

**Cable Entry:** Incoming and Outgoing – Top and Bottom. (see Glanding Section within Particular Specification).

QTY	DESCRIPTION	IDENTIFICATION
One	Panels comprising the following	Incomer
1	80Amp continuous current-rated TP (triple pole) MCB circuit breaker complete with sufficient auxiliary contacts to monitor if open or closed position. Equal or similar to Schneider Electric: Plus	Main Circuit Breaker
Set	80/1 Amp current transformer: Plus	Current inputs
3	2 Amp HRC fuse holders and fused links: Plus	Voltage inputs
4	80Amp tint copper bus bars [appearance shall be aluminium], suitable clamps shall be used, and no drilling shall be allowed on the busbars [cubic system shall be used]: Plus	3 Phase + N

<b>QTY</b>	<b>DESCRIPTION</b>	<b>IDENTIFICATION</b>
1	60Amp tint copper bus bars [appearance shall be aluminium], suitable clamps shall be used, and no drilling shall be allowed on the busbars [cubic system shall be used]: Plus	Earth
4	125Amp continuous current-rated HRC fuse holders and fused links: Plus	Surge arrestors connection fuses
1	Three-Phase Class 2 surge arrester: Plus	Surge arrester plus signals
3	2Amp continuous current-rated HRC fuse holders and fused links: Plus	Indicator Lamp Protection
3	Robust LED indicator lamps connected on the load side of the circuit breaker.	Indicators for 3 Phase (Red, White and Blue Indications)
1	Relay for under voltages, phase sequence, and phase loss in three-phase: Plus	Protection relay
One	Panels comprising the following	Distribution Section
2	63Amp SP + N earth leakage without overload protection: Plus	Earth Leakage for each phase [one for each phase]
5	20Amp continuous current-rated SP MCB: Plus	Socket Circuits
1	30Amp continuous current-rated TP MCB: Plus	High Mast Area Lighting
1	30Amp continuous current-rated TP Type2 Coordinated Contactor: Plus	Area lighting contactor, type 2 coordination
1	6Amp continuous current-rated SP MCB: Plus	Area Lighting
1	6Amp continuous current-rated SP MCB: Plus	Area lighting Coil Protection
1	Time switch equal and similar Schneider electric ITA digital with 100-hour standby capacity: Plus	Area Lighting Digital Timer Switch
12	10Amp continuous current-rated SP MCB: Plus	Lighting
1	20Amp continuous current-rated SP MCB: Plus	Lighting Circuit
3	25Amp continuous current-rated SP Type 2 Coordinated Contactor: Plus	lighting contactor, type 2 coordination [will be done under mechanical contract] switched via lighting switches
3	6Amp continuous current-rated SP MCB: Plus	Area Lighting [will be done under mechanical contract]
3	6Amp continuous current-rated SP MCB: Plus	Area lighting Coil Protection [will be done under mechanical contract]

QTY	DESCRIPTION	IDENTIFICATION
6	10Amp continuous current-rated TP MCB: Plus	Lighting Circuit allowances
1	20Amp continuous current-rated TP MCB: Plus	Electrocutor Circuit
1	25Amp continuous current-rated TP Type2 Coordinated Contactor: Plus	Electrocutor Circuit contactor, type 2 coordination
1	6Amp continuous current-rated SP MCB: Plus	Electrocutor Circuit
1	6Amp continuous current-rated SP MCB: Plus	Electrocutor Circuit Coil Protection
1	Time switch equal and similar Schneider electric ITA digital with 100-hour standby capacity: Plus	Electrocutor Circuit Digital Timer Switch
4	10Amp continuous current-rated SP MCB: Plus	Electrocutor Circuits
1	20Amp continuous current-rated TP MCB: Plus	Dehumidifier Circuit
1	25Amp continuous current-rated TP Type2 Coordinated Contactor: Plus	Dehumidifier Circuit contactor, type 2 coordination
1	6Amp continuous current-rated SP MCB: Plus	Dehumidifier Circuit
1	6Amp continuous current-rated SP MCB: Plus	Dehumidifier Circuit Coil Protection
1	Time switch equal and similar Schneider electric ITA digital with 100-hour standby capacity: Plus	Dehumidifier Circuit Digital Timer Switch
3	16Amp continuous current-rated TP MCB: Plus	Dehumidifier Circuits No.1 – No.3
1	6Amp continuous current-rated SP + N MCB: Plus	Access Control Feeder
1	6Amp continuous current-rated SP + N MCB: Plus	Fire Detection Feeder
1	6Amp continuous current-rated SP + N MCB: Plus	Alarm Panel Feeder

### PS ESPL-A.9PVC Accessories, Multicore Cables and earth wires

NUMBER	DESCRIPTION	LOCATION
All	<p>The Contractor shall provide all necessary PVC accessories and equipment to facilitate the flush installation of single core PVC insulated copper cables in walls. This includes all PVC conduits, PVC accessories, and equipment required for the luminaires. All IP-rated luminaires must be installed in a manner that does not damage or void their warranties. Cables shall be drawn through conduits or trunking that is flush-mounted within brickwork. The conduits/trunking must be securely fixed to the brickwork and adequately sized to accommodate the cables without causing damage to the insulation. Bends in the conduits should be smooth to prevent damage to the cables during installation.</p> <p>Cables must be protected from mechanical damage during installation and throughout their service life. Ensure that any exposed parts of the cables are adequately insulated and protected from moisture ingress. No surfix will be accepted.</p>	Cables, PVC Accessories and equipment



### PS ESPL-A.10 Outdoor and Compression Glands

NUMBER	DESCRIPTION	LOCATION
All	All outdoor installations the Contractor shall not use PVC type materials. The Contractor shall provide suitable IP66-rated boxes and IP68-certified glands. IP certification documentation must be submitted for approval. Additionally, all outdoor equipment shall be UV resistant, weatherproof, and rated accordingly. The IP certification for all outdoor equipment must be sent to the Engineer for approval. 25+ year UV life for longevity	Cables, PVC Accessories and equipment

### PS ESPL-A.11 Cable terminations

NUMBER	DESCRIPTION	LOCATION
All	All terminations using ferrules, chocolate blocks, or screw-type terminals will not be accepted. Insulation tape is not permitted. Only heat shrink and compact splicing connectors with easy-to-use opening and closing levers equal and similar to Wago or HellermannTyton are to be used for insulation and termination.	Terminations

### PS ESPL-A.11 Surface Mounted Conduit

NUMBER	DESCRIPTION	LOCATION
All	<p>Surface-mounted conduit shall be of steel type. Conduits shall be made of high-quality, hot-dip galvanized steel to ensure durability and corrosion resistance. All joints and fittings shall be of the same material and finish as the conduit. Couplings, connectors, elbows, and other fittings must ensure a secure and conductive path. Threaded connections shall comply with relevant standards to ensure tight and secure fittings.</p> <p>Conduits shall be securely fastened to the building structure using appropriate clamps and brackets. Fasteners shall be spaced according to the conduit size and local codes and standards. Conduits must be installed in a manner that prevents mechanical damage and ensures ease of cable pulling. Bends and elbows should be made using appropriate tools to prevent deformation. All conduit systems must be properly grounded and bonded in accordance with local electrical codes. Outdoor conduits shall use the specified outdoor box. When IP-rated equipment is used, care should be taken to ensure that all outdoor boxes and terminations are completed within this outdoor box.</p>	Surface Mounted Conduits

### PS ESPL-A.12 Two Tier Power Skirting

QTY	DESCRIPTION	LOCATION
8m	Grey two-tier power skirting, including all necessary components for installation: steel skirting with bends, 90-degree bends, fasteners, covers, elbows, end caps, tees, and silicone to cover top and bottom for painting.	Two Tier skirting

4	16Amp single Normal switched socket outlet equal or similar to Waco	Within power skirting
4	RJ45 CAT 6 Data outlet for power skirting equal or similar to Waco	Within power skirting
1	32Amp 2P Isolator equal or similar to Waco	Within power skirting
4	16Amp single Dedicated switched socket outlet equal or similar to Waco	Within power skirting

### PS ESPL-A.13 Electrocutors

NUMBER	DESCRIPTION	LOCATION
EL01 – EL04	Electrocutor with ROHS complaint T5 Tubes, stainless steel construction and UVA lamps complete with mounting brackets and accessories all that may be required. Equal and similar to Nemesis Quattro from PestWest.	2.5m above the final floor level



## **PS EMCA MULTICORE CABLES AND EARTHWIRES**

### **PS EMCA-1 Scope**

Schedules of cables associated with sections of works are listed below under the relevant sections.

All earth wires shall be bare copper conductors, unless otherwise specified and cables shall be of the type as specified.

These cables are only a guide and Contractors must make due allowance for all cabling to complete the works in its entirety.

Before ordering cables the contractor shall obtain the correct cable lengths by measuring required cable lengths on site.

### **PS EMCA-8 Cable Trays And Cable Ladders**

All cable trays and cable ladders shall be stainless steel Hot Dip Galvanised Type type. Cable trays will only be acceptable for cable supports where small cables are involved.

Vertically installed cable ladders shall be used for floor mounted cable support purposes.

### **PS EMCA-9 Installation Of Cables**

It is the responsibility of the contractor, as a design and build contract, to ensure the correct supply and signal cabling is specified and utilized for the relevant electrical and electronic equipment.

In order to support the cable sections, the following information and documentation should be supplied before project implementation;

Equipment schedules (motor, valves, etc.).  
Instrumentation list,  
Motor List,  
Cable Schedule;  
Actuator and valve list;



## *DAWID KRUIJER MUNICIPALITY*

**CONTRACT No: TN003/2026**

**REPLACEMENT OF ABRAHAM HOLBORS SEPTEMBER WATER TREATMENT  
PLANT MOTOR CONTROL CENTRE**

**BUILD OF ELECTRICAL WORKS**

### **C3.4.3 PARTICULAR SPECIFICATIONS**



### **C3.4 PARTICULAR SPECIFICATIONS**

#### **C3.4.3 PARTICULAR SPECIFICATIONS FOR ELECTRICAL WORKS**

The following Particular Specifications for electrical works will be applicable to this Contract:

**ECIS CONTROL AND INSTRUMENTATION SYSTEM**

**EG&M GENERAL AND MISCELLANEOUS**

**EMCA MULTICORE CABLES AND EARTHWIRES**

**EMCC MOTOR CONTROL CENTRE AND DISTRIBUTION BOARDS**

**EPLC PROGRAMMABLE LOGIC CONTROLLERS**

**PPG CONTRACTORS ESTABLISHMENT AND GENERAL CHARGES**



## *DAWID KRUIJER MUNICIPALITY*

### **CONTRACT No: TN003/2026**

### **REPLACEMENT OF ABRAHAM HOLBORS SEPTEMBER WATER TREATMENT PLANT MOTOR CONTROL CENTRE**

#### **BUILD OF ELECTRICAL WORKS**

### **ECIS – ELECTRICAL/ELECTRONIC: CONTROL INSTRUMENTATION SYSTEMS**

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## **ECIS CONTROL AND INSTRUMENTATION SYSTEMS**

### **ECIS 1 SCOPE OF WORKS**

As specified in the Project Specifications.

### **ECIS 2 PRESSURE TRANSMITTERS**

The pressure transmitters shall be pipe socket mounted and shall constantly display the relevant pressure and shall be easy to calibrate and reliable in service.

The pressure sensor shall have a ceramic diaphragm with electrodes in the ceramic substrate and diaphragm. A pressure proportional change in the capacitance shall be measured by the electrodes and displayed as the measuring pressure value.

The pressure sensor shall comply with the following technical requirements

Application	-	Measuring of absolute and gauge pressure in liquids
Measuring technique	-	Deflection of diaphragm
Measuring range	-	As specified in Variations and Additions to General and Particular Specifications
Construction	-	304 Stainless Steel housing
Mounting	-	½" pipe socket mounted
Pressure		16 bar or as required for application
Voltage	_	0 – 30VDC
Output	-	4 – 20mA
Accuracy	-	+/_ 0.2%
Reproducibility	-	+/_ 0,3%
Long term drift	-	+/_ 0,1% per year
Protection		
Display	-	Plug in display unit
Sensor cable	-	Screened transposed two-wire cabling



### **ECIS 3 FLOW METER EQUIPMENT**

Flow meters will be supplied and installed by the mechanical contractor if not otherwise indicated. The flow meter controllers as free issue items will have to be installed under this contract in flow meter kiosks complete with a supply of electricity, surge protection and earthing system.

### **ECIS 4 ELECTRONIC LEVEL CONTROL**

The micro based electronic controllers which will be mounted in the motor control centres or as specified and shall be easy to calibrate and reliable in service.

The transducers shall be designed to operate in air, been capsulated, of rugged construction and impervious to submergence.

The transducers shall, where possible, be installed at a point 500mm away from a wall or pipe, which may cause a false signal, and at least 500mm above maximum water level.

The coaxial cable between the transducer and power unit shall be of sufficient length to avoid any joints in this cable, as no joints will be permissible.

The grade 304 stainless steel brackets for mounting of level transducer must be provided and installed under this contract.

### **ECIS 5 NO-FLOW SWITCHES**

The electromagnetic flow monitor shall be pipe socket mounted and shall be easy to calibrate for specific no-flow conditions and shall be reliable in service.

The no-flow sensor shall be steel pipe mounted and shall be supplied complete with a weld stub to ensure correct immersion into the measuring liquid. The weld stub shall be adapted according to the flow measuring pipe diameter.

The no-flow sensor shall comply with the following technical requirements:

Application	-	Measuring of no-flow condition in water pipelines for pump set protection
Measuring technique	-	The flow sensor shall adopt the electro-magnetic principle of flow velocity measurement at the tip of the no-flow sensor
Measuring range	-	As specified in Variations and Additions to General and Particular Specifications
Construction	-	Die-cast aluminium housing, epoxy coated
Mounting	-	Weld stub mounted



Voltage	_	0 – 30VDC
Output	-	4 – 20mA
Accuracy	-	+/_ 2%
Reproducibility	-	+/_ 2%
Conductivity	-	≥20μS/cm
Protection		/ NEMA 4X / Type 4X
Settings	-	Potentiometer adjustment

## ECIS 6 FREE CHLORINE ANALYZER

The free chlorine analyser shall be an enclosed unit with front door mounted free chlorine content display unit with storage space for reagent. The unit shall be wall mountable.

The analyser shall sample every 2,5 minutes and shall use less than 475mL each of indicator and buffer over a 30-day period. A linear peristaltic pump, seal-free mixer, easy-to-clean cell and compact colorimeter shall provide a reliable low maintenance operation.

The analyser shall be equipped with a programmable 4-20mA recorder output and two user selectable alarms and shall be installed on a 230 Volt supply system.

The mixing system shall operate with no moving parts and a self-cleaning stir bar in the sample chamber shall generate a vigorous mixing action for accurate sample analysis. A transparent gasket shall occupy the space between the light source, sample chamber and detector. The optically clear RTV silicon light pipes shall transmit the colorimetric beam and minimize the risk of interference caused by high levels of humidity.

The measuring range shall be 0 to 5 mg/L free or residual chlorine.

Accuracy shall be +/- 5% or +/- 0.035mg/L, whichever is the greater.

The analyser shall be supplied with a three months' supply of reagent

## ECIS 7 PH SENSOR

The ph sensor shall be of the pipe insertion mounted type with a LCP body glass electrode and titanium ground rod.



The instrument shall have a pH measuring range of 0 – 14 and temperature range of -5 to 95°C. The sensor shall be rated to withstand a pressure of 6 bar.

The sensor shall have a sensitivity of less than 0.005pH and shall have three measuring electrodes, a standard and process electrode as well as a ground electrode. If necessary, a digital gateway shall be provided with the pH sensor for communication with the same controller as the turbidity sensor.

## **ECIS 8 TURBIDITY SENSOR FOR LOW TO MEDIUM RANGE TURBIDITY MEASUREMENTS**

### **ECIS 8.1 Turbidity sensor**

The Turbidity sensor shall have a pulsed infrared source in conjunction with an automatic cleaning process and shall be a precision bypass sensor suitable for ultra-clear media to media with medium turbidity due to the particular low level of light interference.

The sensor enclosure shall have an IP 65 rating and shall be separately mountable from the controller up to a distance of 50m. Sensor to controller connection cable shall be provided with the sensor unit. The sensor shall be reconcilable with the existing turbidity and pH controllers installed on the plant.

The turbidity sensor shall comply with the following technical specifications:

Measuring technique	-	90° scattered infrared light in accordance with DIN EN ISO 7027
Measuring range	-	0.0001 – 1000 NTU
Precision	-	+/_ 1%
Reproducibility	-	+/_ 0,5%
Air bubble compensation	-	Physical-mathematical
Sample size required		Min. 0,2l/min, max. 1l/min. max. 6 bar
Ambient temperature	-	Max. 40° C
Automatic cleaning	-	Wiper cleaning
Materials	-	Quartz measuring window, silicone wiper profile, Noryl GFN2 measuring chamber, ASA housing and stainless-steel wiper axle.
Sensor cable	-	+/_ 5m length



## **ECIS 8.2 Turbidity controllers**

The turbidity controller shall be a product from the same manufacturer as the turbidity sensor and shall be capable of receiving data from two sensor units and shall communicate with a PLC by means of RS485/MODBUS protocol. The controller shall be microprocessor-based and housed in a ½ DIN, NEMA 4X enclosure with an IP rating of IP66.

Multiple control functions shall include built-in PID, control contacts and alarm functions

The turbidity sensor shall comply with the following technical specifications:

Ambient conditions	-	-20°C to 40°C, 0 – 95% relative humidity and non-condensing
Power requirements	-	230V AC
Display	-	Graphic dot matrix LCD, 128 x 64 pixels with LED backlighting
Relays	-	Three SPDT user configurable contacts rated 230V AC 5Amp.
Outputs	-	Two analog 4-20mA
Control		PID, high/low phasing, set point, dead band, overfeed timer, off and on delay
Communication	-	RS485 MODBUS
Memory	-	Non-volatile setting memory
Mounting	-	Wall mounting
Certifications	-	ETL to UL 6101A-1 and CSA C22.2 No. 1010.1

## **ECIS 9 ROTATING BRIDGE BRUSH GEAR**

The brush gear to be installed on the kingpost on the bridge at the centre of the tank to facilitate connections between the incoming supply cable and the cable from the kingpost to the motor starter via the rotating arm shall consist of the following:

- A set of four 20 mm wide and three 8 mm wide brass slip rings on an ebonite or equivalent insulating sleeve (i.e. three slip rings or phase connections, one for the earth connection, three slip rings for the control circuit, namely, start, common and stop connections). Connections to these slip rings shall be affected via an approved heavy duty terminal block



with stud type brass terminals onto which the lugs on the cable tails shall be bolted. This terminal arrangement shall be completely independent of fixing screws for the slip rings.

- A set of four main circuits and three control circuit "Morganite" carbon brushes, or equivalent. Each of these brushes shall be spring-loaded to ensure high contact pressure and the springs shall be rust-proofed.

The abovementioned brush gear shall be installed in a weatherproof IP55 grade UV protected and impact proof synthetic housing with removable cover, on the kingpost of the bridge. This brush gear-housing shall be suitably sized to accommodate the relevant equipment without cramping and shall be insect proofed.

The brush gear housing shall be designed and constructed to prevent the accumulation of gas and the condensation of moisture inside the housing and the pressure of the brushes on the slip rings shall be high enough to obtain a self-cleaning effect during operation.

The driving motor must be provided with a weatherproof emergency stop push button station mounted on the bridge in close proximity to the bridge access ladder. The supply and installation of cables between the motor, emergency push button station, brush gear and kingpost, shall form part of this Contract. The cable shall be installed in a grade 304 stainless steel conduit mounted on the underside of the bridge and secured to the bridge by means of stainless-steel conduit saddles.

## **ECIS 10 SURGE PROTECTION – ELECTRONIC DEVICES**

The section is to be read in conjunction with the Particular Specifications of Electrical distribution systems.

Electronic equipment shall be adequately protected on both the incoming and outgoing terminals by means of suitable arrestors compatible with the relevant equipment. 4-20mA signal cables shall be protected on both sides of the cable against surges.

Surge protection shall be provided as specified at flow meters, level sensors and other electronic instruments.

The following surge arrestors shall be supplied and installed for surge protection complete with base element.

### ***ECIS 10.1 Flow meters, level sensors and electronic instruments (4-20ma)***

A combined lightning current and surge arrester module with Din rail mounted base and removable surge arrester module. The surge arrestors shall be of sufficient voltage rating and shall withstand a total discharge current of 8/20 magnitude and 20kA rating and a total impulse current of 10/350 magnitude. At flow meter and level sensor position as well as at the termination point in the MCC/DB)



## **ECIS 10.2 Earthing at flow meters and level sensors**

Apart from earthing already specified the following earthing system shall form part of the installations.

### **ECIS 10.2.1 At flow meter and level sensor**

The earth connection and surge arrestor earth at the flow meters/level sensors shall be connected to an earth mat comprising of 70mm<sup>2</sup> bare copper conductors installed in a cross configuration with the earth mat centre Cad welded to the 16mm<sup>2</sup> earth connection at the flow meter. The cross radial shall be at least 2m long with the radial ends connected to a 1,5m long earth spike driven into the ground at each end.

### **ECIS 10.2.2 Outdoor connection boxes at level sensors and flow meters**

The outdoor type connection boxes required at flow meters and level sensors positions for cable connections to surge arrestors shall be equal and similar to the following:

Raised lid type with IP65 rating and equipped with mounting rail for surge arrestors and Teflon compression glands for unarmoured cables and brass compression glands for armoured cables.

All cables in manholes and valve chambers shall be mounted on heavy-duty cable racks.

## **ECIS 11 OPERATING AND MAINTENANCE INSTRUCTIONS**

Before completion of the testing of the plant, the Contractor shall provide the Employer with adequate and complete working, operating and maintenance instructions *in triplicate*, with the necessary drawings and diagrams clarifying the instructions. The Contractor will also provide 3 x "soft copies" of the complete manual in PDF format on a Suitable sized USB Flash Drive (Memory Stick)

Instructions are to be made up in book form and particular reference is to be made to:

- Maintenance of equipment;
- Precautions to be taken in running the plant;
- All instruments and components must be fully described in data sheets supplied by the relevant suppliers;
- Wiring diagrams of the complete electrical installation.

The manual must be specific for the plant supplied and all extraneous material not connected with the relevant plant shall be deleted, leaving the manual as a comprehensive coherent document, bound in a professional way such that this may be used frequently without falling apart. Standard pamphlets may be supplied as addendums, bound separately in a good quality file to serve as reference but will not be allowed as part of the main manual.



## ECIS 12 INFORMATION TO BE SUBMITTED BY THE SUCCESSFUL TENDERER

The successful Tenderer shall submit three prints of the under mentioned drawings to the engineer for approval, before manufacturing.

- a) Wiring diagrams.
- b) General layouts and Schematic single line diagrams.
- c) Elevations showing dimensional information including details such as, but not limited to, the following:
  - height (less any removable lifting angles or eyes)
  - widths
  - depth
- d) Structure descriptions showing the following:
  - Other information as required for approval.
- e) Conduit locations
- f) Unit descriptions
- g) Nameplate information
- h) Manufacturer drawings shall be provided in PDF format
- i) Data sheets and publications on all major components including, but not limited to, the following:
  - Instrumentation
  - Pipe connections
  - Instrumentation
  - Additional comments required
  - All clarifications and exceptions must be clearly identified

After completion of the work, the contractor shall submit three final copies of each of the above-mentioned drawings showing the final layout and wiring diagram of the boards.

## ECIS 13 MEASUREMENTS AND PAYMENT

Measurement and payment will be done in accordance with the methods stated below.

## ECIS 14 DESIGN, DRAWING AND GENERAL

The rate tendered shall include for the provision of the necessary design information for all items measured under the respective schedule. For control and instrumentation, design information shall include but limited to as listed in this Particular Specifications.

### Pay Item

### Unit

- |     |  |     |
|-----|--|-----|
| (a) | The Contractor will provide the general layout drawings and wiring diagrams of the enclosure and instrumentation for approval to the Engineer. | Sum |
|-----|--|-----|



- |     |   |     |
|-----|---|-----|
| (b) | Provide operating and maintenance manuals, data sheets of all equipment and “as built” drawings | Sum |
|-----|---|-----|

## **ECIS 15 SUPPLY AND DELIVERY TO SITE**

Measurement and payment shall be as done in accordance with the labelling, headings and descriptions listed in the relevant Bill of Quantities schedule. Reference shall be made to Part C2.1 - *Pricing Instructions*, and it shall be the responsibility of the Contractor to ensure that its system, unit or process offered conforms to the specifications, is fit for purpose and operates as per the intended use.



## *DAWID KRUIJER MUNICIPALITY*

### **CONTRACT No: TN003/2026**

### **REPLACEMENT OF ABRAHAM HOLBORS SEPTEMBER WATER TREATMENT PLANT MOTOR CONTROL CENTRE**

#### **BUILD OF ELECTRICAL WORKS**

### **EG&M: GENERAL AND MISCELLANEOUS**

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## EG&M GENERAL AND MISCELLANEOUS

### EG&M 1 STANDARDS

The following standards, regulation and drawings, etc. shall be applicable to the electrical installations related to this particular specification, whereas the latest applicable South African Bureau of Standards Codes and Standards should be used;

Standard No.	Description
SANS 1507	Electrical cables with extruded solid dielectric insulation for fixed installations (300/500 V to 1900/3300V)
SANS 1063	Earth rods and couplers
SANS 1213	Mechanical cable glands
SANS 1433-1	Electrical terminals and connectors Part 1: Terminal blocks having screw and screwless terminals
SANS 1433-2	Electrical terminals and connectors Part 2: Flat push-on connectors
SANS 10142	Code of Practice for the wiring of Premises
SANS 10199	The design and installation of an earth electrode
SANS 10292	Earthing of low-voltage distribution systems
SANS 10313	Protection against lightning - Physical damage to structures and life hazard
SANS 60947-5-2	Low-voltage switchgear and control gear Part 5-2: Control circuit devices and switching elements - Proximity switches

### EG&M 2 GENERAL REQUIREMENTS

#### EG&M 2.1 Laws, Regulations and Codes of Practice to be Observed

The work shall be carried out strictly in accordance with the following laws and regulations where applicable;

- a) The latest edition of "Code of Practice for the Wiring of Premises", SANS 10142, as amended;
- b) Occupational Health and Safety Act (Act No. 85 of 1993);
- c) The "Electricity Supply By-Laws and Regulations" of the Local Supply Authority;
- d) The local Fire-Office Regulations;
- e) The Requirements of the Department of Communications;
- f) The Acts and Regulations applicable to the use of explosives;
- g) "The Code of Practice for the Installation and Maintenance of Electrical Equipment used in Explosive Atmospheres"

The Contractor will be responsible for serving all notices and paying all fees due in terms of the above laws and regulations.



### ***EG&M 2.2 Radio and TV Interference***

All equipment installed under this Contract shall comply with the Government Notice No. R.2246 and any other applicable rules and regulations in respect of radio and TV interference. Any equipment found producing interference subsequent to commissioning, shall be suppressed or replaced to the satisfaction of the Engineer without any additional cost.

### ***EG&M 2.3 Interchangeability***

All equipment must be manufactured to such close tolerances that all similar components and spares must be fully interchangeable without any further alterations or adjustment being necessary.

### ***EG&M 2.4 Water and Debris Accumulation***

All outdoor equipment shall be designed so that water and debris will not readily accumulate to cause deterioration of equipment or an electrical discharge hazard. Where this cannot be avoided, such places shall be easily accessible for cleaning.

### ***EG&M 2.5 Colour and Finishing***

All metal parts of equipment shall either be finished in baked enamel or powder coating or galvanized (depending on the circumstances) after manufacture and treatment to SANS 064.

Colours of paint to be used shall be confirmed with the Engineer prior to application.

All steel areas subjected to corrosive atmospheres must be hot dip galvanized. The galvanizing must be clean, smooth, of uniform thickness and unblemished. The galvanizing must not affect the mechanical properties of the covered metal.

All drilling, welding, cutting and bending must be complete, and the metal must be cleaned of any machining blemishes, mill scale, rust and lubricants before galvanizing. If site trimming, drilling and cutting cannot be avoided then all such denuded surfaces must be dressed with a cold galvanizing paint.

The Engineer must approve any other proposed corrosion protection before it is applied.

Galvanized areas must be kept free of lubricants.

Wire must be galvanized.

### ***EG&M 2.6 Inspections And Tests***

All equipment will be inspected by the Engineer and tested in his presence both in the factory during manufacturing and on-site during installation. The Engineer will do all inspections accompanied by the Contractor and the Contractor will do all tests with the Engineer as witness.



The Engineer will require seven (7) days notification to avail himself for any test or inspection and the Contractor must arrange for the maximum number of inspections and tests to be done on the same day. The Contractor must provide all testing facilities and instruments, all equipment required for a test or inspection and all safety clothing prescribed by the Engineer.

The instruments must have valid test certificates issued by an accepted testing authority and the results of the test done must be recorded on a test certificate, of which the Engineer must receive two copies. The Engineer reserves the right to call for a calibration test on any instruments used during the test. The cost of all tests must be included in the tender price.

### **EG&M 2.7 Performance Tests**

On completion of erection and installation the Contractor must carry out the following tests, where applicable, in addition to any other tests, which may be specified elsewhere:

Before commissioning:

- Cable Insulation test.
- Earth continuity test.
- Tests for correct direction of rotation of motors and reverse if necessary.
- Test for correct operation of control gear, setting of overload protection equipment, etc.
- The Contractor must obtain SABS test certificates for samples of insulating oil in HT switchgear and transformers. These certificates must be submitted to the Engineer.

On completion of installation and putting into proper operation all the plant and equipment, the Contractor will be required to make suitable arrangements for the testing of all plant and equipment supplied under this Contract and running the plant for at least one week, during which time he shall also train all the operators in the correct running of the plant. He shall also explain the maintenance manuals to the operator during this time.

The entire cost of testing, including supply of test equipment, must be borne by the Contractor and an adequate allowance for such tests must be made in the Tendered price.

### **EG&M 2.8 Operating And Maintenance Instructions**

Before completion of the testing of the plant, the Contractor shall provide the Employer with adequate and complete working, operating and maintenance instructions in triplicate, with the necessary drawings and diagrams clarifying the instructions.

Instructions are to be made up in book form and particular reference is to be made to:

- Maintenance of equipment;
- Precautions to be taken in running the plant;
- All instruments and components must be fully described in data sheets supplied by the relevant suppliers;
- Wiring diagrams of the complete electrical installation.



The manual must be specific for the plant supplied and all extraneous material not connected with the relevant plant shall be deleted, leaving the manual as a comprehensive coherent document, bound in a professional way such that this may be used frequently without falling apart. Standard pamphlets may be supplied as addendums, bound separately in a good quality file to serve as reference but will not be allowed as part of the main manual.

The format for the operating and maintenance manual is described in detail elsewhere in this document.

N.B. The prices Tendered in the Schedule of Prices will be held to include for the supply of these operating and maintenance instructions.

### ***EG&M 2.9 Spares***

Tenderers shall submit on the appropriate Schedule in this document a list of spare parts and special tools, which is recommended and should be kept by the Employer for maintenance of the plant. Spares, which the Employer decides to order, must be manufactured simultaneously with the rest of the equipment and be subjected to the same tests for dimensions, tolerances, strength, etc. All spares and special tools must be packed separately and the cases appropriately marked. All spares and special tools must be new and unused and where possible should be standard to all sections of the plant.

### ***EG&M 2.10 Labels And Inscriptions***

The standard labels on equipment regarding the manufacturer, type, class, rating etc., shall be accepted unchanged.

Engraved laminated plastic labels shall however be provided to indicate a numbering system for relays, fuses, links, lights and selector and control switches and shall correspond to the wiring diagram numbering system. These labels shall be fixed with screws, bolts or rivets.

### ***EG&M 2.11 Name Tags***

Identification tags shall be attached to all equipment, sub-assemblies, components such as instruments, fuses etc., cable ends etc. The tags shall be screwed on with brass or plated steel screws (no self-tapping screws will be permitted). Where it is not possible to use screws such as on the cables, other means of attachment must be submitted for approval to the Engineer.

Cables shall be tagged at either end, whether the end terminates in a distribution board or an end box.

All cable cores and internal panel wiring shall be identified at both ends by means of durable colour coded wire marking ferrules in accordance with numbering systems in cable and wiring diagrams. Only closed ring interlocking type identification ferrules shall be used.

Outdoor tags shall be of stainless steel or brass type.



Tags mounted indoors or protected by an enclosure shall be made of Ivorene or similar sandwich material with black letters on a white background.

All lettering and text shall be approved by the Engineer.

Letter sizes must be compatible with the application, e.g.

For fuses, terminals, relays etc	3 to 5 mm
For panels or cubicles	12 to 20 mm
For switchboard or MCC board names	about 50 mm
For building or structure names	about 80 mm

### **EG&M 3 EMERGENCY STOP PUSH BUTTONS AND WEATHERPROOF ISOLATORS**

Each of these units shall consist of a totally enclosed outdoor type heavy duty "push and turn to lock" stop push button station with a cable gland entry at the bottom to accommodate a 4 core 2,5mm<sup>2</sup> LT PVC SWA PVC cable.

This push button station and weatherproof isolator shall be mounted on a rigid 1meter high grade 304 stainless steel pedestal with 2mm radius rounded edges, designed to be bolted to a concrete floor. (Refer to the relevant drawing.)

An emergency stop push button station shall be installed near the coupling between each motor and its associated pump and shall be connected to the relevant starter panel via the specified cable to stop the motor.

The pedestal shall be securely bolted to the floor by means of stainless-steel foundation bolts grouted into the concrete and care shall be taken to ensure that it is installed plumb.

Emergency stop pedestals for submersible pump sets shall be large enough to accommodate a motor cable termination box to facilitate submersible motor cables on DIN rail mounted termination blocks

### **EG&M 4 CONDUCTOR ENDS**

#### ***EG&M 4.1 Numbering Of Conductor Ends***

Every conductor end whatsoever, with the exception of AC power cables at any terminal shall be numbered.

These numbers shall correspond with those on the circuit diagram and shall consist of the slip on type numbering system (clipped on numbering system will not be accepted). It shall not be possible to remove the number holder without damaging it or cutting off the lug.

#### ***EG&M 4.2 Connection Of Conductor Ends***

All conductors whatsoever shall be connected at terminals by means of lugs and/or ferrules suitable for the specific conductor and terminal.



## **EG&M 5 EARTHING**

The contractor shall do all the bonding and earthing in accordance with the latest addition of the "Code of Practice for the Wiring of Premises" SABS 10142.

## **EG&M 6 LIGHTNING PROTECTION**

### ***EG&M 6.1 Plant***

The lightning protection of the lighting structures, poles and plant of the works, including all the buildings and handrails on the new plant, form part of this contract.

The lightning protection must be a SABS approved scheme and SABS approved drawings of the scheme must be submitted to the Engineer.

## **EG&M 7 SURGE PROTECTION**

Tenderers shall allow in their Tender prices for adequate protection of the equipment supplied and installed under this contract against direct as well as induced voltage surges and spikes which may be experienced on the system.

Surge arrestors shall be provided on each phase as well as neutral on the incoming power supply terminals of each board.

All arrestors shall be connected directly to earth along the shortest possible route and only conductors of adequate rating for the discharge currents catered for shall be used for connections to arrestors.

Tenderers shall submit full particulars of the arrestors offered as well as written confirmation that it will provide adequate protection for the relevant equipment against possible voltage surges and spikes on the system.

### ***EG&M 7.1 Surge Protection Units***

The following surge arrestors shall be supplied and installed for surge protection complete with base element.

#### **EG&M 7.1.1 Main Supply Protection**

Single Din rail mounted mains surge arrestors shall be supplied and installed for each phase and neutral conductor of an electrical board. The surge arrestors shall be of sufficient voltage rating and shall withstand a max discharge current of 8/20 magnitude and 40kA rating.

## **EG&M 8 NOTICES AND DANGER PLATES**

### ***EG&M 8.1 Scope***

This specification deals with the provision of Notices and Danger Plates as required in terms of the Occupational Health and Safety Act No. 85 of 1993, as well as any other notices that may be required by law or by the nature of the finished Works.

The following standard specifications are referred to in this specification: -

- SANS 10140; Parts I to IV: Identification colour marking.
- SANS 1186: Symbolic safety signs.
- Occupational Health and Safety Act No 85 of 1993

### ***EG&M 8.2 Materials and Finish***

Outdoor signs shall be either of vitreous enamelled type or of cast aluminium with raised or embossed letters.

Indoor notices shall be of non-deteriorating plastic, Perspex or fiberglass.

The colours and sizes of letters and colours of background shall be in accordance with requirements of SANS 0140 and as approved by the Engineer. Symbolic signs shall conform to the requirements of SANS 1186.

Signs shall be pre-drilled for fixing.

All fixing accessories shall be of non-corrosive material.

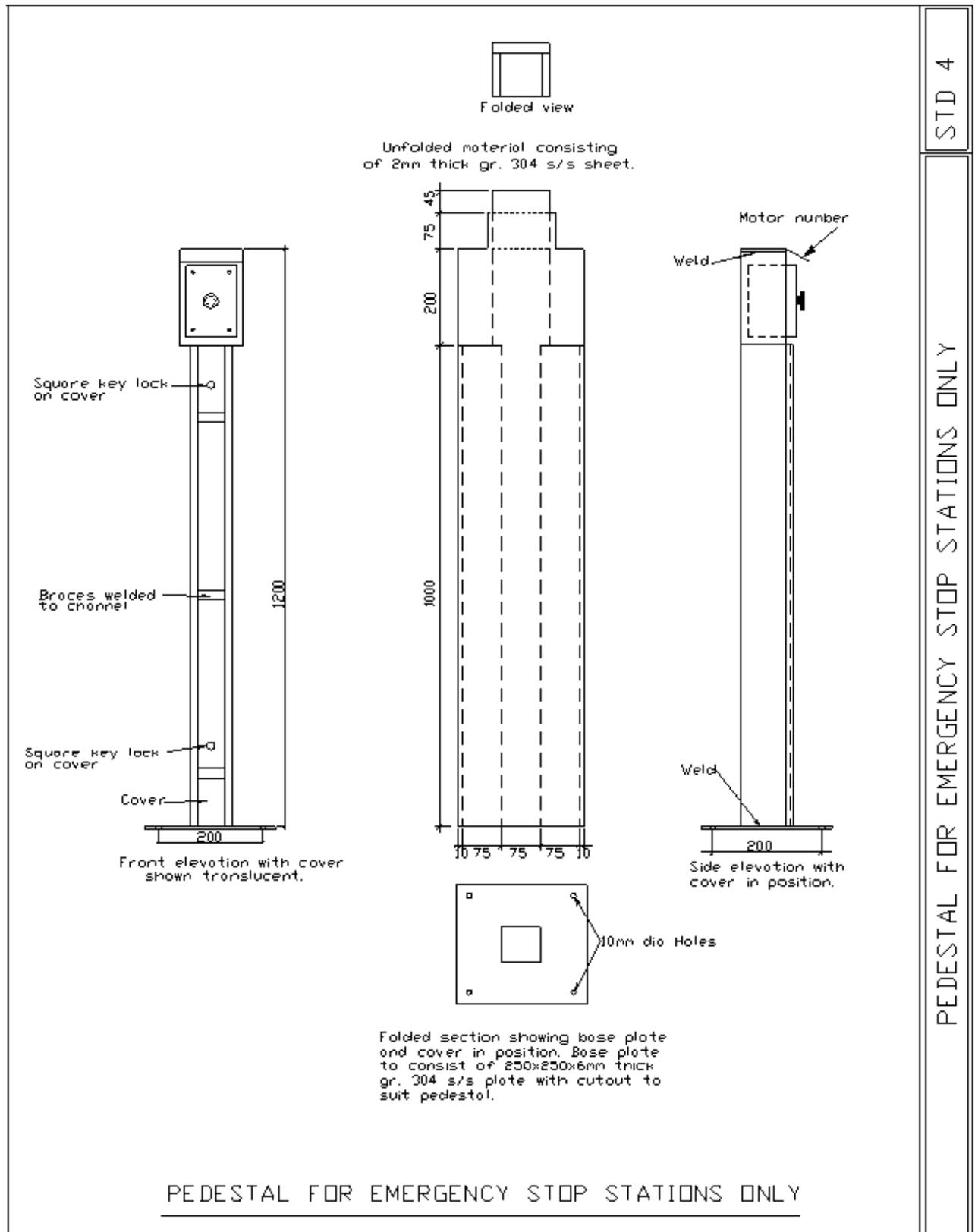
### ***EG&M 8.3 Installation and Erection***

The Contractor shall supply and fix permanently in position the signs and notices required by law for all the relevant working areas of the Works. The Engineer shall as prescribed by the relevant Regulations and as agree positions of signs.

## **EG&M 9 FIRE EXTINGUISHERS**

5kg CO<sub>2</sub> and powder fire extinguishers shall be supplied and installed in all pump stations and treatment plant buildings in accordance with the requirements of the Local Authority.

EG&M 10 PEDESTAL FOR EMERGENCY STOP AND START STATIONS ONLY



STD 4

PEDESTAL FOR EMERGENCY STOP STATIONS ONLY

## EG&M 11 OPERATING AND MAINTENANCE INSTRUCTIONS

Before completion of the testing of the plant, the Contractor shall provide the Employer with adequate and complete working, operating and maintenance instructions *in triplicate*, with the necessary drawings and diagrams clarifying the instructions. The Contractor will also provide 3 x "soft copies" of the complete manual in PDF format on a Suitable sized USB Flash Drive (Memory Stick)

Instructions are to be made up in book form and particular reference is to be made to:

- Maintenance of equipment;
- Precautions to be taken in running the plant;
- All instruments and components must be fully described in data sheets supplied by the relevant suppliers;
- Wiring diagrams of the complete electrical installation.

The manual must be specific for the plant supplied and all extraneous material not connected with the relevant plant shall be deleted, leaving the manual as a comprehensive coherent document, bound in a professional way such that this may be used frequently without falling apart. Standard pamphlets may be supplied as addendums, bound separately in a good quality file to serve as reference but will not be allowed as part of the main manual.

## EG&M 12 INFORMATION TO BE SUBMITTED BY THE SUCCESSFUL TENDERER

The successful Tenderer shall submit three prints of the under mentioned drawings to the engineer for approval, before manufacturing.

- j) Wiring diagrams.
- k) Schematic single line diagrams.
- l) Elevations showing dimensional information including details such as, but not limited to, the following:
  - E-stop and notices height (less any removable lifting angles or eyes)
  - E-stop and notices height width
  - E-stop and notices height depth
- m) Structure descriptions showing the following:
  - Other information as required for approval
- n) Conduit locations
- o) Unit descriptions
- p) Nameplate information
- q) Manufacturer drawings shall be provided in PDF format
- r) Data sheets and publications on all major components including, but not limited to, the following:
  - Pilot devices
  - Relays
  - All clarifications and exceptions must be clearly identified

After completion of the work, the contractor shall submit three final copies of each of the above-mentioned drawings showing the final layout and wiring diagram of the boards.

## EG&M 13 MEASUREMENT AND PAYMENT

Measurement and payment shall be as done in accordance with the labelling, headings and descriptions listed in the relevant Bill of Quantities schedule. Reference shall be made to Part C2.1 - *Pricing Instructions*, and it shall be the responsibility of the Contractor to ensure that its system, unit or process

offered conforms to the specifications, is fit for purpose and operates as per the intended use.



## *DAWID KRUIJER MUNICIPALITY*

### **CONTRACT No: TN003/2026**

### **REPLACEMENT OF ABRAHAM HOLBORS SEPTEMBER WATER TREATMENT PLANT MOTOR CONTROL CENTRE**

#### **BUILD OF ELECTRICAL WORKS**

### **EMCA: MULTICORE CABLES & EARTHWIRES**

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## **EMCA 3.2 Medium Voltage Cables**

These cables shall be manufactured in accordance with NRS. 013-1991 and comply with SANS 97 - 1991. All the 11 kV cables shall have copper conductors and shall be suitable for use on an unearthed system.

Three core cables shall be of the fully impregnated belted type. The cable shall have a helical fibrous bedding, lead alloy E sheath, single wire armour and a PVC serving as laid down in the Variations and Additions to the Standard and Particular Specifications, all in accordance with SANS 97 - Table 18. Single core cable shall be fully impregnated, screened general purpose cable with copper conductors suitable for an earthed system. The cables shall be in accordance with Table 11 of SANS 97, shall have a lead alloy E sheath and a PVC anti-electrolytic over sheath. (Type PEC)

## **EMCA 3.3 Fibre Optic Cables**

### **EMCA 3.3.1 Communication Network (Fibre Optic Cable - Multimode)**

The multimode Fibre Optic communication network shall have both uplink and downlink connections available.

### **EMCA 3.3.2 Technical Design Requirements**

The design of the multimode Fibre Optic network shall include, amongst others the following minimum design requirements:

- a) Detailed optical power budget calculations
- b) Transceiver SFP details
- c) Fibre link lengths
- d) dB losses per each patch cord/lead used
- e) Any Mid-couplers used
- f) Type of Patch panels installed (8-way, 16-way, etc.)
- g) Type of connectors used (LC, ST, etc.)
- h) Amount of splicing joints made

The design of the multimode Fibre Optic network shall conform, amongst other international standards to the following international standard: **ITU-T G.651.1** specification.

The distances between the sites that will be interconnected will be indicated on the specific drawings and/or project specifications. The contractor shall however confirm these distances as part of their final design.

No splicing of Fibre Optic cable joints shall be allowed, except for termination of the Fibre Optic cables in the patch panels at all the respective sites. The design of the entire multimode Fibre Optic network shall be based on international standards, including but not withstanding the **ITU- T G.651.1** specification. The design shall include, amongst others the technical details specified below:



- a) **Type of SFP transceivers selected** - Shall include the following design details:
- Optical Power Budget (PB)
  - Minimum Optical Power transmission values (dBm)
  - Minimum Receiver sensitivity values (dBm)
- b) 76
- dB losses from connectors;
  - dB losses from patch cords;
  - dB losses from patch panels;
  - dB losses from mid-couplers;
  - dB losses from pig-tails;
  - dB loss/km for each specific Fibre Optic link (@ 850nm wavelength)

### EMCA 3.3.3 Express/Emergency Joints

Each Fibre Optic link shall be installed without the need for any splicing joints in-between sites. Only splicing at the patch panels on either side (at both sites) is expected. Express or Emergency splicing joints shall only be done when a Fibre Optic cable has been damaged and needs to be temporarily repaired to restore service.

Before commencing with any such endeavours, the Contractor shall firstly request permission from the Engineer if the need to make an Express or Emergency splicing joint arises. The Engineer reserves the right to decline such a request from the Contractor. An express joint shall always be a temporary measure only and the repaired cable shall be replaced as soon as possible (The Contractor shall communicate the time frame on the replacement of the affecting Fibre Optic link to the Engineer).

**For Information:** The overall design of the Fibre Optic network shall ensure the optimal Optical Power Budget (**PB**) shall remain after installation, to cater for any such temporary Express or Emergency splicing joints, without affecting the overall Quality of Service (QoS) relevant to the Fibre Optic Link affected.

### EMCA 3.3.4 Optic Fibre Optical Characteristics

The multimode Fibre Optic cable shall conform to the following **Optical** properties and characteristics:

- a) 8 cores
- b) Typical Core Diameter - 50  $\mu\text{m}$ ;
- c) Cladding Diameter - 125.0  $\pm$  1  $\mu\text{m}$ ;
- d) Primary Buffer >250  $\mu\text{m}$ ;
- e) Secondary Buffer >900 nm;
- f) Bandwidth at 850nm – 1000 MHz/km;



- g) Cable Fibre Attenuation – <math>< 5\text{dB/km}</math> @ 850nm, <math>< 3\text{dB/km}</math> @ 1300nm;
- h) Each Optical Fibre shall consist of a doped silica core surrounded by a concentric silica cladding;
- i) The Fibre shall be a matched clad design; and
- j) The coating shall be dual layered and UV-cured acrylate.

### EMCA 3.3.5 Optic Fibre Mechanical Properties

The multimode Fibre Optic cable shall conform to the following **Mechanical** properties and characteristics:

- a) The cable shall consist of a dielectric, glass reinforced plastic (GRP) rod to prevent bucking of the cable;
- b) Water-blocking technology shall be used to impede migration of water through the cable core;
- c) Fillers shall be included in the cable core to aid in symmetry of the cable cross-section if needed;
- d) A water blocking tape shall be applied longitudinally around the outside of the stranded tubes or fillers;
- e) The water blocking tape shall be non-nutritive to fungus, electrically non-conductive and homogenous. It shall also be free from dirt and any foreign matter;
- f) High tensile strength dielectric yarns shall be helically stranded evenly around the cable core to improve tensile strength;
- g) Ripcords shall be provided in the cables for easy sheath removal;
- h) The armoured cables shall contain two ripcords under the steel armour;
- i) The armoured cable shall contain corrugated steel tape/steel wire, plastic coated on both sides for corrosion resistance;
- j) It shall be applied around the outside of the water blocking tape over the dielectric tensile strength members;
- k) This shall be done with an overlapping seam with all the corrugations in line;
- l) The outer jacket shall be applied over the corrugated steel tape/steel wire armour;
- m) The outer jacket / sheath shall be HDPE;
- n) The minimal outer jacket thickness shall be 2.0 mm;
- o) The cable jacket on the armoured cables shall contain no metal elements and shall be of a consistent thickness;
- p) The shipping, storage, and operating temperature range of the cable shall be  $-40^{\circ}\text{C}$  to  $+70^{\circ}\text{C}$ ;
- q) The installation temperature range of the cable shall be  $-30^{\circ}\text{C}$  to  $+70^{\circ}\text{C}$ ;
- r) Cable Sheath Marking - All cables shall have sequential length markings along the cable sheath;
- s) The height of the marking shall be approximately 2.5 mm; and
- t) As required by Section 350 G of the NESC, ANSI C2-1993, all cables shall have a visual identifier to identify them as telecommunications / data-communications cables.



### EMCA 3.3.6 Fibre Optic Cable Installation Requirements

The Fibre Optic cable shall be installed in 50mm cable ducts. The requirements for the cable duct shall be as follows:

- a) Direct burial type of duct
- b) 50mm outside diameter
- c) UV rated
- d) Pre-installed pull tape
- e) Silicone lined for reduction in friction
- f) Manufactured according to SABS ISO 9001
- g) Jointing of duct only via high compression couplings
- h) Ducts shall have a pressure rating > 9 Bar

Where the cable route changes direction (termination of fibre links into buildings, change of direction due to services and infrastructure, etc.), manholes/handholes shall be constructed or installed if of the pre-cast/polyethylene type.

The Contractor shall be required to survey the route prior to the commencement of the installation of the multimode Fibre Optic cables to determine the following:

- a) The length of the route that requires the Fibre Optic cable;
- b) The terrain conditions and terrain accessibility;
- c) Crossings including existing services, streams, rivers, pipelines, etc.;
- d) Location and condition of existing manholes (where applicable);
- e) Distances between existing manholes (where applicable);
- f) Distances between planned new manholes;
- g) Accessibility of the terrain, if the use of mechanical hauling equipment is preferred;
- h) However, the pulling in of multimode Fibre Optic cables by hand is preferred;
- i) Identification and allocation of correct spare pipe to be utilised if available;
- j) Once the above has been verified, a proper hauling schedule shall be compiled;
- k) Cables are normally available in full drum lengths from the cable supplier and it is essential to make optimum use of the available lengths;
- l) Confirm the available lengths from cable supplier before the hauling schedule is compiled;
- m) Ensure that the cables are drummed correctly to suit the direction of pull; and
- n) Drums shall be unloaded from its transport vehicle using a JCB or fork-lift truck.

**NOTE** - Under no circumstances shall the drums be dropped from the transport vehicle onto the ground.

Small drums can be rolled carefully to the installation point. Drums shall never be allowed to roll freely down a slope. In most instances a drum trailer or similar arrangement shall be used. Battens shall only be removed when ready for installation. When deploying cable from a rotating drum into a trench or duct, it shall be ensured that the drum stand or trailer is firmly located and that rotation of the drum during installation shall not cause any problem.



The Contractor shall ensure that the drum does not lie flat during installation and that coils are pulled off thus causing corkscrew twists. This shall be avoided at all costs as this will cause cable damage and installation problems, the replacement costs for the cable of which shall be for the contractor's account.

To minimize problems which may arise due to water/moisture contamination, the following guidelines shall be adhered to:

- a) Do not cut or break into cables until it is absolutely necessary;
- b) Before cutting into or breaking, pump out any standing water in the manhole or trench if applicable;
- c) Before cutting or breaking cable, check weather conditions and if applicable cover the manhole/trench with a tent or waterproof covering (Rain, Thundershowers, Hail, etc.);
- d) When Splicing always arrange the cable working position 'above ground' so as not to allow the cables to lie on the ground or in water;
- e) If a cable end has to be created by cutting through a continuous cable, fit a waterproof sealing end cap until such time is required to open the end of the cable for termination or splicing; and
- f) If cut cables have to be left for a considerable period of time like overnight or longer, then the cable shall have to be sealed to prevent water ingress.
- g) Where patch panel are installed, the patch panels shall be earth bonded to earthing bars.

The Contractor may need to adjust trench depths to accommodate bedding where required. The padding and bedding materials shall be sieved to a maximum allowable size, approved by the Engineer. Large objects shall not be dumped into the trench. Removal of rubble shall be the responsibility of the Contractor.

All ducts and pipes shall be well sealed at entry/ exit points of manholes/handholes. General Backfill shall consist of the material excavated from the trench, provided that:

- a) The material is easily workable and compactable;
- b) The material is free from organic material (roots, grass etc.) rubbish, clay lumps and aggregates larger than 50 mm stones in diameter; and
- c) The material has suitable moisture content and is not too dry.

If the site materials cannot meet these requirements, then suitable material shall be imported. Compaction of suitable bedding material of thickness 100 mm shall be achieved by passes over the whole trench bed, preferably using a Power Vibrating Rammer or a 5 kg hand rammer as an alternative. The cable/duct/sleeve shall then be laid on the prepared bed. For any variations to this procedure, approval shall firstly be required from the Engineer.

An appropriate amount of slack shall be looped and retained where splices are to be made (at all designated sites). Self-expanding polystyrene type foam shall be injected into the communication tube openings after the cable has been pulled in to seal the ends of the tubes and to stop the ingress of sand, rodents, etc. at these manholes.



All trenches shall be backfilled with suitable material that is easily workable and compactable. The backfill material shall be free from grass and roots. If the backfill material is too dry, it shall be moistened prior to placing and compacting.

Each layer of 150 mm thick compacted backfill shall be tested to the following requirements using the standard 5 kg DCP test method or an appropriately SABS recognised Density Test Method:

**Road Trenches:** Minimum of 5 blows per 100 mm penetration

**Sidewalk, driveways and median trenches:** minimum of 3 blows per 100 mm penetration

**Verge trenches:** minimum of 2 blows per 100 mm penetration

Trenches in the verge (unhardened areas) may be backfilled and compacted in 300 mm loose layers. All test results shall be recorded and handed to the Engineer. The Engineer reserves the right to carry out their own DCP testing and should minimum requirements not be achieved on completed work, the Contractor shall be required to remove and redo the operation to ensure compliance.

The procedure to deal with existing services shall be as follows:

- a) Where required trenches have been identified in areas by the Contractor, and where infrastructure are/may be prevalent, pilot holes shall be dug at intervals along that run.
- b) These pilot holes shall be dug either as per one or a combination of the following:
  - ≤ 20 m for trenches less than equal to 200m
  - ≤ 25 m for trenches greater than 200m
  - Or as per the site requirements and/or site instruction.
- c) Pilot holes shall be dug at points where the new trench crosses known existing services, according to way leave plans and/or other drawings and including verbal communication from the client's site personnel.
- d) The pilot holes shall be at least 150 mm deeper and wider than the proposed excavation so as to reveal the presence of any services belonging to other administrations.
- e) These Pilot holes shall be dug by hand, and with the utmost of care.
- f) All excavation work shall be performed under the supervision of a responsible and competent person who shall be competent to exercise such supervision.
- g) Failure to abide by any of the above instructions, may/can lead to damages to existing services. The contractor shall be liable for all damages to existing services, and the subsequent repairs shall be carried out by the contractor without any delay.

The trench shall be laid out in such a position that the cables/ducts/sleeves shall be laid at least 300 mm from power cables. Where this is not possible with services that are in the way of the cable/duct/sleeve and if there is insufficient space for the 300 mm separation, then the cable/duct/sleeve shall be tunnelled 300 mm underneath the other services. Storm-water gutters and drains shall not be obstructed.



Where it is not possible to get the minimum required depth, the cables/ducts/sleeves must be boxed in concrete to a required thickness of 50 mm and strength of 20 MPa. Trenching for cables shall be excavated in straight lines in accordance with the servitude/way leave plan, except where obstruction or other conditions occur. These areas shall be pointed out to the Engineer for his approval on any route diversions.

The width of trenches shall be in accordance with the following:

- a) Trench widths for one and/or two 50mm sleeves – 450 mm;
- b) Trench widths for three 50mm sleeves – 625 mm; and
- c) Trench widths for four 50mm sleeves – 800 mm.

Before commencing with cable/duct/sleeve-laying operations in an excavated trench the Contractor shall suitably prepare the trench floor to provide firm support for the cable/duct/sleeve over their full length. To this end he must ensure that the trench floor is free from all loose and or unsuitable material, including soil saturated with water, evenly levelled and at the proper depth required for the cable/duct/sleeve.

The Contractor shall exercise due care in trimming and/or undercutting trench floors to ensure that only the necessary amount of ground is removed. Should the Contractor remove, either by neglect or bad workmanship more ground than is necessary, he shall at his own cost fill such excess excavation with compacted bedding material.

The Contractor shall pay particular attention to the proper compaction of bedding, padding and backfilling material. The approved type of marker tape, orange in colour and a minimum width of 150mm (warning tape with inscription: "**Warning - Fibre Optic Cable Below**") shall be laid 300 mm above the cable/duct/sleeve over the entire length of the cable/duct/sleeve run. A high standard of compaction effort shall be incited upon in all cases where fine materials are approved as bedding and padding.

The Contractor shall supply tamping tools for the manual compaction of padding material immediately adjacent to and between the cable/duct/sleeve. A suitable tamping tool shall be provided similar to the following:

- a) A tamping foot made up of a 37 mm diameter steel rod 300 mm long securely attached to a vertical handle made up of 20 mm steel rod 1.35 meters long.

During the compaction of padding and backfill material the Contractor must exercise due care to ensure that cable/ducts/sleeves are not disturbed or damaged in any way. The use of non-cohesive, single size, graded sand or crusher sand for bedding, surround blankets and backfilling of trenches shall not be permitted.



## **EMCA 4 JOINTING OF CABLES**

### ***EMCA 4.1 Low Voltage Cables***

Joints will only be allowed where more than one full drum length of cable is necessary to complete a specific circuit and must be restricted to the absolute minimum. All joints shall be made to the best practice by competent cable jointers using first class material. The contractor shall maintain the electrical continuity of the armouring in an approved manner at all straights through joints.

Heat shrinkable cable joint kits that will suit the relevant cable size shall be used for all low voltage cable joints

### ***EMCA 4.2 Medium Voltage Cables***

On 11 kV cables, straight joints shall be made by means of heat-shrinkable straight through joints for unearthed paper insulated cables up to 11 kV. All cable joint kits shall comply with NRS 053 Specifications

The joints shall be made to the manufacturer's instructions and with materials stipulated in such instructions.

The cores of the cable shall be joined colour to colour or number to number.

### ***EMCA 4.3 Fibre Optic Cables***

Joints in fibre optic cable must be avoided as far as possible due to losses in signal strength when jointed.

The joints shall be made to the manufacturer's instructions and with materials stipulated in such instructions.

## **EMCA 5 TERMINATION OF CABLES**

### ***EMCA 5.1 Low Voltage Cables***

Low voltage cables shall be terminated with cable glands manufactured of bronze and comprising a barrel with sealing washer and bush nut screwed into one end and a compression nipple with wire clamping ring screwed onto the other end. The opposite end of the compression nipple must have a male electrical thread with locknut. The glands shall be suitably sized for the relevant cables, be of the adjustable type complete with armour clamps and with watertight neoprene shrouds.

Cable terminating glands for outdoor use shall be IP68 rated and provided with waterproofing double inner seals as well as waterproofing seals on nipples. Cable termination glands for high humidity and possible temporary water submerged conditions as for instance in filter lower gallery areas at water treatment plants shall also be IP68 rated with waterproofing double inner seals as well as waterproofing seals on nipples.



Cable armouring shall be earthed at each end but may not be used as earth continuity conductor.

### **EMCA 5.2 Medium Voltage Cables**

Medium voltage cable terminations shall be heat shrinkable termination kits and shall comply with NRS 053 Specifications.

The cable terminations shall be made to the manufacturer's instructions and with materials stipulated in such instructions.

### **EMCA 5.3 Fibre Optic Cables**

Fibre optic cables shall be terminated by means of suitable glands, ST connections and bus terminals capable of direct connection to the bus interfaces on the bus stations. These bus stations will be housed in separate panels of various motor control centres.

## **EMCA 6 CONCRETE CABLE SLABS**

The cable slabs supplied and installed under this Contract shall be formed solidly out of concrete with steel reinforcing and shall have dimensions of 1 000 x 350 x 100 mm. Alternative block sizes will be considered. The following concrete mixture is desired:

1. Portland cement (dry) - 1 part per volume
2. Clean dry river sand - 3 parts per volume
3. Crushed stone (size 10 mm) - 6 parts per volume

## **EMCA 7 CABLE TRAYS AND CABLE LADDERS**

Heavy duty cable trays and cable ladders manufactured from hot dipped galvanised steel or grade 304 stainless steel, as specified in the Variations and Additions to the Standard and Particular Specifications, shall be supplied and installed as indicated on the drawings. The height of the cable ladder sides shall be 76 mm with the width to suit the number and size of cables to be installed.

## **EMCA 8 INSTALLATION OF CABLES**

### **EMCA 8.1 Cable Trenches**

The contractor will be responsible for the excavation, bedding, back-filling, consolidating and making good of all cable trenches along the routes indicated on the drawings, with the exception of those sections of the cable routes where it is specifically indicated on the accompanying drawings that open cable ducts will be provided by others. The Contractor however will be responsible for the bedding and filling soil in cable ducts where necessary. A sealing screed to cover the cable duct shall be provided by others unless otherwise stated in the Variations and Additions to the Standard and Particular Specifications and relevant drawings.



**NOTE:** Tenderers shall acquaint themselves fully with the nature and formation of the ground in which the cables are to be laid, before submitting a Tender. No subsequent claim for extras due to lack of knowledge in this respect will be entertained by the Employer.

Cable trenches for L.T. power and lighting cables shall be deep enough to facilitate the laying of these cables at a depth of 750 mm below final ground level.

Trenches for H.T. power cables shall be deep enough to facilitate the laying of these cables at a depth of 1 m below ground level. The floors of all cable trenches shall be smooth and free from boulders and sharp rock projections.

Plastic danger tape shall be installed in all cable trenches 300 mm above the cables for cable protection during future excavations.

Each cable shall be laid in a bedding of river sand or sifted soil 75 mm over and 75 mm below the cable. Clayey soil will not be accepted as bedding.

No cable trench shall be backfilled before the cable(s) in the trench has been inspected and approved by the Engineer.

### ***EMCA 8.2 Under Ground Cable Pipes***

Cable pipes will be supplied and installed by others unless indicated otherwise on the drawings.

Each cable pipe shall be sealed by the Contractor under this Contract at both ends by means of bitumen impregnated jute bags or similar material, after the cable has been installed.

### ***EMCA 8.3 Cable Slabs***

Where electrical cables cross above other services such as water pipes, sewerage pipes, other electrical cables, pilot cables and telephone cables or where danger exists that cables may be damaged due to excavations by other cables shall be protected by means of reinforced concrete slabs. The concrete slabs shall protect the cable for at least 0,5 m in both directions of the crossing.

Where electrical cables cross underneath other services such as water pipes, sewerage pipes, post office cables etc. a concrete slab shall be placed above and axial with the other service and should the free space between the two services be less than 300 mm an additional slab shall be placed axial with the electrical cable between the two services.

Where cables are laid down a grading and a possibility exist that the cables might be washed open due to rain, then cable slabs shall be placed on top of the cables for the entire length of the grading.



The concrete slabs shall be supplied and installed under this Contract.

## **EMCA 8.4 Cable Crossing with Other Services**

### **EMCA 8.4.1 General**

Where a cable is laid above another service it shall not be less than 750 mm below ground level, and if this is not possible, the cable shall be laid underneath the other service and shall be protected by means of concrete slabs in the manner prescribed. The deeper or shallower positions of the cable shall only apply for a distance of 1 m on both directions of the crossing.

If not possible to cross underneath the other service, the matter shall be referred to the Engineer for a decision.

### **EMCA 8.4.2 Clearances**

The following minimum clearances shall be maintained between electrical cables and other services:

	VERTICAL	HORIZONTAL
Telkom cables	0,3m	0,3m
Other water pipes	0,3m	0,3m
Sewerage pipes	0,3m	0,8m
Storm water pipes	0,3m	0,6m
Other Electrical cables	150mm	150mm

## **EMCA 8.5 Cables must be Laid without Delay**

The cables shall be laid with the minimum of delay in order to backfill the trenches as soon as possible.

The Contractor shall, however, not backfill the trench until each length of cable has been tested, inspected and approved by the Engineer.

Only one cable shall be laid at a time, and the Contractor shall ensure that cables already laid are not damaged.

## **EMCA 8.6 Method**

All cables shall be handled with the utmost care and shall be laid in accordance with the best methods observed in good modern practice. All cables shall be run out on rollers in order to prevent abrasion and no cable shall be dragged along the ground. No cable shall be bent to a radius of less than 12 times its overall diameter.



a) In Concrete Ducts

Cables shall be laid neat parallel with each other on the floor of the duct with the maximum spacing. Any other cables shall be installed on cable ladders secured to the vertical sections of the cable ducts.

b) On cable ladders

Cable shall be installed neat and parallel with each other with the maximum spacing. On Horizontal sections the cables shall be secured to the cable ladders with intervals of not more than 2m. On vertical sections or where the cable ladders are installed at an angle the cables shall be secured to the cable ladders with intervals of not less than 500mm with suitable strapping material approved by the Engineer.

Either stainless steel or hot dipped galvanized steel cable strapping material shall be used on outdoor cable installations depending on the cable rack or ladder material.

Sections of the cable ladders shall be electrically connected, and provision shall be made for crimping and expansion of the racks.

c) In Trenches

Two or more L.T. cables in the same trench shall be laid in a straight line and in parallel and not less than 75mm apart between cable route turning points, except where otherwise approved. Cable routes shall always follow routes parallel to permanent structures to facilitate as built information.

H.T. cables in the same trench shall be laid parallel and not less than 150mm apart, except where otherwise approved.

All L.T. power cables shall be laid 750mm below final ground level and H.T. power cables shall be laid 1 m below final ground level.

The contractor shall provide 3m slack at each end in each run of power cable and its associated earth wire and bury the same in the ground as near to the relevant end as possible. Where the cables and earth wires are to be installed in open ducts outside buildings, the slack shall be coiled in the ducts.

The separation between any signal cable and the nearest parallel power cable shall not be less than 150mm.

d) Against Walls

Cables and earth wires to be installed on walls, where approved by the Engineer, shall be neatly installed on heavy-duty hot dipped galvanised steel cable racks. Cables and earth wires on outside walls shall be installed in a similar manner or in suitably sized hot dipped galvanised



conduit from 300 mm below up to 2,4 m above final ground level or as required. These conduits shall be secured to the walls by means of hot dipped galvanised steel bat holders at intervals not exceeding 600 mm. (Hospital Saddles).

Saddles shall only be secured by means of round-headed hot dipped galvanized screws and plugs of an approved type. (Wood will not be accepted as plugging material.) Plugs will not be allowed in joints between bricks.

e) On Poles

Cables and earth wires to be installed on poles shall be secured to the poles at intervals not exceeding 600 mm by means of 25 mm x 1,5 mm adjustable Grade 304 Stainless Steel straps. Each cable together with its associated earth wire shall be installed in a suitably sized stainless-steel pipe or channel from 300 mm below up to 2,4 m above ground level. This pipe or channel shall be secured to the pole by means of 25 mm x 1,5 mm adjustable stainless-steel straps at intervals not exceeding 600 mm. To avoid metallic action between different materials Neoprene rubber strip shall be installed between the pole and the strap.

f) Cable Channels on Structures and in Buildings

Where cable channels have been provided on structures and in buildings these must be backfilled with river sand by the contractor.

g) Cables connected to motors and other equipment

Cables and earth wires connected to motors and other equipment shall be secured between the cable channels, cable rack or cable tray to the point of termination by means of a heavy-duty hot dipped galvanised type of cable support. The cable shall be secured to the cable support by means of steel straps or other acceptable strapping material.

### ***EMCA 8.7 Inspection of Cables and Cable Trenches***

After the cables have been installed and spaced on top of the 75mm thick layer of sand in the trenches, the installation shall first be inspected and approved by the Engineer before the trenches may be refilled. Should the Contractor not meet with the requirement, or if he fails to give the Engineer sufficient notice of an inspection, portions of the trenches or the complete trench shall have to be re-excavated by the Contractor at his own expense for inspection by the Engineer.

A logbook with three copies per page shall be kept by the Contractor on the site, in which each part of the installation that has been inspected can be recorded after inspection and approval.

### ***EMCA 8.8 Backfilling of Trenches***

Once the cable has been laid, straightened, inspected, approved and covered with the top layer of bedding soil, the trenches shall be backfilled with soil which does not contain more than 40 % rock or shale and will pass through a sieve with 100 mm diameter holes that has been approved by the Engineer.



Back filling of cable trenches shall be done in layers of 150 mm and shall be compacted and consolidated to 95% modified AASHTO. Test shall be carried out to ensure the required compaction at the cost of Contractor.

The Contractor shall maintain the closed-up sections of the cable trenches in a proper, safe condition for the duration of the contract. Where the soil in the trenches subsides, it shall be refilled and compacted to the satisfaction of the Engineer.

**Bedding:** This shall refer to the material constituting the even floor of an excavated trench onto which a duct or a bank of ducts is laid (+/-100mm).

**Padding:** This shall refer to the material installed around and/or between ducts up to a level of at least 150 mm above the duct or bank of ducts.

**Backfilling:** This shall refer to the material installed above the padding material layer to complete the refilling of an excavated trench.

The 3 layers of material in the backfilled trench shall be classified as bedding, padding, and main backfill. The bedding and padding material shall not be too fine and shall be free of large stones (it shall be evenly graded between 0,6 mm and 19 mm). Clay type material shall not be acceptable (the PI shall not exceed 12 and the compaction factor shall not exceed 0.4).

## EMCA 9 INSTALLATION OF CABLE TRAYS AND CABLE LADDERS

The cable ladders shall be secured on suitable lengths which shall be suspended from the roof slab by means of suitable lengths 8 mm dia. threaded hot dipped galvanized steel rods or secured to the walls with suitable sized hot dipped galvanized steel Rawl type bolts and shall be secured to the channel sections by means of two hot dipped galvanized nuts and washers.

The different parts of the trays and ladders must be thoroughly bonded electrically and mechanically to each other.

The cable trays and ladders shall be installed neatly, level and square/parallel to walls.

Cable straps suitable for the specific cable shall be employed to secure the cable onto the tray. Outdoor cable straps shall be stainless steel, and cables shall be secured on intervals not exceeding 600mm. Cables on cable trays or ladders in outdoor environments shall be covered with removable cable tray or ladder covers of similar material.



## **EMCA 10 CABLE SUPPORTS TO MOTORS AND OTHER EQUIPMENT**

Cables to motors and other electrical equipment shall be supported by means of hot dipped galvanized cantilever brackets and cable supports. Cables shall be strapped to these supports by means of acceptable strapping material.

## **EMCA 11 WIRE TRUNKING**

Heavy duty hot dipped galvanised wire trunking of sufficient dimensions shall be installed against all large capacity pump set concrete plinths for installation of pump set protection sensor monitoring cables. The monitoring cables shall be installed in hot dipped galvanised conduit from the trunking to the sensor position.

## **EMCA 12 SENSOR TERMINATION CUBICLE**

All large capacity pump set sensor cables shall be terminated in a powder coated mild steel frame mounted termination cubicle with lockable front door secured against the pump set plinth. DIN rail mounted cable conductor termination blocks shall be installed inside the termination cubicle for cable conductor termination.

## **EMCA 13 CABLE MARKERS**

Cable ends shall be properly labelled with reference to equipment, section of plant and other requirements specified by the client at both cable ends.

Cable markers with lead labels cast into the top of the cable markers shall be supplied and installed along the cable routes under this Contract as follows:

Along straight runs of the route, not further than 25 m apart;

At turns - one on each side of the turning point, 900 mm from such turning points;

At each branch, 3 markers - i.e. one on each side of the branch, 900 mm from the branch.

The cable markers shall be installed deep enough to ensure that the top of the marker will protrude 50 mm above final ground level.

### ***EMCA 13.1 Name Tags***

Identification tags shall be attached to all cable ends. The tags shall be secured to cables by means of cable ties to the approval to the Engineer.

Cables shall be tagged at either end, whether the end terminates in a distribution board or an end box.



All cable cores and internal panel wiring shall be identified at both ends by means of durable colour coded wire marking ferrules in accordance with numbering systems in cable and wiring diagrams. Only closed ring interlocking type identification ferrules shall be used.

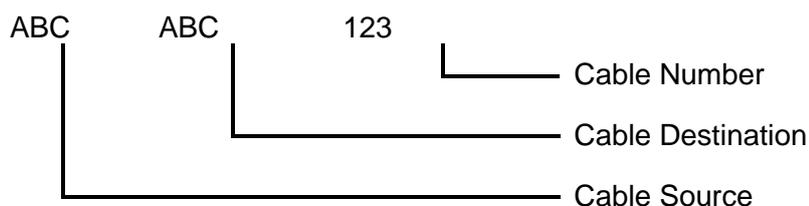
Outdoor tags shall be of stainless steel or brass type and shall be secured by means of similar strapping material.

Tags mounted indoors or protected by an enclosure shall be made of Ivorene or similar sandwich material with black letters on a white background.

All lettering and text shall be approved by the Engineer.

Letter sizes must be compatible with the application and shall not be smaller than 8mm.

a) Cable Naming Convention



b) Table of Areas

Example of area abbreviations:

ILW	-	Inlet works
IMC	-	Inlet motor control centre

c) Example of cable schedule;

Cable Number	From	To	Grade (V)	Size mm <sup>2</sup>	No. of cores	Length (m)
ILW-IMC-001	Inlet works	Inlet motor control centre	400	185	4	55
IMC-SCR-001	Inlet works MCC	Screen 01	400	10	4	25

## EMCA 14 WARNING TAPES

Warning tape shall be installed along all trench excavated cable routes 300mm above the cables.

Warning tape shall have a minimum width of 300mm and have a bright orange colour with the wording "Danger". The minimum thickness shall be 800 gauge.



## **EMCA 15 EARTH WIRES**

Earth wires shall be installed with L.T. cables as and where indicated on the drawings or specified herein and shall consist of bare hard-drawn copper wire.

These earth wires shall be installed at the same depth as the relevant cables, with at least 75 mm clearance between any earth wire and the nearest cable, unless specifically approved otherwise.

No joint will be allowed in any run of earth wire.

Each earth wire shall be terminated at each end by means of a suitably sized bolted lug either sweated or crimped onto the wire. The lugs shall be bolted onto the relevant earth bars or earthing terminals.

## **EMCA 16 TESTING OF CABLES**

### ***EMCA 16.1 Low Voltage Cables***

On each completed section of laid and jointed cable, the insulation shall be tested to approval with an approved "Megger"-type instrument of not less than 500 V.

### ***EMCA 16.2 Medium Voltage Cables***

On each completed section of laid and jointed high-tension cable a high voltage test shall be carried out. The test shall be performed according to SABS 97 of 1991. Alternating or direct current may be used.

A certificate shall be submitted confirming the successful testing of the relevant cable.

## **EMCA 17 ROUTE PLANS TO BE SUBMITTED BY THE CONTRACTOR**

On completion of the works, but before the certificate of completion will be issued, the contractor shall submit to the Engineer, route plans in electronic format indicating in a satisfactory manner:

- (a) The exact cable routes with reference to fixed points (e.g. buildings);
- (b) The exact lengths of cable (HT and LT) installed between terminating points and between joints where relevant; and
- (c) With reference to fixed points the exact positions of cable joints (e.g. buildings).

Electronic copies of the various plans for the marking up of the information required will be supplied to the contractor on request.

## **EMCA 18 MEASUREMENT AND PAYMENT**

Measurement and payment shall be as done in accordance with the labelling, headings and descriptions listed in the relevant Bill of Quantities schedule. Reference shall be made to Part C2.1 - *Pricing Instructions*, and it shall be the responsibility of the Contractor to ensure that its system, unit or process



offered conforms to the specifications, is fit for purpose and operates as per the intended use.



## DAWID KRUIJER MUNICIPALITY

### CONTRACT No: TN003/2026

### REPLACEMENT OF ABRAHAM HOLBORS SEPTEMBER WATER TREATMENT PLANT MOTOR CONTROL CENTRE

#### BUILD OF ELECTRICAL WORKS

### EMCC: MOTOR CONTROL CENTRES AND DISTRIBUTION BOARDS

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## EMCC MOTOR CONTROL CENTERS AND DISTRIBUTION BOARDS

### EMCC 1 SCOPE OF WORKS

As specified in the Project Specifications.

### EMCC 2 STANDARDS AND TESTS

The motor control centres shall conform to and be in accordance with the latest applicable South African Bureau of Standards Codes and Standards:

The following Standard Specifications and drawings shall apply;

**Table 1: Applicable Standards**

Standard No.	Description
SANS 10142	Code of Practice for the wiring of Premises
BS 159	Bus bars
SANS 1195	Bus bars
SANS 1091	Paint colour
BS 3938	Current Transformers
SANS 60044	Current Transformers
NRS 029	Current Transformers
BS 89	Ammeters
BS 638	Welding cables
SANS 1576	Welding cables
SANS 156	Moulded Case Circuit Breakers
SANS 767	Earth leakage protection units
SANS 1574	Electric cables and flexible cords
NRS 002	Graphical symbols for electrical power, telecommunications and electronic diagrams
SANS 1213	Mechanical cable glands
SANS 1433-1	Terminal blocks having screw and screw less terminals
SANS 1433-2	Flat push-on connectors
SANS 1473-1	Low-voltage switchgear and control gear assemblies: Type-tested and partially type-tested assemblies
SANS 1473-2	Low-voltage switchgear and control gear assemblies: Busbar trunking systems
SANS 1619	Small power distribution units (ready boards) for single-phase 230V service connections
SANS 1765	Safety of distribution boards
SANS 10292	Earthing of low-voltage distribution systems
SANS 60439-2	Low-voltage switchgear and control gear assemblies: Particular requirements for busbar trunking systems
SANS 60439-4	Low-voltage switchgear and control gear assemblies: Particular requirements for assemblies for construction sites



Standard No.	Description
SANS 60947-2	Low-voltage switchgear and control gear: Circuit breakers
SANS 60947-3	Low-voltage switchgear and control gear: Switches and disconnectors
SANS 60947-4-1	Low-voltage switchgear and control gear: Contactors and motor starters (Electromechanical)
SANS 60947-4-2	Low-voltage switchgear and control gear: Contactors and motor starters (semiconductor motor controllers)
SANS 60947-4-3	Low-voltage switchgear and control gear: Contactors and motor starters (For non-motor loads)
SANS 60947-5-1	Low-voltage switchgear and control gear: Electromechanical control circuit devices
SANS 60947-5-2	Low-voltage switchgear and control gear: Electrical emergency stop device with mechanical latching function
BS 89	Ammeters
NEMA ICS 18	Industrial Control and Systems: Motor Control Centres
UL 845	UL Standard for Safety for Motor Control Centres
IEEE C37.20.7	Arc-resistant or arc-containing low voltage MCCs shall be tested, rated, and labelled in accordance with the requirements of IEEE C37.20.7 'IEEE Guide for Testing Metal enclosed Switchgear Rated up to 38 kV for Internal Arcing Faults'

### EMCC 3 QUALITY ASSURANCE

The manufacturer of the Motor Control Centre (MCC) shall have proven experience in the manufacturing and assembly of Low Voltage Motor Control Centres and distribution boards, with a minimum of **five (5) successfully completed installations at water or wastewater treatment plants**. This experience must demonstrate the manufacturer's technical capability, quality of workmanship, and compliance with industry standards specific to water and sanitation applications.

All Motor Control Centres and distribution boards shall be designed, manufactured, assembled, and tested in full compliance with the **relevant SANS, IEC, and other applicable international standards as referenced in this specification**. The design shall ensure safety, reliability, ease of maintenance, and suitability for the environmental and operational conditions of the installation site.

### EMCC 4 PRE – MANUFACTURE SUBMITTALS

#### EMCC 4.1 *Manufacturer Drawings*

MCC elevations showing dimensional information including details such as, but not limited to, the following:

1. MCC height (less any removable lifting angles or eyes);
2. MCC width;
3. MCC depth;



4. Location of shipping splits;

#### **EMCC 4.2 Structure Descriptions Showing the Following**

1. Bus ratings;
2. Enclosure ratings;
3. Short-circuit withstand ratings;
4. Cascaded systems;
5. Type 1, type 2 or full coordination system;
6. Other information as required for approval.

#### **EMCC 4.3 Product Data**

Data sheets and publications on all major components including, but not limited to, the following:

1. Motor starters
2. Overload relays
3. Circuit breaker and fuse information including time current characteristics
4. Control power transformers
5. Pilot devices
6. Relays
7. Timers

#### **EMCC 4.4 Specifications Response**

All clarifications and exceptions to the project specifications must be clearly identified and marked up on the drawing.

#### **EMCC 4.5 Specifications Response**

Provide a copy of the manufacturer's installation instructions that includes the following:

1. Receiving, handling, and storage instructions;
2. Nameplate data, serial numbers, UL markings, and short circuit ratings;
3. Installation procedures including splicing procedures, terminations and connections;
4. Conduit and cable installation;
5. Installing and removing plug-in units;
6. Operation of operator handles and unit interlocks;
7. Checklist before energizing;
8. Procedure for energizing equipment;
9. Maintenance procedures.

#### **EMCC 4.6 Final Submittals**

1. The contractor shall provide certification that all components or MCC has been installed in accordance with the manufacturer's instructions and with local codes and standards that govern MCC installations.



2. The contractor shall provide certification that all circuit breaker settings have been adjusted per field requirements.
3. The contractor shall provide certification that all power fuses have been selected and installed per field requirements.
4. The contractor shall provide certification that all solid-state motor overload settings have been adjusted per installed motor characteristics.
5. The contractor shall provide certification that all settings for solid state devices such as reduced voltage solid-state controllers and variable frequency drives have been adjusted per the specific application requirements.
6. The contractor shall provide certification that any timing devices have been properly adjusted.
7. Test reports indicating manufacturer's standard testing was performed.
8. MCC installation instructions
9. Installation/operation instructions for major components such as, automatic transfer switch and circuit breakers
10. MCC spare parts listing and pricing
11. Technical details and descriptive literature regarding all equipment and instruments offered;
12. Three paper prints of all of the above for final hand-over.

**All settings as above detailed shall be indicated on the final drawings.**

## **EMCC 5 DELIVERY, STORAGE AND HANDLING**

The contractor shall coordinate with the Engineer manufacturer for entry into the building.

The contractor shall store the MCCs in a clean, dry, and heated space.

The contractor shall protect the units from dirt, water, construction debris, and traffic.

During storage the contractor shall connect internal space heaters (if specified) with temporary power.

## **EMCC 6 MANUFACTURER**

### ***EMCC 6.1 Ratings***

The MCC shall be rated for the system voltage as indicated in the Project Specifications.

The MCC horizontal and vertical power bus bracing shall be rated to meet or exceed the available fault current as indicated in Project Specification.

All MCC units shall have a full rated short-circuit rating that meets or exceeds the available fault current as indicated in the Project Specification.

All circuit breakers used in the motor control centre shall have full rated short-circuit interrupting ratings based on the applied MCC voltage.



**The manufacturer shall be certified by South African Bureau of Standards or accredited testing facility which is to approval of the Engineer in manufacturing motor control centres or distribution boards to the specified withstand fault current as detailed in the project specification. If the contractor does not have certification to build motor control centres or distribution boards to the rated withstand fault current as specified in the project specifications, it will be to the cost of the contractor to fully type test the assemblies at South African Bureau of Standards at the contractor's cost.**

**The contractor shall have certificate from South African Bureau of Standards which is higher or is equal to the specified withstand fault current.**

Motor control centre and distribution board shall be type tested as laid out South African Bureau of Standards to the rated withstand fault current as indicated in the Project Specification.

## **EMCC 6.2 Enclosure**

The motor control centre or distribution board shall be suitable for the environmental conditions in which it operates. The motor control centre and distribution board shall be protected against corrosion.

Any point of a motor control centre or distribution board that has to be reached during normal operation shall not exceed a height of 2,2 m above floor (or walking) level. However, the board may be mounted higher if it can be disconnected from the supply by a switch-disconnector or circuit breaker that is less than 2,2 m above floor level.

The motor control centre board or distribution board shall be of the free-standing floor mounted type with a minimum IP rating of 55 (insect proofed enclosure). The motor control centre or distribution board shall be constructed with a minimum of 2mm steel which will rest on a rigid channel iron or similar frame and for outdoor 3CR12 rigid channel shall be used and shall be bolted down in position by means of M16 high tensile stainless-steel bolts grouted into the concrete floor, the bolts shall be inside the board.

The panel door shall be provided with a locking system suitable for padlocking. The locking system shall consist of a 3-way locking mechanism locking the door at the top, middle and bottom. The unit doors shall be capable of being opened at least 110 degrees.

The motor control centre or distribution board shall be provided with removable covers on the sides and hinged panels on the front. All removable covers shall be suitably braced and reinforced to ensure rigidity.

The board shall be provided with readily removable, sectionalized, rigidly supported unpainted 3CR12 cable end support gland plates along the entire length of the board and at least 230 mm above floor level.

This compartment shall if necessary, consist of an outer and inner shell with at least 10 mm insulation or polystyrene between the inner and outer shell all round to keep the temperature inside the compartment at least 5 Degree Celsius below the temperature surrounding the compartment in summer complete with ventilation fans.



The board shall be suitably sized to accommodate without cramping, all the switchgear and equipment specified. Motor starter panels shall be a segregated system with each motor starter housed in a separate panel complete with door interlocked main switch. Where motor starter panels are installed on top of each other cable access shall be provided from the side of each panel by means of a common cable marshalling panel. Provision shall be made for pre-wiring between the starter panel and cable connectors inside cable marshalling panel to facilitate site cable connections.

All switch gear, instruments and equipment for the control of any specific motor or other electrical device, shall be mounted flush behind a common hinged panel, with only operating handles, push buttons and instrument faces protruding through neatly machine punched holes in the panel.

Sufficient provision for ventilation and heat dissipation as per the equipment ratings and manufacturers requirements shall be allowed for. The contractor shall prove to the Engineer by means of Anemometer or Differential that the requirements and manufacturer's requirements are met.

Screwed-on engraved labels in English shall be provided below all switchgear and equipment on and in the panels, to facilitate identification.

All unpainted parts shall be plated for corrosion resistance.

The systems shall be designed to allow for **30%** for future extensions.

### **EMCC 6.2.1 Indoor**

All hinged panels shall be reinforced to ensure rigidity and shall be provided with heavy duty rust proof hinges.

Each panel shall be supplied with concealed hinges, each fastened with not less than four (two on each side) brass bolts and nuts. In the case of double doors, the first door shall be locked with two slides on the inside, onto the shell. The second panel door shall close over a drip proof gutter shaped lip on the first one.

All screws, studs, bolts, nuts and washers used for these boards shall be Cadmium plated. The use of self-tapping screws will not be permissible.

### **EMCC 6.2.2 Outdoor**

All hinged panels shall be reinforced to ensure rigidity and shall be provided with heavy-duty stainless-steel hinges.

Each panel shall be supplied with concealed stainless-steel hinges, each fastened with not less than four (two on each side) brass bolts and nuts. In the case of double doors, the first door shall be locked with two slides on the inside, onto the shell. The second panel door shall close over a drip proof gutter shaped lip on the first one.



All screws, studs, bolts, nuts and washers used for these boards shall be stainless steel plated. The use of self-tapping screws will not be permissible.

The outdoor motor control boards shall be constructed of at least 2mm powder coated 3CR12 steel. Vermin proofed IP 54 rated ventilation openings shall be provided in doors and side panels. A 3CR12 roof shall be added to all outdoor motor control centres and distribution boards with a minimum slope of 1/10.

### **EMCC 6.2.3 Busbars**

The board shall be provided with one set of four solid, copper busbars in the top section and extending over the entire length of the board. Provision shall be made at the end of each busbar for future extensions. Bus bars shall comply with the requirements of BS 1433, SANS 1973-8 and SANS 1195. A solid copper earth bar shall be provided inside the board above the gland plate along the entire length of the board.

Busbars shall be rigidly supported at suitable intervals to prevent undue damage resulting under short circuit conditions. Ceramic or other approved busbar insulators shall be used. The busbars shall be arranged horizontally with the longer sides of the cross-sections in the vertical plane and one behind the other, in the horizontal plane, at 90mm centres.

Busbars shall be clearly and indelibly marked in the middle of the bus bar Red, White and Blue for the three phases and Black for Neutral.

The earth bars shall be drilled and provided with 6 mm diameter and 10 mm diameter cadmium plated, high tensile steel bolts and nuts, complete with cadmium-plated washers and cup washers or lock washers, for making the earth connections. The earthing positions shall be evenly spaced along the entire length of each busbar.

Connections to busbars shall be affected by means of cable lugs and suitably sized cadmium-plated, high tensile steel bolts and nuts with cadmium-plated cup washers or lock washers. Spare connections shall be provided complete with bolts, nuts, washers and spring washers.

### **EMCC 6.2.4 Electronic Equipment**

Where electronic equipment such as transmitting I/O units are incorporated in an outdoor distribution or motor control board, this equipment shall be installed in a separate and special compartment, and all wiring shall be terminated on rail mounted terminal strips for field connection of all monitoring and control cables.

The doors of this compartment must be labelled: "Electronic Equipment".

All the electronic equipment but not limited to HMI, power supply, PLC CPU, Ethernet switch, fibre switch, all I/O cards, UPS and telemetry and 30% additional space for the future. All equipment shall be mounted flush behind a common hinged panel, with laminated, shatterproof and tinted glass for viewing purposes.



Sufficient provision for ventilation and heat dissipation as per the equipment ratings and manufacturers requirements shall be allowed for. The contractor shall prove to the Engineer by means of Anemometer or Differential that the requirements and manufacturer's requirements are met.

The tier shall be designed to house all of the above equipment, and the manufacturer shall coordinate with communication and instrumentation specialist.

### **EMCC 6.2.5 Treatment And Painting of Metal Parts**

All metal parts shall be treated before powder coating in accordance with standard corrosion protection standards and the appropriate coating system shall be selected for the specific application. Motor control centre outer surfaces shall be powder coated colour B26, SANS 1091. (Electric orange)

An average of 2 mil thick electrostatic powder paint coat shall be applied, the contractor shall have a Rugged, fully electronic coating thickness gauges present for testing the thickness of the paint.

## **EMCC 7 GENERAL REQUIREMENTS**

### **EMCC 7.1 Internal Wiring**

The internal wiring of the boards shall consist of coloured PVC-insulated conductors of adequate copper cross-section, which shall be neatly installed horizontally and vertically in PVC trunking. Numbered ferrules of an approved type (clip on type not acceptable), shall be provided on each end of each wire, to facilitate the tracing of circuits.

Control circuits shall be colour coded as follows;

Three Phase	-	Red
Three Phase	-	Blue
Three Phase	-	White
Single Phase	-	Red
A.C. Neutral	-	Black
Earth	-	Green and yellow
110V D.C. Positive	-	Brown
110V D.C. Negative	-	Black
24V D.C. +ve	-	Grey
24V D.C. -ve	-	Purple
4-20mA +ve	-	White
4-20mA -ve	-	Black
All other voltages	-	To be confirmed with Engineer.



## **EMCC 7.2 Electronic Equipment**

Where electronic equipment such as transmitting I/O units are incorporated in a distribution board and motor control centre, this equipment shall be installed in a separate and special compartment.

Sufficient room shall be provided for the rail mounted terminal strips and all wiring shall be terminated on these rail mounted terminal strips for field connection of all monitoring and control cables.

## **EMCC 7.3 Cable Terminations**

Low voltage cables shall be terminated with cable glands manufactured of bronze and comprising a barrel with sealing washer and bush nut screwed into one end and a compression nipple with wire clamping ring screwed onto the other end and shall bear the SABS mark of approval. The opposite end of the compression nipple must have a male electrical thread with locknut. The glands shall be suitably sized for the relevant cables, be of the adjustable type complete with armour clamps and with watertight neoprene shrouds.

Cable terminating glands for outdoor use shall be IP68 rated and provided with waterproofing double inner seals as well as waterproofing seals on nipples. Cable termination glands for high humidity and possible temporary water submerged conditions as for instance in filter lower gallery areas at water treatment plants shall also be IP68 rated with waterproofing double inner seals as well as waterproofing seals on nipples.

Cable armouring shall be earthed at each end but may not be used as earth continuity conductor.

Flameproof glands for indoor and outdoor use shall be used where the hazardous area classification and explosion protection rating is supplied by the Engineer.

## **EMCC 7.4 Labelling of Switchboards and Motor Control Boards**

A screwed on engraved label of the black on white "traffolyte" type shall be provided below each item of equipment on the front panel of each board as well as on the chassis in close proximity to the relevant equipment to identify such equipment in the English language in 6 mm high lettering.

Each board shall further be provided with a screwed-on reverse engraved yellow Perspex nameplate with black 20mm high lettering to identify the board in the English language on the outside of the door at the top thereof.

## **EMCC 7.5 Motor Starter Panels**

Motor starters shall be contained in its own separate compartment in the motor control board or distribution board.



## EMCC 8 MOTOR STARTERS AND ACCESSORIES FOR SWITCHBOARDS

### EMCC 8.1 Direct-on-Line starters (400V motors)

These starters shall be of the manually operated (locally and remotely) type and each starter shall be contained in its own separate compartment on the relevant motor control board.

Each of these units shall comprise amongst other the following components:

- a) 1 Only mains **Type 2 Coordinated** fused or circuit breaker switch/circuit breaker connected to the busbars of the board and interlocked with the door of the compartment to prevent opening of the door with the switch closed and to prevent closing of the switch with the door open
- b) 1 Set of HRC control fused links with carriers and basis where necessary;
- c) All necessary relays as required
- d) 1 Only mains Type 2 Coordinated contactor;
- e) 1 Set of START and STOP push buttons;
- f) 1 Only mains operated timing device to limit starts per hour; and
- g) 1 Only power factor correction capacitor unit for motors of 5 kW and more.

The following protective and indicating devices complete with the necessary suitably rated potential fuses, current transformers, test blocks and auxiliary relays;

- a) 1 Only electronic type motor protection relay for motors > 7,5kW or more or as specified;
- b) 1 Only motor under current relay (Where specified)
- c) 1 Only instantaneous indicating ammeter for motor current;
- d) 1 Only ammeter selector switch for motors >5 kW;
- e) 3 Only Current transformers for motors > 5 kW;
- f) 1 Only running hour meter;
- g) 1 Only anti-cycle timer; and
- h) 1 Only thermistor relay for motors > 22kW or more
- i) 1 Only Start delay timer for motors >15kW and higher
- j) 1 Only blue LED type indicator light to indicate the time delayed starting period
- k) 4 Only LED type indicator lights as follows; Red – 'Motor Stopped'; Green - 'Motor Running'; Yellow – 'Motor Tripped'; and Red - "Emergency stop engaged". Optional: Yellow - 'Supply on'; Blue – 'Motor start delay'; and Green – 'Healthy'.

It shall further be possible to trip and lock out the starter by means of a remote stop button to be provided at the relevant motor.

Provision shall also be made for locking the mains fused switch handle in the OFF position.

### EMCC 8.2 Star/Delta Starters (400V motors)

These starters shall be of the automatic star/delta type, and each starter shall be contained in its own separate compartment on the relevant motor control board.



Each of these units shall comprise amongst others provided for direct-on-line starters the following components as:

- a) 1Only Mains **Type 2 Coordinated** Contactor;
- b) 1Only Star Type 2 Coordinated Contactor;
- c) 1Only Delta Type 2 Coordinated Contactor;
- d) 1Only Star to Delta timer of the clockwork or electromagnetic type;
- e) 1Only Mains operated timing device to limit the starts per hour;
- f) 1Set START and STOP pushbuttons
- g) 1Only Three phase Power Factor Correction Capacitor unit for motors of 5kW or more
- h) All necessary relays

### **EMCC 8.3 Variable Speed Drives**

These variable speed drives shall each be contained in its own separate panel, manufactured and equipped to the satisfaction of the variable speed drive manufacturer to suit their own requirements with regard to ventilation of the variable speed drive. Small drives below 1kW can be combined into one panel but sufficient ventilation by means of extractor fans must always be allowed for

The variable speed drive panel shall be equipped with ventilation fans and air filters. The ventilation fan shall be interlocked with the relevant motor and shall only be in operation when the motor is running. Failure of the ventilation fan shall stop the motor and a visible indication of the cause of the failure shall be provided on the panel.

The frequency converter shall make use of flux vector control without encoder or tacho generator feedback and shall incorporate direct torque control technology so that the overall effectiveness of the drive shall only be limited by the performance of the motor.

Semi-conductor switching shall be determined by the values of flux and torque and shall not have a predetermined pattern as in conventional pulse width modulation flux vector drives.

Each of these drives shall comprise amongst others the following components:

- a) 1Only main isolator/circuit breaker that shall be interlocked with the door of the panel to prevent opening of the door with the switch closed and to prevent closing of the switch with the door open
- b) 3Only ultra rapid fuses rigidly connected to the load side of the above-mentioned mains isolator and the rating of which shall comply with the manufacturer's specifications for the drive
- c) 1Only direct torque control frequency converter
- d) 1Only door mounted control panel complete with cable connections (also for small drives)
- e) 1Set of START and STOP push buttons for manual control of small drives
- f) One dial type potentiometer for manual speed control.
- g) 1Only manual/off/auto selector switch for manual control of small drives
- h) 1Only Thermistor relay for motors of 22kW or more



- i) 1 Only external EMC line filter
- j) All equipment necessary for remote emergency stop device.
- k) All bus system interface equipment necessary for remote speed control via a monitoring and control SCADA system as well as PLC control.
- l) All equipment necessary for remote motor status and speed monitoring.
- m) 4 Only LED type indicator lights as follows; Red – ‘Motor Stopped’; Green - ‘Motor Running’; Yellow – ‘Motor Tripped’; and Red - “Emergency stop engaged”. Optional: Yellow - ‘Supply on’; Blue – ‘Motor start delay’; and Green – ‘Healthy’.

A 3CR12 steel gland plate must be provided at least 250mm above floor level for cable connections.

The control panel shall be the user interface for monitoring, adjusting parameters and controlling the drive operation. It shall be possible to:

- a) Enter start-up data into the drive.
- b) Control the drive with start, stop and reference signals.
- c) Display actual values of motor performance.
- d) Display information on at least the five most recent faults.
- e) The drive shall satisfy the following technical requirements.
- f) The static speed control error shall not exceed  $\pm 0,5\%$  of motor nominal speed.
- g) Fundamental power factor shall be at least 0,97 at nominal load.
- h) Efficiency shall be at least 98% at nominal power level.
- i) The drive shall operate satisfactorily under all ambient temperature conditions between  $-5^{\circ}\text{C}$  and  $+40^{\circ}\text{C}$  at an altitude of 1260m above sea level and humidity up to saturation point.
- j) The drive shall provide output protection for motor overload, over current, short circuit at start, earth fault, missing motor phase and over frequency.
- k) The drive shall satisfy the following minimum harmonic voltage limits: Total harmonic distortion of 6%, odd harmonic distortion of 4% and even harmonic distortion of 2%. The Contractor shall measure these harmonic distortion parameters after commissioning of the system and if the equipment fails to comply with this requirement, the Contractor will have to rectify the same to the satisfaction of the Engineer.
- l) The drive shall be equipped with an AC choke for harmonic current reduction and shall be placed on the AC side of the rectifier bridge in order to protect the rectifier semiconductors against power line transients.
- m) Torque step rise time shall typically be less than 5ms.
- n) Stringent precautions must be taken in the design of the protection equipment to assure adequate lightning and surge protection.

#### **EMCC 8.4 Electronic Soft Starters**

The soft starter shall be installed in the relevant motor starter panel but sufficient ventilation by means of extractor fans must always be allowed for and shall be interlocked with the relevant motor and shall only be in operation when the motor is running. A bypass contactor for motor running conditions is a requirement and shall either form part of the soft starter or shall be a separate unit.



The soft starter shall have soft start and stop programmable capabilities with torque and current control. The normal motor protection facilities such as over/under-current, start limit, long start time, electronic overload, phase loss and phase sequence and load loss shall be available.

At least a 2-line 16-character LCD display unit with control function keys shall form part of the soft starter and shall preferably be separate motor starter front panel mountable. The LCD unit shall display all statistical data and trip conditions and shall allow functional key changes to programmable parameters.

The full motor protection capabilities shall be maintained when motor is operating in bypass contactor mode.

RS 485, MODBUS, PROFIBUS communication shall be possible.

### **EMCC 8.5 Induction Soft Starters**

The induction type soft starter shall be installed in the relevant motor starter panel but sufficient ventilation by means of extractor fans must always be allowed for and shall be interlocked with the relevant motor and shall only be in operation when the motor is running. A bypass contactor shall be provided to bypass the soft starter.

The series impedance type starter shall incorporate reduced starting current and ensure gradual increase in the motor terminal voltage in smooth step-less manner.

The design of the induction soft starter shall allow the motor to generate adequate starting torque to overcome the load torque and friction to ensure smooth acceleration.

The soft starter shall allow five starts per hour.

### **EMCC 8.6 Mains Surge Arrestors**

When a surge arrestor is installed in systems with a main breaker with 250Amps or 5kA fault current, the surge arrestor shall be pre-fused to prevent the units creating a danger when subjected to high fault currents. Surge arrestors shall be pre-fused to the manufacture's requirements. All surge arrestors shall be **connection type 2** as per the latest addition of the SANS 10142.

#### **EMCC 8.6.1 Building With external lightning protection**

The main distribution board surge arrestors shall be combined type 1 & 2 and voltage compatible to the relevant installation and shall be able to withstand a lightning impulse current wave form 10/350µs at a maximum discharge current of 100kA.



Any distribution board feeding from the main distribution board shall have surge arrestors and shall be type 2 and voltage compatible to the relevant installation and shall be able to withstand a lightning impulse current wave form 8/20 $\mu$ s at a maximum discharge current of 40kA.

Each distribution board shall be equipped with mains surge arrestors.

### **EMCC 8.6.2 Building with NO lightning protection**

The surge arrestors shall be type 2 and voltage compatible to the relevant installation and shall be able to withstand a lightning impulse current wave form 8/20 $\mu$ s at a maximum discharge current of 40kA.

Each distribution board shall be equipped with mains surge arrestors.

### **EMCC 8.7 Moulded Case Circuit Breakers**

All moulded case circuit breakers shall be as specified in the schedules of equipment for distribution boards and shall comply with the requirements of SANS Specification no. 156.

The required frame sizes or rupturing capacities required are specified in the schedules for each board.

Each circuit breaker shall be provided with non-adjustable time-delayed trips.

These circuit breakers shall be fitted with copper terminal collector bars where more than one cable tail has to be terminated on the same terminal.

### **EMCC 8.8 Fused Switches**

All fused switches shall be of the "load-breaking" and "fault-making" type complying with BS-5419 where applicable and fitted with HRC cartridge fused links to BSS-88. Auxiliary contacts shall be provided where relevant for signal purposes.

### **EMCC 8.9 Current Limiting Circuit Breakers**

The current limiting circuit breakers shall be capable of remaining in service and of carrying their normal rated current after having interrupted the maximum short circuit current of 200 kA rms at least three times.

The current limiting circuit breaker shall be equal and similar to the specified Merlin Gerin type.

### **EMCC 8.10 Current Transformers**

All current transformers shall be of the air insulated type complying in all respects with the requirements laid down in BS 3938: 1973.



The contractor shall carefully select the ratio, burden and accuracy class to suit its specific application in accordance with the recommendations and requirements of BS 3938.

### **EMCC 8.11 Indicating Instruments**

All indicating instruments shall comply with the requirements laid down in BS 89: Part I: 1970 for instruments of a 2,5 Accuracy Class. All indicating instruments shall have 96mm square dials.

The maximum demand ammeters shall be of the 6A combined maximum demand registering and instantaneous indicating type having MISC movement and thermal demand indication with an integrating time lag of 15 minutes. The ammeter scales shall be direct reading with a full-scale deflection corresponding to 120% of the rated primary current of the relevant current transformer. Each ammeter shall be clearly and indelibly marked to indicate the colour of the phase to which it is connected.

The ammeters for motor starters shall be 5A instantaneous indicating meters with MISC movement and direct reading scales. The meters shall be able to withstand over currents resulting under starting conditions and the full load current of the relevant motor shall be clearly marked in red on the face of the meter.

Voltmeters shall be of the direct reading moving iron suppressed zero type.

The power factor meters shall indicate from 0,7 lagging to 0,7 leading.  
The running hour meters shall have cyclometer dials indicating up to 5 digits and two decimals. (12345,67)

### **EMCC 8.12 Instrument Selector Switch**

A four-position rotary type instrument selector switch shall be mounted directly below the relevant instrument in such a way that only the selector knob and indicator plate are on the panel, and the switch itself is behind the panel.

The selector knob shall consist of Bakelite, and shall have an arrow engraved on it, indicating the switch position.

The switch shall have a positively driven switching mechanism.

The indicator plate shall consist of Bakelite and shall have the positions for the three phases and "OFF", engraved on it in 5mm high lettering.

### **EMCC 8.13 Contactors**

All contactors shall be of the totally enclosed, three pole, double air break per pole, automatic magnetic type complying with the requirements of BS 775 for "CLASS UR" contactors of the "CLASS II MECHANICAL DUTY CLASS / TYPE 2 COORDINATION" and "A3 Make and Break Category".



All contactors shall be provided with arc extinguishers, and readily replaceable silver or silver-alloy contacts rated for at least 2 million "on" and "off" switching operations at rated current.

Each contactor shall be provided with an AC, closing coil suitable for continuous operating and at least 15 closing operations per hour at system voltage. The contactor may not hum or chatter in service and the contacts may not bounce on closing.

#### **EMCC 8.14 Time Switches**

The time switches shall be suitable for use on a 231-volt, 50 cycle per second AC supply and shall be of the microprocessor type.

The time switches shall be digital timers suitable for rail or surface mounting and shall be programmable with daily and weekly programs, switching intervals of 1 minute and switching accuracy precise to the second.

The time base shall be of the quartz type with LED display for time, weekday, holiday program, switching position and manual override and shall have a power reserve of 250 hours at full operation. The time switches shall have a switching capacity of 16 A at 231 V.

#### **EMCC 8.15 Isolators**

All isolators shall be of the "Load-breaking" and "fault making" type and shall comply with the requirements of BS 5419-1977 where applicable. Where relevant, isolators shall be provided with auxiliary contacts for signal purposes.

#### **EMCC 8.16 400 Volt Air-Break Contactors**

All contactors shall be of the totally enclosed, three pole, double air break per pole, automatic magnetic type complying with the requirements of IEC 158-1 for Class AC 3 contactors of Intermittent Duty Class 0,3.

All contactors shall be provided with arc extinguisher and readily replaceable silver or silver-alloy contacts rated for at least 2 million "on" and "off" switching operations at rated current.

Each contactor shall be provided with a 240 Volt, 50 Hz closing coil suitable for continuous operation and at least 15 closing operations per hour. In rural areas contactor coils must be rated to operate satisfactorily between 75% and 130% of nominal voltage.

An adequate number of auxiliary contacts shall be fitted.

The contactor may not hum or chatter in service and the contacts may not bounce on closing.



### **EMCC 8.17 Earth Leakage Units**

The earth leakage units shall consist of a combination of a earth leakage relay and a moulded case circuit breaker and shall have a sensitivity as specified, it shall conform to SANS 767.

### **EMCC 8.18 Terminals**

Terminals may be of the bolted type otherwise they shall be of rail mounted clamp type.

All types of terminals and their insulation shall have a minimum comparative creep index of 500 to BS 3781.

### **EMCC 8.19 Clamp Type Terminals**

These terminals shall be not less than 8 mm wide.

Screws and connectors shall be electroplated to prevent corrosion. The connectors shall be such that the screws will not loosen due to vibration. Current carrying parts shall be of serrated silver-plated copper or brass. Only one connection shall be allowed per connector. For more connections the number of terminals shall be increased, and bridge pieces shall be used.

### **EMCC 8.20 Surge Protection**

#### **EMCC 8.20.1 Surge arrestors**

Surge arrestors shall be supplied and installed under this contract where applicable.

#### **EMCC 8.20.2 Main supply protection**

Surge arrestors as specified shall be installed at the main incomer of each distribution board, motor control centre or any type of kiosk.

### **EMCC 8.21 Power Factor Correction Capacitors for 400 Volt Motors**

Each of these capacitors shall be of the indoor switchboard mounting 400 Volt 50 cps three-phase self-contained type with a dead casing and shall fully comply with the requirements laid down in BS 1650-1971.

Each capacitor unit shall be of carefully selected rating to correct the power factor of its associated motor to 0,95 at full load and should not exceed a value which compensates for 85% of the no-load magnetizing current.

The dielectric shall consist of plastic film and low-loss paper situated between aluminium foil and impregnated with a synthetic liquid agent with scavenger additive.

The capacitor losses shall not exceed 1 Watt/kV.Ar.



The capacitor units shall have the following admissible overloads at an ambient temperature of 40°C and an altitude 260 m above sea level.

10% excess volts continuously;

50% excess current continuously; and

30% excess kV.Ar continuously.

Each of these capacitor units shall be provided with discharge resistors and a fuse in each winding element that will disconnect the affected element in event of a dielectric breakdown. A time-controlled contactor shall connect and disconnect the capacitors to the starter control circuit.

## **EMCC 9 DANGER SIGNS**

Danger signs on aluminium plates shall be supplied on each door of an outdoor motor control centre or distribution board and shall be in accordance with the Occupational Health and Safety Act, Act 85 of 1993.

## **EMCC 10 ELECTRONIC LEVEL CONTROL**

The micro based electronic controllers which will be mounted in the starter panels shall be easy to calibrate and reliable in service.

The power units for all the pumps in a specific pump station shall be installed in a separate compartment of the starter panel and clearly labeled in accordance with the pumps it controls.

These level controls shall be designed to automatically select the pump sequence to ensure that all the pumps will at random be a duty pump.

Where a controller controls only two pumps and one pump is always a standby pump, the standby pump shall automatically become the next duty pump after each duty cycle, unless one pump is taken down for service. When that occurs, the duty pump shall remain on duty until the normal operation is restored.

When a pump selected for duty fails to respond to the start signal from the control, then the next duty pump shall automatically start-up after five minutes.

The level controller must also stop all the pumps, whether on manual or automatic selection, when the pump has reached a predetermined low level.

The transducers shall be designed to operate in air, been capsulated, of rugged construction and impervious to submergence. The transducer shall not form part of the MCC scope of supply

The coaxial cable between the transducer and power unit shall be of sufficient length to avoid any joints in this cable, as no joints will be permissible.



## **EMCC 11 EMERGENCY STOP PUSH BUTTONS AND WEATHERPROOF ISOLATORS**

Each of these units shall consist of a totally enclosed outdoor type heavy duty "push and turn to lock" stop push button station with a cable gland entry at the bottom to accommodate a 4 core 2,5mm<sup>2</sup> LT PVC SWA PVC cable.

Where installed at motor positions the emergency stop push buttons shall not form part of the MCC scope of supply.

## **EMCC 12 EARTHING**

The contractor shall do all the bonding and earthing in accordance with the latest addition of the "Code of Practice for the Wiring of Premises" SABS 10142.

Earth resistivity measurements of less than 1 ohm will be acceptable at motor control centres and distribution boards.

## **EMCC 13 INFORMATION TO BE SUBMITTED WITH TENDERS IN RESPECT OF THE 400 VOLT DISTRIBUTION BOARDS AND MOTOR CONTROL BOARDS.**

The following information shall be submitted with each Tender in respect of all boards offered:

- a) Full technical details and descriptive literature regarding all equipment and instruments offered;
- b) Three paper prints of an outline drawing of each motor control centre and distribution board indicating the main overall dimensions and general lay-out of the boards; and
- c) Three paper prints of an outline drawing of the front end processor cabinet indicating the main overall dimensions, general layout and type of material employed on the face of the panel.

## **EMCC 14 INFORMATION TO BE SUBMITTED BY THE SUCCESSFUL TENDERER**

The successful Tenderer shall submit three prints of the under mentioned drawings to the engineer for approval, before manufacturing.

- s) Wiring diagrams of all motor control centres and distribution boards.
- t) Schematic single line diagrams of all motor control centres and distribution boards.
- u) Elevations showing dimensional information including details such as, but not limited to, the following:
  - motor control centres and distribution boards height (less any removable lifting angles or eyes)
  - motor control centres and distribution boards width
  - motor control centres and distribution boards depth
  - Location of shipping splits
- v) Structure descriptions showing the following:



- Bus ratings
  - Enclosure ratings
  - Short-circuit withstand ratings
  - Other information as required for approval
- w) Conduit locations
- x) Required bus splices
- y) Unit descriptions including information such as, starter sizes, circuit breaker frame sizes, circuit-breaker continuous ampere ratings, and pilot devices
- z) Nameplate information
- aa) Manufacturer drawings shall be provided in PDF format
- bb) Data sheets and publications on all major components including, but not limited to, the following:
- Motor starters
  - Overload relays
  - Circuit breaker and fuse information including time current characteristics
  - Control power transformers
  - Pilot devices
  - Relays
  - All clarifications and exceptions must be clearly identified

After completion of the work, the contractor shall submit three final copies of each of the above-mentioned drawings showing the final layout and wiring diagram of the boards.

## **EMCC 15 INSPECTIONS AND TESTS**

All equipment will be inspected by the Engineer and tested in his presence both in the factory during manufacturing and on-site during installation. The Engineer will do all inspections accompanied by the Contractor and the Contractor will do all tests with the Engineer as witness.

The Engineer will require seven (7) days notification to avail himself for any test or inspection and the Contractor must arrange for the maximum number of inspections and tests to be done on the same day. The Contractor must provide all testing facilities and instruments, all equipment required for a test or inspection. The instruments must have valid test certificates issued by an accepted testing authority and the results of the test done must be recorded on a test certificate, of which the Engineer must receive two copies. The Engineer reserves the right to call for a calibration test on any instruments used during the test.

The cost of all tests must be included in the tender price.

## **EMCC 16 TESTING OF DISTRIBUTION/MOTOR CONTROL BOARDS AT THE MANUFACTURER'S WORKS**

Each distribution/motor control board shall be subjected to the following tests in the manufacturer's works after manufacture:



- a) A thorough inspection shall be carried out to ensure compliance with the specification and approved drawings and wiring diagrams and to ascertain that all connections are properly made.
- b) A high voltage test on all primary connections to check the insulation between phases mutually and between each phase and earth.
- c) The polarities and ratios of all potential and current transformers shall be checked.
- d) Primary and secondary injection tests shall be carried out on all switching, protection, metering interlocking and indication circuits.

The manufacturer shall submit three copies of test certificates giving details of conditions and results of tests carried out to the Engineer.

### **EMCC 17 CONCRETE PLINTH FOR OUTDOOR STARTER PANELS AND PEDESTALS**

The plinth shall be cast 150mm below as well as 150mm above the ground level. It shall have neatly bevelled edges and shall be 75mm wider than the panels all round.

An opening of sufficient width to allow for cable entry shall be provided under the starter panels.

The grade 304 stainless steel foundation bolts for mounting of the panels shall be cast or grouted into the plinth. The plinth shall be in Class 20/19 concrete and shall be suitably reinforced if necessary.

It is recommended that the casting of these foundations must be carried out by the Civil Contractor at the cost of the Contractor under this Contract in accordance with his instructions and under his supervision.

### **EMCC 18 INSTALLATION OF DISTRIBUTION BOARDS AND MOTOR CONTROL BOARDS**

Each of the relevant distribution boards and motor control boards shall be built into walls or securely bolted down on the floor or plinth, as may be required, by means of the requisite number of foundation bolts grouted into the floor in the positions indicated on the drawings.

These positions shall be confirmed with the Engineer on site, prior to installation.

- a) Contractor shall install MCC in accordance with manufacturer's instructions.
- b) Contractor shall tighten accessible bus connections and mechanical fasteners to the manufacturer's torque requirements.
- c) Contractor shall select and install fuses in fusible switches based upon field requirements.
- d) Contractor shall adjust circuit breaker settings based upon field requirements.
- e) Contractor shall adjust solid state overloads to match the installed motor characteristics.

### **EMCC 19 TESTING AND COMMISSIONING OF DB/MCC AFTER INSTALLATION ON SITE**

After installation on site but prior to commissioning the following inspections and tests shall be performed on each distribution/motor control board.



- a) Check all components to ensure that they are free from dust and protective packing material;
- b) Check the operation of all components liable to damage in transit such as meter and protection measured;
- c) The insulation of all primary circuits between phases mutually and between each phase and earth shall be measured;
- d) All fused links shall be checked for electrical continuity; and
- e) All control supplies shall be checked.
- f) All adjustable protection devices shall then be set and the boards commissioned all in consultation with and to the instruction of the Engineer.

## EMCC 20 OPERATING AND MAINTENANCE INSTRUCTIONS

Before completion of the testing of the plant, the Contractor shall provide the Employer with adequate and complete working, operating and maintenance instructions *in triplicate*, with the necessary drawings and diagrams clarifying the instructions. The Contractor will also provide 3 x "soft copies" of the complete manual in PDF format on a Suitable sized USB Flash Drive (Memory Stick)

Instructions are to be made up in book form and particular reference is to be made to:

- Maintenance of equipment;
- Precautions to be taken in running the plant;
- All instruments and components must be fully described in data sheets supplied by the relevant suppliers;
- Wiring diagrams of the complete electrical installation.

The manual must be specific for the plant supplied and all extraneous material not connected with the relevant plant shall be deleted, leaving the manual as a comprehensive coherent document, bound in a professional way such that this may be used frequently without falling apart. Standard pamphlets may be supplied as addendums, bound separately in a good quality file to serve as reference but will not be allowed as part of the main manual.

## EMCC 21 MEASUREMENT AND PAYMENT

Measurement and payment shall be as done in accordance with the labelling, headings and descriptions listed in the relevant Bill of Quantities schedule. Reference shall be made to Part C2.1 - *Pricing Instructions*, and it shall be the responsibility of the Contractor to ensure that its system, unit or process offered conforms to the specifications, is fit for purpose and operates as per the intended use.



## *DAWID KRUIJER MUNICIPALITY*

### **CONTRACT No: TN003/2026**

### **REPLACEMENT OF ABRAHAM HOLBORS SEPTEMBER WATER TREATMENT PLANT MOTOR CONTROL CENTRE**

#### **BUILD OF ELECTRICAL WORKS**

### **EPLC – ELECTRICAL/ELECTRONIC: PROGRAMMABLE LOGIC CONTROLLERS**

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## **EPLC      ELECTRICAL/ELECTRONIC: PROGRAMMABLE LOGIC CONTROLLERS**

### **EPLC 1    SCOPE OF WORKS**

As specified in the Project Specifications.

### **EPLC 2    CONDITIONS TO SERVICE**

The PLC Units will be installed inside MCC (Motor Control Centres) Panels and/or in the PLC cabinets where required. The typical areas where PLC installation shall be required are the following:

- An industrial WTP (Water Treatment Plant)
- An industrial WWTP (Wastewater Treatment Plant)
- A Pipeline Project with Pump Stations/Reservoirs/Feeder Tanks, etc.
- Mining areas
- Power Plants
- Substations
- And all subsequent areas where Control Systems are required

### **EPLC 3    Abbreviations**

PLC	-	Programmable Logic Controller
CPU	-	Central Processing Unit
HMI	-	Human Machine Interface
UPS	-	Uninterrupted Power Supply
SFC	-	Sequential Function Chart
SRS	-	Software Requirements Specification
I/O	-	Input and/or Output (Analog and/or digital)
CF	-	Control Function
CFS	-	Control Function Section
CSC	-	Computer Software Configuration item
CSC	-	Computer Software Component
CSU	-	Computer Software Unit

### **EPLC 4    STANDARDS AND TESTS**

All materials and equipment to be supplied and installed under this contract shall be new and of the best quality available, as specified.

All materials and equipment shall comply with the requirements laid down in the latest editions of the BS, SANS and IEC specifications and their amendments (if any) as well as those laid down in this specification. All material and equipment shall bare the SABS mark, if material and equipment are offered not baring the mark, test certificates shall be submitted from independent testing agent, of the standard compliance of equipment.



The workmanship and finish of work shall be of a high standard throughout and to the satisfaction of the Engineer.

Similar equipment supplied under this contract must be identical in all respects and it shall be possible to interchange any of the same equipment under this contract.

#### a) **Compliance with Laws and Regulations**

The work shall be carried out strictly in accordance with and all material and equipment supplied shall comply with the following laws and regulations (the latest edition) of the where applicable:

- "Code of Practice for the Wiring of Premises", SANS 10142, as amended;
- The machinery and Occupational Safety Act (Act No 6 of 1983) as amended;
- The "Electrical Supply By laws and Regulations" of the Supply Authority;
- The local Fire Office Regulations;
- The Post Office Regulations;
- "Code of Practice for the Installations and Maintenance of Electrical Equipment used in Explosive Atmospheres" (SABS 086).

The Contractor shall be responsible for serving all notices and paying all fees due in terms of the above laws and regulations.

#### b) **Standard Specifications**

The work shall be carried out strictly in accordance with and all material and equipment supplied shall comply with The Occupational Health and Safety Act (Act No. 85 of 1993) as amended.

The following Standard Specifications and drawings shall apply:

- |             |   |  |
|-------------|---|--|
| SANS 156    | - | Moulded Case Circuit Breakers  |
| SANS 1574   | - | Electric cables and flexible cords   |
| NRS 002     | - | Graphical symbols for electrical power, telecommunications and electronic diagrams |
| SANS 1433-1 | - | Terminal blocks having screw and screw-less terminals                              |
| SANS 1433-2 | - | Flat push-on connectors  |
| IEC 68      | - | Shock and vibration resistance   |
| IEC 1000    | - | Electrostatic discharge and electromagnetic interference                           |
| IEC 1131    | - | Standard software  |



## **EPLC 5 RADIO AND TV INTERFERENCE**

All equipment installed under this Contract shall comply with the Government Notice No R.2246 and any other applicable codes, rules and/or regulations in respect of radio and TV interference.

Any equipment found producing interference subsequent to commissioning shall be suppressed or replaced to the satisfaction of the Engineer without any additional cost.

## **EPLC 6 PROGRAMMING AND CONFIGURATION**

### **a) Programmable logic software**

All PLC software shall be structured in a logical manner representing the key process units and control regimes required for plant control.

### **b) Programming**

The contractor shall program the PLC including all functions and operations to comply with the plant and/or pump control philosophy and/or any other equipment as provided by the engineer. The contractor shall ensure that at tender stage they are familiar with the standards and protocols used by the client and shall allow for adaptability of the offered system. The client's standard IP addressing and network configuration shall be used to ensure smooth integration.

### **c) Execution of control regimes**

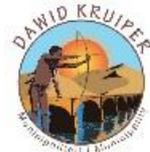
Control programs shall be executed at PLC level always. Approval to execute any control functions at supervisory level shall be obtained from the Engineer before commencement of the development of the software.

### **d) Configuration**

Where required, the contractor shall allow for the following scenario:

- i) Interface and configuration to an existing SCADA System, as per the existing Client's specification, and shall include all the relevant graphics required for integration to the new equipment.

A system specialist shall be required to complete this task and the contractor shall allow adequate time to complete, test (FAT), pre-commission and commission the complete integrated system, consisting of both the new and the old installations.



## **EPLC 7 PROGRAMMABLE LOGIC CONTROLLER HARDWARE**

### ***EPLC 7.1 Hardware Configuration***

Normally the hardware configuration will be a single CPU with I/O modules as required mounted on a 19-inch rack back plane.

Where required, Remote I/O shall be installed within close proximity to a PLC unit. Based on the distance between the Remote I/O unit and PLC unit, this shall determine which physical media type is to be used (Multimode Fibre Optic or Ethernet CAT5e).

All designs shall be backed up with design calculations, compliance to network standards and compliance to international communication standards and protocols (ANSI, IEEE, IEC, etc.)

### ***EPLC 7.2 Enclosures***

PLC/Remote I/O equipment shall be mounted in an IP54 enclosure with a suitable viewing window in front of the modules. The enclosure will form part of the MCC (Motor Control Centre) and in the event that no MCC is available a separate enclosure shall be supplied.

### ***EPLC 7.3 General***

The unit shall comprise of a PLC with interface modules, a power supply, input and output modules, network modules and shall be suitable for 19-inch rack mounting, unless specified differently by the Engineer. All equipment shall be housed in a steel cabinet that will form part of that specific MCC unless the application requires a separate control cabinet installation.

The technical requirements for the different modules forming part of the overall PLC System are discussed below:

### ***EPLC 7.4 Power Supply***

The standalone single slot rack mounted power supplies shall operate from 24VAC/24VDC/230VAC and shall have sufficient capacity for the application. The Power Supply module shall be fed by a regulated UPS supply. The power supply shall provide all regulated DC back plane power necessary for all the installed modules. The power supply shall have over and under voltage protection for added security.

The stand-alone single slot rack mounted power supplies shall operate from UPS fed - 230 V-AC and be sufficiently sized based on the requirements of this project in terms of its power capacity.

The UPS backup shall provide power for a minimum duration period of one hour.

The power supply shall provide all regulated DC back plane power necessary for the installed modules.



The power supply shall have over and under voltage protection for added security.

Allowed interruptions of power supply should DC and AC power supplies should be less than 10mS and 0.5 seconds respectively.

### **EPLC 7.5 CPU**

The CPU module shall be a back plane slot mounted controller containing on board executive memory, application memory and communication ports. It shall be possible to perform field upgrades through a field bus communications port. The front panel of the CPU shall be equipped with status and fault LED's to facilitate fault diagnostic procedures. The CPU shall have a multipoint interface for an external programming device as well as an Ethernet RJ45 port

The technical specifications of the CPU Unit (unless specified differently by the Engineer) shall be as follows:

- The CPU should have the following minimum processing times for:
  - a. Bit operations :  $\leq 50$  nanoseconds
  - b. Word operations :  $\leq 60$  nanoseconds
  - c. Fixed point arithmetic operations :  $\leq 80$  nanoseconds
  - d. Floating point arithmetic operations :  $\leq 300$  nanoseconds
- The CPU should have minimum IP20 degree of protection
- The CPU shall have a real time clock for the generation of time related information
- The CPU shall have surge protection
- The CPU shall have diagnostics like alarms (including diagnostic alarm, hardware interrupts, wire break)
- The CPU shall have diagnostics indication LEDs (including run, stop, error, send, receive, etc.)
- The CPU shall have shock resistance according to IEC 60068-2-27.
- The CPU module shall be a back plane slot mounted controller containing the required integrated program memory and data memory.
- Sufficient programming memory and a processor with a very fast processing speed shall be made available.
- The programming memory shall have 30% spare capacity, after all the required design requirements have been met.
- The size of the processor selected shall be done such that the utilization factor will be at most 70% of its processing (CPU clock speed) capability. This then leaves at a minimum 30% available processing capability for future expansion
- Note: The proof of the CPU Utilization factor (based on the current I/O requirements), for each individual CPU Unit is required by the Engineer and shall form part of the overall Data Pack.
- Ethernet and engineering interface communication ports must be available on the CPU
- It shall be possible to perform field upgrades, as well as firmware upgrades, through the Field bus communications port/Ethernet port
- The CPU shall support at least the following IEC 1131-3 programming languages:



- Sequential Function Chart;
- Structured control language (SCL)
- Function Block Diagram
- Ladder Diagram
- Structure Text
- Instruction List
- The CPU shall be equipped with either a lithium battery or an internal energy storage element, for backing up the RAM holding application programs

### ***EPLC 7.6 Communications Processor***

The communications processor shall provide communication links with other programmable controllers to other required network communication (i.e. PROFIBUS, Industrial Ethernet) connections apart from the PLC CPU communication interfaces.

### ***EPLC 7.7 Software (General)***

- All PLC software shall be structured in a logical manner representing the key process units and control regimes required for plant control.
- System diagnostics should provide all relevant information regarding errors present in the system; also, the software should allow automatic updating of the system diagnostics when modifying the hardware configuration and also fast fault localization.
- All PLC software shall be fully documented, and the documentation shall consist of the following as a minimum:
  - Functional specification of the plant to be controlled
  - Process control logic diagrams
  - Sample report forms
  - Sample alarm report details (list and format of reports)
  - Fully annotated listing of the full software package
  - Full input/output listings
  - Full allocated register listing with functional description
  - Program software in electronic format
  - All documentation is subject to the approval of the Electrical Engineer.

### ***ELC 7.8 Software (Development)***

The Sequential Function Chart (SFC) language, used to structure the internal organization of a program, and four inter-operable programming languages: Instruction List (IL), Structured Control Language (SCL) , Ladder Diagram (LD), Function Block Diagram (FBD) and Structured Text (ST) should correspond to the textual high-level language ST (Structured Text) defined in the standard IEC 61131-3 and fulfils base level and reusability level requirements according to PLC open standard

### ***EPLC 7.9 Digital I/O Modules***

- The digital I/O modules shall accept inputs from plant controls and auxiliary multiple operations and provide control outputs to plant operations.
- The modules shall be complete with I/O connectors. 24VDC input and output modules will be preferred.



- These modules shall also be capable to accept floating alarms of duration of 20 milliseconds. as well as steady alarms from normally closed controls.
- A typical response time of 1ms for change of state shall be acceptable.
- All inputs and outputs shall be 2,5 kV isolated from the logic components.

#### ***EPLC 7.10 Analogue I/O Modules***

- These modules shall accept analogue inputs from plant transducers and provide control analogue outputs to plant operations and shall be capable of converting 0-5V, 0-10V, 0-20mA or 4-20mA signals as may be required.
- All analogue inputs and outputs shall be galvanically isolated.
- The input modules shall have a typical accuracy of at least  $\pm 0.05\%$  of full scale while the accuracy of the output modules shall not exceed  $\pm 0.2\%$  of full scale.
- The input modules shall have broken wire fault detection capabilities, diagnostic functions, monitoring the supply voltage, should have an IP20 degree of protection, diagnostic functions, Diagnostic LEDs for status of inputs and maintenance.

#### ***EPLC 7.11 Distributed (Remote) I/O Modules***

- The distributed I/O module shall be a standalone unit with an integral 230V AC power supply and equipped with digital and analogue I/O as listed in the attached I/O list. The module shall, preferably, have an Ethernet port and the distributed I/O module should have minimum IP20 degree of protection.
- The distributed I/O module shall be connected via Ethernet/IP to the main PLC unit
- The Engineer must firstly approve if the contractor offers an alternate communication protocol (for e.g. PROFIBUS, PROFINET, EtherNet/IP, Modbus TCP/IP, etc.).

#### ***EPLC 7.12 Optical Link Modules***

The back plane mounted optical link modules for fibre optic cables shall allow networks to be configured in linear, ring and star structures and shall be supplied complete with the necessary cable connectors, interface cards and bus connectors.

#### ***EPLC 7.13 Fibre Optic to RJ45 Converters***

Where specified fibre optic to RJ45 converters shall be installed. These units shall be secured in an acceptable manner.

#### ***EPLC 7.14 Distributed I/O***

The distributed I/O module shall be a standalone unit with an integral 230V AC power supply and equipped with digital and analogue I/O as may be required. The module shall have an Ethernet port (unless specified differently by the Engineer)



### ***EPLC 7.15 I/O Allocations for Plant Availability***

The allocation of input and outputs shall be in a logical manner. The allocation shall be on the basis of process units or streams or drives such that the failure of a card will cause minimum loss of plant availability.

Specifically for any motor starter the inputs shall be grouped on one card. The number of inputs allocated to a motor starter is such that they can be grouped on a 16/32 way digital input card and/or 4/8 way analogue input card so that at most two motor starters are allocated to one card. The allocation of inputs and outputs for motor starters shall be such that a duty and standby motor starter are not together on the same I/O cards.

### ***EPLC 7.16 Documentation***

All PLC hardware and software shall be fully documented, and the documentation shall consist of the following as a minimum:

- Functional specification of the plant to be controlled
- All proposed PID Loops including diagrams
- Process control logic diagrams
- All Loop diagrams
- Layout/images of Graphical Faceplates for proposed Plant Sites
- Sample report forms
- Layouts of proposed Trending Faceplates
- Sample Alarm report details (list and format of reports)
- Fully annotated listing of the full software packages
- Full input/output listings
- Full allocated register listing with functional description
- Program software in electronic format
- All documentation is subject to the approval of the Electrical Engineer.

## **EPLC 8 COMMUNICATION**

### ***EPLC 8.1 General***

PLC communication shall utilize Ethernet as a standard, unless another standard is specifically mentioned by the Engineer.

The Contractor shall list three different protocols they intend using over the Ethernet physical standard. The Contractor shall ensure that the three different protocols they select, are not only compliant with their own equipment but with all the major Control System equipment suppliers (Siemens, Honeywell, Rockwell, Schneider, ABB, GE, Mitsubishi, etc.) as well.

The Contractor may give their preference for any of the three protocols selected but must include valid reasons for their choice. The Engineer however reserves the right to decide which protocol shall be best suited to the installation requirements.



## **EPLC 9 INTERLOCKING CONTROL USING COMMUNICATION NETWORKS**

Where it is necessary to execute process control on a PLC and/or supervisory network the following shall apply:-

Safety interlocks where human or equipment safety is a criterion may be communicated over a PLC-to-PLC network. The interlocks may not be communicated over a higher-level supervisory network. This requirement does not negate the requirement to have hardwired safety stop controls on all drives and switchgear.

Non-essential interlocks, the failure of which will not cause harm to persons or equipment may be communicated with prior permission over a supervisory communications network. Preference, however, is to keep all interlocking at the field bus or Ethernet level unless rate of communication is compromised due to excessive traffic levels.

Data for the purpose of reporting and management information shall be channelled through the supervisory level network (Full duplex Ethernet Network). Such data shall preferably not be transmitted on the field bus or Ethernet sub-network level unless a supervisory level channel is not available for this purpose.

## **EPLC 10 HARDWARE CONFIGURATION UNIT BASIS**

Hardware shall be configured on a per "unit" basis, which means each pump set shall be configured in a module with equipment dedicated to that pump set only. It shall be configured on a unit-by-unit basis only, thus ensuring that the failure of any one item will affect only a single pump set at any instant in time.

It may, however, be necessary to serve a pump set PLC hardware with common services such as UPS (Uninterruptible Power Supplies) Units.

For this purpose, the pump sets shall be provided with the following:

- A control console located on the operating floor in a position where the operator is able to overlook the pump sets, unless otherwise specified.
- A HMI (Human Machine Interface) terminal is required to display all process and fault information, unless otherwise specified. The normal control functions shall be executed by way of soft keys on the HMI Unit.
- An "Emergency Stop" push button for each pump set in the pump station mounted on the control console, unless otherwise specified. The emergency stop push button shall have a red mushroom operator and shall be of the latching, twist to release type.
- Stop circuits shall be hardwired in the main circuit breaker control circuit as the primary trip route and shall also be wired into the PLC control circuit.
- Emergency trip push buttons shall activate both the trip coil and no volt release coil of the main circuit breaker or contactor where used.



## EPLC 11 HMI TERMINAL - PROCESS INFORMATION

The monitoring and control functions of each pump set shall be accessible on the HMI.

The device shall be programmed that the control soft keys of each pump set are the same. To ensure that this requirement is maintained, a standard software package shall be applied to each pump set. Variable speed pump sets shall have the facility for speed adjustment added.

The HMI shall have a minimum 10,4-inch colour screen and HD definition pixilation. Sufficient application memory shall be available to ensure at least 50% spare memory with the required applications loaded. The HMI shall be equipped with an Ethernet port for PLC communication.

As a minimum, the following basic process information shall be displayed for each pump set or pump stage as applicable:

### Operating Parameters

- Suction pressure
- Delivery pressure
- Delivery flow rate
- Running hours - accumulated total and since last start
- Accumulated kWh
- Tank Levels
- Hour operational schedule

### Valve Parameters

- Suction valve position indication
- Delivery valve position indication

### Pump Parameters

- DE and NDE bearing temperatures
- Thrust bearing temperature
- Vibration measurement (vertical, horizontal and axial directions)
- Volute temperature

### Motor Parameters

- DE and NDE bearing temperatures
- Phase stator temperatures
- Motor power
- Motor current
- Motor speed (variable speed drives only)
- Power factor (variable speed drives)
- Vibration measurement (vertical, horizontal and axial directions)

### Auxiliary Devices

- Device run and stop indication
- Device fault indication
- Flood alarm



The following basic information Faceplate screens shall also be provided

- Faceplates showing process information for each individual pump
- Faceplate showing overview of pump sets
- Faceplates for each Area or Sub-area
- Faceplates for Auxiliary Systems (CP, AC Mitigation Systems, etc.)
- Faceplates for Auxiliary Systems (Fire Detection, Intruder Detection)
- Faceplates for Alarming
- Faceplates for trending
- Faceplate for all MV Protection settings and adjustments
- Faceplates for all interlocks (Hardwired & “Soft” wired)
- Faceplate showing a main Overview of entire process
- Faceplate for main 11kV electrical power supply system with status indication for all circuit breakers and associated equipment.

## **EPLC 12 SCADA INTERFACE**

To facilitate an interface with a SCADA system the PLC’s shall all have Ethernet communication ports as a minimum requirement, unless specified differently. Depending on whether sub-networks are required, field bus communication ports shall also be required.

The intention is that all main water pump sets be controlled from the relevant local control panel as well as from the SCADA system. However, process data will be collected utilizing the Ethernet standard for information, control, alarming, reporting and trending on the SCADA system.

Provision shall be made for control of the pump sets via the SCADA system by means of a selector switch panel on the motor starter panel located in the pump station which shall have the functions – Remote Mode / Local Mode / Maintenance Mode, unless otherwise specified. Switching of this selector switch while a pump is running shall not trip the relevant motor.

## **EPLC 13 TERMINAL STRIPS IN PLC PANELS.**

Wiring directly to the PLC I/O cards is not permitted. All wiring shall be by way of two sets of terminals arranged such that one set of terminals are grouped on a cable by cable basis and the second set of terminals reflect the PLC I/O card slots. Patch wiring shall be provided between each of the terminal strips as required.

Terminals used in PLC cubicles shall be of the knife type, unless specified differently.

## **EPLC 14 PLC SOFTWARE DEVELOPMENT**

### ***EPLC 14.1 Software***

IEC 1131 Standard software with up and download capabilities programmable over the Ethernet network and complies with a standard Graphical User Interface 64/128-bit operating system for network applications, shall be used.



The software shall allow the reusability of function blocks as building blocks in future applications and shall have a built-in PLC simulator that will allow the running of the IEC program for debugging purposes.

## **EPLC 15 IDENTIFICATION**

This specification describes the procedure for the development of PLC software. All PLC software developed shall conform to the conventions and standards described in this procedure. The documents described in this procedure shall be produced as outputs during the software development process, and together they will enable the maintenance and re-use of software, and they will simplify configuration management of software items.

## **EPLC 16 SOFTWARE ENGINEERING REQUIREMENTS**

PLC software shall be designed for continuous reliable operation

The software shall be designed for maintainability. This particular requirement enforces the following constraints on the software development:

It shall be possible to change the software in response to changing requirements by modifying only those sections of code that are directly related to the change in process requirements.

The code shall be written on the premise that it shall be possible to make changes to local code sections without affecting the functionality of other code.

The program style shall be direct and simple wherever possible. This will enable future modifications to be performed by programmers that may not have been involved in the development of the original system. Convolved programming techniques shall not be used.

Convolved programming techniques tend to mask the essential design of the program. Such techniques shall only be used when the programmer has no alternative, or when the benefit (efficiency, size, execution time etc.) significantly outweighs the cost.

All PLC programs shall be extensively documented to convey the intended function of the program. The intended function of the PLC programs shall therefore be very well described in the documentation, thus allowing for the total understanding of what the PLC programmer intended to achieve with the PLC program. Copies of the PLC programs (both soft copies & hard copies) shall be given to the Engineer.

## **EPLC 17 CSCI (COMPUTER SOFTWARE CONFIGURATION ITEMS)**

High-level plant "classes" identified during the analysis phase shall be mapped to CSCI (Computer Software Configuration Items). Child classes shall be mapped to CSC (Computer Software Components) and CSU (Computer Software Units), in accordance with the class hierarchy of the system.



Each CSCI shall be comprehensively documented in a SRS (Software Requirements Specification).

A CSCI, CSC and CSU shall be characterized by one or more control function instances. These instances may be grouped into one or more control function types. Control function types include interlocks, trips, control algorithms and other functional and logical entities that are required for interaction with and control of a specific piece of plant equipment.

## **EPLC 18 SRS (SOFTWARE REQUIREMENTS SPECIFICATIONS)**

Each CSCI must be specified by means of an SRS. The SRS shall meet the following minimum requirements:

Each plant component that has been subjected to object-oriented analysis shall be described by a set of overview class hierarchy diagrams that illustrates the inheritance relationships that are inherent in the system. The class hierarchy diagrams shall illustrate inheritance in:

- The PLC Input & Output points
- Discrete and batch control functions, e.g. interlocks, trips, start-up sequences
- Continuous process control functions, e.g. PID (Proportional - Integral - Derivative) Control
- The analog and digital values that are generated by the PLC software and/or communicated to the SCADA system, e.g. metering information

The SRS shall contain an introductory subsection that describes the purpose of the software system, and in particular, the role of the PLC software in the system.

The SRS shall specify the names and descriptions of all analog and digital plant inputs and outputs that are communicated to or from the PLC.

The SRS shall incorporate several subsections called Control Function Sections (CFS), each describing a number of instances of a specific control function. For example, a PLC program may implement several PID control loops. The software segment specification would then incorporate a "PID Control Loops" section, in which each PID control loop is described in detail, in keeping with a standard layout.

The SRS shall list and describe all digital or analog values that are generated by the PLC software (or that are scanned into the PLC) and then transmitted to the SCADA system.

The SRS shall include a detailed explanation of how the PLC driven systems operate in conjunction with the hard-wired systems.



## EPLC 19 GENERIC LAYOUT

Each CFS shall conform to the following generic layout:

- Control Function (CF) type and instance number - this number shall be unique for each instance in a control function class hierarchy

Name	-	A short text label that describes the control function.
Description	-	Textual explanation of the behavior of the control function.
Software	-	Explanation of the PLC logic that is used to implement the control function. The names of all the PLC inputs and outputs that are used shall be given in the algorithm description
Algorithm	-	

- SCADA indication - the SCADA indication details of the CF (Control Function) are given, including the location of the indicator, the colour of the indicator, and the message details.
- Notes and associated conditions - any settings that may be relevant to the CF, or any conditions such as alarms or pre-conditions that relate to the CF shall be documented.
- For example, the requirements section may incorporate a subsection describing the interlocks that pertain to the particular class. Each interlock description shall incorporate the following:

Interlock number	-	This number shall be unique for each interlock in a class hierarchy
Name	-	A short text label that is normally the same as the interlock message
Description	-	Textual explanation of the function of the interlock
Software	-	Explanation of the PLC logic that is used to implement the interlock. The names of all the PLC inputs and outputs that are used shall be given in the algorithm description.
Algorithm	-	
SCADA indication	-	The SCADA indication details of the interlock are given, including the location of the indicator, the colour of the indicator, and the message details.
Pre-conditions	-	These are any pre-conditions that must be satisfied before it can be confirmed that the interlock is unhealthy. In some cases it may be necessary to explain the algorithm and PLC logic of the pre-conditions and any overrides that may be present.

## EPLC 20 NAMING AND DOCUMENTATION OF SOFTWARE

Each PLC program shall be documented in a manner that allows the reader to understand the functionality of the program, and to locate the desired section of ladder logic.

A short "Program description" document shall be produced for each PLC program. The primary functions of the program shall be listed in this document. For example, the program might monitor and control electricity reticulation, provide water quality monitoring functions, and allow for the control of certain pump sets.



Each PLC program shall consist of several segments. Segments are used to divide the program into logical sections. Segments are the basic schedulable entities within the PLC software. Each segment shall be documented by means of an SFC list. The SFC list gives some indication as to the purpose and structure of the program. Segment comments may be up to one page in length.

PLC segments consist of several SFCs. Each SFC shall be documented by means of a list of networks within the SFC. The list shall identify which of these networks are implemented as macros and which are specific and unique to the SFC. This list is intended to give some indication as to the purpose and structure of the SFC. SFC comments may be up to one page in length.

Each SFC consists of a number of networks. The logic employed in each network shall be described in the network comments that may be up to one page in length. Where a network is implemented by a macro, the macro comments may be copied to the network comments screen, or the network comments screen may simply reference the macro comments. Macro comments and network comments shall describe the PLC logic in terms of "power flow" that is regulated by the opening and closing of coils.

Each coil and register that is used in the PLC program shall be described in the comments field that may be 50 characters long (10+10+10+20).

Print outs of appropriate ladder logic shall be attached to all network comment documents.

## **EPLC 21    MACROS**

Macros shall be used wherever possible in the implementation of PLC software in order to promote software re-use.

Common software elements shall be identified from the plant class hierarchy.

A set of macros shall be associated with a specific plant class hierarchy, although a direct mapping of macros to entities in the hierarchy may not result in optimal re-usability. In such instances, the macros shall rather be designed for optimal re-usability.

The PLC logic used in macros shall be described in the macro comments screen.

The design of macros shall not be explicitly documented. The software segment specification relating to each software segment identified in the plant class hierarchy shall describe the functional and behavioural aspects of the PLC software. If the software has been implemented in terms of macros, then the reader shall know this from the network comments that are associated with the relevant software.



## **EPLC 22 OPERATIONS MANUAL**

An "Operations Manual" shall be delivered with the software. This manual shall contain the following information:

- Details of all instruments and devices that shall be connected to the PLC.
- Details of PLC - network connections.
- A user document that describes how the PLC program shall operate in conjunction with new/existing SCADA systems, hard-wired systems and mimic panels.
- This document shall inform the user of alternative control options and give some idea of how the PLC system integrates with the plant and its hard-wired systems.

## **EPLC 23 TEST SPECIFICATION**

A test plan shall be developed for each software segment whilst the software segment specification is being drawn up.

The test plan shall focus initially on verifying the architectural design of the program that is that the partitioning into segments, SFCs and networks has been performed in an intuitive and logical manner.

Each trip, interlock and data output shall be tested by varying all pre-conditions and overrides. The test scenario for each case shall be comprehensively described. Details of how to model a particular override or pre-condition by modifying the hard-wired configuration shall be given. Explicit criteria shall be given in terms of which the interlock or trip shall be deemed to have passed or failed the test.

## **EPLC 24 WALK-THROUGHS**

Structured walk-throughs and code inspections shall be carried out during the development of each software segment.

Walk-throughs shall initially focus on verifying the architectural design of the program that is that the partitioning into segments, SFCs and networks has been performed in an intuitive and logical manner.

Ladder logic networks shall be tested individually. All possible coil status permutations shall be identified for each network. Factors that may cause coil statuses to change shall be identified and the ramifications of changing coil statuses shall be investigated. Where registers are used in the networks, factors affecting register values shall be identified, and tests shall be devised to investigate the behaviour of the software when register values change to and from critical values.

A checklist shall be used to allow PLC programs to be checked for common PLC programming faults. The checklist shall be maintained on an on-going basis to ensure that the maximum number of common errors can be detected before testing and commissioning.



## **EPLC 25 TEST PROCEDURE**

Software testing shall be carried out on site.

Before testing begins, the plant to be used in the on-site tests shall be de-commissioned and configured for testing.

Trips, interlocks and data outputs shall be tested individually. These tests shall follow the test specification that was produced in parallel with the software segment specification.

A test compliance document shall be completed during the test phase, and this document shall be included in the project documentation.

## **EPLC 26 CHANGE MANAGEMENT**

Changes to the functionality of a program may be required if the system fails due to an identifiable fault in the program, if the requirements change such that the change in specification forces a change in the software, or if sub-optimal system behaviour can be improved through software modification.

Faults reports shall be generated by the plant operators, and they shall be passed on to the software configuration manager. Similarly, any change in requirements that leads to a change in specification shall be passed on to the software configuration manager.

Changes shall first be made to the software requirements specification. The ramifications of making the changes shall be investigated, and the software modules (segments, SFCs, networks) that are affected shall be identified and modified.

Before the software changes are affected, a test plan shall be produced that describes how the changes are to be approved. This test plan shall be incorporated in the project documentation in the "Change control" section.

A walk-through inspection shall be held once the changes are complete. The primary goal of this inspection shall be to determine that all possible side effects that may be produced by the changes have been anticipated and explicitly dealt with.

Minutes from this inspection shall be appended to the body of the main project documentation in the "Change control" section.

The modified software shall then be tested according to the test procedure that was produced when the specification was amended.

## **EPLC 27 MEASUREMENTS AND PAYMENT**

Measurement and payment shall be as done in accordance with the labelling, headings and descriptions listed in the relevant Bill of Quantities schedule. Reference shall be made to Part C2.1 - Pricing Instructions, and it shall be the responsibility of the Contractor to ensure that its system, unit or process offered conforms to the specifications, is fit for purpose and operates as per the intended use.



## *DAWID KRUIJER MUNICIPALITY*

**CONTRACT No: TN003/2026**

**REPLACEMENT OF ABRAHAM HOLBORS SEPTEMBER WATER TREATMENT  
PLANT MOTOR CONTROL CENTRE**

**ELECTRICAL WORKS**

**PPG: CONTRACTOR'S ESTABLISHMENT ON SITE  
AND GENERAL CHARGES**



## **PPG      CONTRACTOR'S ESTABLISHMENT ON SITE AND GENERAL CHARGES**

### **PPG 1    SCOPE**

This specification covers all work and costs involved in the establishment of the Contractor's organisation, camp and plant on the site and the removal thereof after completion of the contract. The specification also covers the Contractor's general obligations, liabilities and risks not covered elsewhere but generally applicable to all contracts.

The specification also covers any/all additional requirements not covered elsewhere.

### **PPG 2    CONTRACTOR'S OFFICES AND STORES**

The Contractor shall supply and maintain during construction adequate administrative and safe storage facilities on site for the proper execution of the Contract as may be required.

Any/all ablution facilities provided on site for use by the Contractor's personnel shall comply with the regulations of the local authority and shall be maintained in a clean and sanitary condition to the satisfaction of the Engineer.

On completion of the Works or as soon as the facilities provided by the Contractor are no longer required, the Contractor shall remove such facilities from such, clear away all surface indications of their presence and re-instate the area of the site camp to its original condition as far as possible.

The Contractor shall be responsible to maintain adequate security on site for the duration of installation and commissioning up to the issue of a Taking-Over Certificate in line with the requirements of the Contractor's Insurers. The Contractor shall put in place such security to look after and protect all equipment and plant to be supplied and installed under this Contract, including any temporary works as well as the Contractor's site establishment.

### **PPG 3    FACILITIES FOR THE ENGINEER**

Unless otherwise specified, the Engineer and his representatives do not require any office facilities on the site of the Works for the duration of construction.

### **PPG 4    SERVICES**

The provision of any/all services such as water and electricity required for the contractor's site establishment or for construction purposes shall be the responsibility of the Contractor.

The availability of potable water and electricity at the site of the Works shall be confirmed at the tender briefing meeting. If available, the Contractor shall be responsible under the Contract for the relevant connections and distribution at his Cost of all water and electricity that he may require for purposes of construction, testing and commissioning of the Works. Accordingly, the Contractor shall pay all



consumption charges, and, at his cost, provide all connections, consumption meters, pipework, storage tanks, cabling, transport and other items associated with the supply of water and electricity for construction activities. All connections to Employer's supply system shall be in accordance to the Employer's or local authority's standards and bylaws and approved by the Engineer. The tariff payable for water and electricity shall be confirmed at the tender briefing meeting. In terms of access roads, the Contractor shall be responsible to repair any damage to access roads to the Site used during construction and for the purposes of this Contract and the road shall be left in a similar state as it was when the installation on Site commenced. Any/all costs in this regard shall be for the Contractor's account and deemed to have been included in the tender.

## **PPG 5 NOTICES, SIGNS AND ADVERTISEMENTS**

The Contractor shall not erect any notices, signs or advertisements on or near the Site without the written approval of the Engineer.

If so specified and measured in the bills of quantities, the Contractor shall erect the official nameboard(s) of the Contract in terms of the drawings at the location(s) indicated by the Engineer.

All signboards, notices, the official nameboard(s) and any advertisements shall be removed by the Contractor on completion of the Works.

## **PPG 6 REQUIREMENTS FOR MAINTENANCE PERIOD**

Over and above the contractual requirements associated with the 12-month defects notification period as defined in the General Conditions of Contract, the Contractor shall also be expected to provide the following additional services during this period for which allowance shall be made under the relevant payment items.

### **PPG 6.1 Site Visits and Reporting**

The Contractor, or a designated agent approved by the Engineer, shall be expected to visit the Works at least twice (2off) per calendar month for the duration of the 12-month defects notification period to assess the condition and performance of the plant. The purpose of these visits shall be the conditional assessment of all mechanical, electrical, control and monitoring equipment installed under the Contract, recording the necessary flow data and motor run hours and taking of the prescribed water quality samples as well as discussion with the full-time operators regarding any process or plant-related matters. The Contractor shall submit a formal report after each and every site visit to the Engineer and the Employer. The format of such report shall be discussed and agreed during the trial operation period.

### **PPG 6.2 Water Quality Sampling**

The Contractor shall employ the services of an accredited laboratory to take samples at prescribed locations at the Works and analyse these samples for the following water quality parameters. Grab samples shall be taken twice per calendar month for the duration of the 12-month defects notification period and



shall preferably coincide with the Contractor's, or designated agent's, site visit as described above:

Sample point: **Inlet Works**

Water Quality Parameters: Turbidity and pH

Sample point: **Sand Filters**

Water Quality Parameters: Turbidity

Sample point: **Final water**

Water Quality Parameters: Turbidity, pH and Residual Chlorine

For pricing purposes, the above samples and analyses shall constitute a single set.

### **PPG 6.3 Maintenance of Mechanical and Electrical Equipment**

The Contractor shall maintain all mechanical and electrical equipment installed under the Contract for the duration of the 12-month defects notification period and shall supply all labour, tools, materials, lubricants, oil etc in order to ensure that the equipment remains fully functional for the said period in accordance with the supplier's maintenance instructions.

The Contractor shall also allow for a full service all equipment installed under this contract at the end of the defect's notification period by the respective supplier or its designated agent and a service report for each item of equipment serviced shall be submitted to the Engineer once completed.

All flow measuring and water quality monitoring equipment shall be calibrated every 3 months and at the end of the defects liability period and the Contractor shall submit documentary proof of such calibration to the Engineer for approval.

The cost of the replacement, repair or adjustment of any item of equipment that is deemed a defect or due to poor manufacturing or workmanship shall be for the Contractor's account as per the normal provision of the Contract.

Any replacement or repair that is deemed a result other than a defect may be sourced from the pool of available spares upon confirmation by the Engineer, provided as free-issue equipment by the Employer or purchased by the Contractor upon receipt of a written instruction from the Engineer.

### **PPG 6.4 Supply Of Chemicals**

The Contractor shall supply and uphold all chemicals required for the operation of the Works for the duration of the 12-week trial operation period. This shall include all poly-electrolyte used for raw water dosing at the inlet works, chlorine and any/all reagents required by water quality monitoring instruments.

For the new plant at Riverton WTW, dosing of chlorine will be done from 1-ton containers and tenderers shall assume a monthly consumption of 19800 kg/month for tendering purposes. Relevant deposits for chlorine containers shall be made by the Employer, however, the Contractor shall be responsible to manage the replacement of empty containers and shall carry all costs in doing so.



The envisaged monthly consumption for poly will be approximately 33000 kg per month and tenderers shall use this figure as well as the proposed poly-electrolyte (Superfloc C-5xx) as a basis for tendering.

## **PPG 6.5 Guarantees**

The Contractor shall submit a separate guarantee for the execution of the above services in the form of a dedicated performance guarantee to the value of the tendered amount for the above tasks. This guarantee shall be issued to the Employer before the Taking-Over certificate will be issued and the Contractor shall make adequate allowance in his tender price under payment item PPG 8.5.5 for upholding the guarantee during the 12-month defects notification period. The guarantee shall be returned to the Contractor at the end of the said period with the Performance Certificate once all contractual obligations have been met.

## **PPG 7 TRIAL OPERATION PERIOD**

The requirements, if applicable, related to the operation of the plant during the trial operation period shall be stated in the Project Specifications.

The Contractor shall make full allowance for the specified requirements under payment item PPG 8.6 and this allowance shall be paid to the Contractor on successful completion of the Trial Operation Period once all contractual obligations have been met.

## **PPG 8 MEASUREMENT AND PAYMENT**

### **PPG 8.1 Scheduled Fixed Charge Items**

PPG 8.1.1 Contractual Requirements Unit: Sum

The sum tendered shall cover the Contractor's initial costs of providing the Performance Security, Insurance of the Works and plant, third party or public liability insurance in the joint names of the Employer and Contractor, unemployment insurance and any other initial financing obligations of a preliminary and general nature.

If additional services are specified for the Contract, the sum amount tendered for these items under PPG 8.5.1 to 8.5.5 shall be excluded from the value of the Performance Guarantee for the execution of the works up to receipt of a Taking Over Certificate as a dedicated guarantee will be required if/when these additional services are to be performed during the defects notification period.

PPG 8.1.2 Facilities for the Contractor Unit: Sum

The sum tendered shall cover the cost of providing and establishing of all offices, workshops, storage sheds, ablution facilities, tools and equipment, services, access and living accommodation in order to commence with the execution of the Contract.



PPG 8.1.3 Facilities for the Engineer / Employer Unit: Sum

The sum tendered shall cover the cost of providing and establishing of all facilities for the Engineer and Employer as described in PPG 3.

PPG 8.1.4 Contract Nameboard(s) Unit: Sum

The sum tendered shall cover the cost of manufacturing, supply, delivery and erection of the official contract nameboard(s) in accordance with the drawings and details provided.

PPG 8.1.5 Other fixed-charge Obligations Unit: Sum

The sum tendered shall cover the fixed costs of all other obligations that are required for the proper execution of the Works and that are not specifically covered elsewhere.

PPG 8.1.6 Removal of Site Establishment Unit: Sum

The sum tendered shall cover the cost of the demolition of and the removal from the surface of the Site of all items established in terms of PPG 8.1.2 and shall provide for the making good and the restoring of the Site to the satisfaction of the Engineer.

PPG 8.1.7 Compliance with the Occupational Health and Safety Act, its regulations and the Employer's Health and Safety Specification Unit: Sum

The sum tendered shall cover the cost of initial compliance with the requirements of the Occupational Health and Safety Act, its regulations and the Employer's Health and Safety Specification bound into the tender document. This fixed charge item shall include, but not be limited to, the provision of the safety file, health and safety training, fences, signs and barricades, baseline medicals for employees employed on the Contract and procurement of necessary Personal Protective Equipment (PPE).

*Payment of fixed charge items*

PPG 8.1.8 Environmental Management Plan Unit: Sum

The Contractor shall comply with the record of Decision and Environmental Management Plan (EMP). The tender fixed charge item shall cover all costs, overheads, profits and charges incurred for the establishment of a suitable environmental control system on site and compliance with the requirements of the EMP.

Payment of the lump sums tendered under fixed charge items shall be made in three (3) separate installments as follows:

- The first instalment, which is 40% of the lump sum, will be paid when the Contractor has met all his obligations to date under this section, the General Conditions of Contract, as amended, and where the value of the work certified for payment, excluding materials on Site and any payment under preliminary and general items is equal to not less than 5% of the Accepted Contract Amount.
- The second instalment, which is 40% of the lump sum, will be paid when the amount certified for payment, including retention monies but excluding the



- second instalment referred herein, exceeds 50% of the Accepted Contract Amount.
- The final payment, which is 20% of the lump sum, will be made when the amount certified for payment, including retention monies but excluding the third instalment referred herein, exceeds 75% of the Accepted Contract Amount.

## PPG 8.2 Scheduled Time-Related Items

### PPG 8.2.1 Contractual Requirements Unit: Sum

The sum tendered shall cover the Contractor's time-related costs of maintaining the Performance Security, Insurance of the Works and plant, third party or public liability insurance, unemployment insurance and any other initial financing obligations of a preliminary and general nature.

### PPG 8.2.2 Facilities for the Contractor Unit: Sum

The sum tendered shall cover the Contractor's costs for site rentals, repairs to and depreciation of buildings, furniture, tools and equipment, the storage and distribution of fuels and lubricants, services, communications, access and sanitation and the wages of the staff appointed to operate and maintain these facilities.

The provision of adequate security during the installation and commissioning period shall also be included under this payment item.

### PPG 8.2.3 Facilities for the Engineer / Employer Unit: Sum

The sum tendered shall cover the Contractor's time related cost to maintain these facilities.

### PPG 8.2.4 Supervision for the duration of installation Unit: Sum

The sum shall cover the costs of on-site supervision and such local administration as the Contractor considers necessary for the proper installation of equipment and completion of the Works and shall cover the cost of the salaries, wages and allowances paid to site agents, technicians, foremen, assistants and other supervisory staff, including transport of accommodation of such staff.

### PPG 8.2.5 Company and Head Office Overhead Costs for the duration of the Contract Unit: Sum

The sum tendered shall cover the Contractor's company and head office overhead charges.

### PPG 8.2.6 Other time-related charge Obligations Unit: Sum

The sum tendered shall cover the time-related costs of all other obligations that are required for the proper execution of the Works and that are not specifically covered elsewhere.

### PPG 8.2.7 Compliance with the Occupational Health and Safety Act, its regulations and the Employer's Health and Safety Specification Unit: Sum



The sum tendered shall cover the cost of ongoing compliance with the requirements of the Occupational Health and Safety Act, its regulations and the Employer's Health and Safety Specification bound into the tender document. This time-related charge item shall include, but not be limited to, for the following:

- The employment cost of all health and safety personnel including consultants, health and safety officers, inspectors, supervisors and issuers required in terms of the Contractor's Health and Safety Plan,
- Updating the Health and Safety Plan as needed,
- Carrying out of periodic own audits and follow-up audits,
- Compiling ongoing risk assessments and risk assessment reports as required by the Works,
- Convening of regular safety meetings with the Safety Representatives,
- Accompanying and supporting the Employer or his Safety Agent during *ad hoc* audits,
- Compilation of monthly safety reports and statistics for the Employer or his Safety Agent,
- Implementation and maintenance of Training
- Maintenance of personal protective clothing and equipment
- Maintenance of fences, signs and barricades
- Implementation and maintenance of safety administration
- Other Health and Safety Time-related Obligations

**PPG 8.2.8 Environmental Management Plan**

Unit: Sum

The Contractor shall comply with the record of Decision and Environmental Management Plan (EMP). The tender fixed charge item shall cover all costs, overheads, profits and charges incurred for the establishment of a suitable environmental control system on site and compliance with the requirements of the EMP.

**PPG 8.3 Other General Charges**

**PPG 8.3.1 Temporary storage of equipment**

Unit: m<sup>3</sup>-month

The tendered shall include full compensation for the temporary storage of equipment in terms of clause C3.4.1.11 to be provided by the Contractor, including all double handling, packing material, insurance, maintenance, storage costs, corrosion protection, administrative costs and additional transport.

**PPG 8.3.2 Provide 'As Built' drawings**

Unit: Sum

The sum tendered shall include full compensation for the provision of As-Built drawings drafted by a qualified draughtsperson and in accordance with the requirements of clause C 3.4.1.5.2.

**PPG 8.3.3 Provide Operation and Maintenance Manuals**

Unit: Sum

The sum tendered sum shall include full compensation for the provision of draft manuals, submitting these to the Engineer for approval, modifying as required until the manuals have been approved by Engineer. The tendered sum shall further include for full compensation for providing the necessary number of copies as specified under clause C3.4.1.5.3.



#### PPG 8.3.4 Training

Unit: Sum

The tendered sum shall include full compensation for the delivery of training to the operating personnel identified by the Employer, including all literature and hand-outs but excluding catering, accommodation and facilities. Also refer to C3.4.1.12 for details.

#### PPG 8.3.5 Appointment of Employer's Agent (Supervising Engineer)

Allow for the management, coordination and payment of a locally appointed ECSA registered Professional Electrical Engineer for supervision and project management as nominated by the Employer. The all-inclusive fee for this service is **R1,500,000**. This sum is not subject to adjustment for the Contractor's profit or attendance and shall be paid directly to the nominated engineer upon receipt of their invoice by the Contractor. Also refer to C3.2.1.1 for details

### PPG 8.4 Sums Stated Provisionally by The Engineer

#### PPG 8.4.1 Maintenance Spares

Unit: Prov Sum

The provisional sum shall provide for the acquisition at the sole discretion of the Employer of critical maintenance spares.

In addition to the above amount, provision is made in Schedule 1 for a mark-up on any payments made by the Contractor. The mark-up shall be regarded as full compensation for overheads, charges and profits as provided for in Clause 13.5 of the Conditions of Contract.

#### PPG 8.4.2 Specialist external inspectorate

Unit: Prov Sum

The provisional sum allows for the costs of all external inspectorates appointed by the Employer during the course of the Contract, which will be paid by the Contractor from this provision upon instruction by the Engineer.

In addition to the above amount, provision is made in Schedule 1 for a mark-up on any payments made by the Contractor. The mark-up shall be regarded as full compensation for overheads, charges and profits as provided for in Clause 13.5 of the Conditions of Contract.

#### PPG 8.4.3 Employer's Health and Safety Officer

Unit: Prov Sum

The provisional sum allows for the costs of the Employer's health and safety officer appointed by the Employer in terms of the Occupational Health and Safety Act and its regulations for the duration of construction. In addition to the above amount, provision is made in Schedule 1 for a mark-up on any payments made by the Contractor. The mark-up shall be regarded as full compensation for overheads, charges and profits as provided for in Clause 13.5 of the Conditions of Contract.

#### PPG 8.4.4 Water Quality Monitoring Instruments

Unit: Prov Sum

The provisional sum shall provide for the acquisition at the sole discretion of the Employer of any/all water quality instruments. In addition to the above amount, provision is made in Schedule 1 for a mark-up on any payments made by the Contractor. The mark-up shall be regarded as full compensation for overheads, charges and profits as provided for in Clause 13.5 of the Conditions of Contract.



#### PPG 8.4.5 Laboratory instruments

Unit: Prov Sum

The provisional sum shall provide for the acquisition at the sole discretion of the Employer of any/all instruments and equipment required for the on-site laboratory.

In addition to the above amount, provision is made in Schedule 1 for a mark-up on any payments made by the Contractor. The mark-up shall be regarded as full compensation for overheads, charges and profits as provided for in Clause 13.5 of the Conditions of Contract.

#### PPG 8.4.6 Engineers Cell Phone Costs

Unit: Prov Sum

A Provisional Sum has been included in Schedule 1 for telephone calls (cellular only) of the Engineer's Representative for the duration of the Contract. The Engineer's Representative will provide his own cellular telephone for the Contract. Payment for cellular calls will be based on call and rental costs.

In addition to the above amount, provision is made in Schedule 1 for a mark-up on any payments made by the Contractor. The mark-up shall be regarded as full compensation for overheads, charges and profits as provided for in Clause 13.5 of the Conditions of Contract.

#### PPG 8.4.7 Engineers Sit Office Consumables

Unit: Prov Sum

A provisional sum has been included in schedule 1 for the provision of all office consumables for the Engineer's office establishment to cover all expenses related to stationary, paper, printer cartridges etc.

In addition to the above amount, provision is made in Schedule 1 for a mark-up on any payments made by the Contractor. The mark-up shall be regarded as full compensation for overheads, charges and profits as provided for in Clause 13.5 of the Conditions of Contract.

#### PPG 8.4.8 Electronic Equipment

Unit: Prov Sum

A provisional sum has been included in schedule 1 for the provision of all electronic equipment required by the Engineer and his representatives/assistants for the execution of their task during the construction stage, which includes computers, printers, cameras etc.

In addition to the above amount, provision is made in Schedule 1 for a mark-up on any payments made by the Contractor. The mark-up shall be regarded as full compensation for overheads, charges and profits as provided for in Clause 13.5 of the Conditions of Contract.

#### PPG 8.4.9 Acceptance Control Testing

Unit: Prov Sum

A Provisional Sum has been included in Schedule 2 for acceptance control testing ordered by the Engineer to be undertaken by a commercial laboratory. Payment will be based on the actual invoicing by the laboratory to the Contractor.

In addition to the above amount, provision is made in Schedule 1 for a mark-up on any payments made by the Contractor. The mark-up shall be regarded as full compensation for overheads, charges and profits as provided for in Clause 13.5 of the Conditions of Contract.



**PPG 8.4.10 Repair or Replacement of Potentially Available Employer's Materials**  
 Unit: Prov Sum

The provisional sum shall be used at the discretion of the Employer, for the repair or replacement of Potentially Available Employer's materials with any latent defects, as certified by the Engineer.

In addition to the above amount, provision is made in Schedule 1 for a mark-up on any payments made by the Contractor. The mark-up shall be regarded as full compensation for overheads, charges and profits as provided for in Clause 13.5 of the Conditions of Contract.

**PPG 8.5 Additional Services Required During Defects Notification (Maintenance) Period**

**PPG 8.5.1 Site visits and reporting** Unit: Visit

The Contractor, or a designated and approved representative, shall visit the Works at least twice per calendar month to execute a conditional assessment of the mechanical and electrical equipment installed under the Contract, assess the performance of the plant since the last reporting period, take the necessary water quality samples, discuss any/all operational problems with the on-site operators, engage in ongoing training where required, record flow data and compile the necessary report for the Engineer's approval. The Contractor's tendered rate shall include for all direct and indirect expenses associated with these site visits and shall include, but not be limited to, travel costs, travelling time costs, time cost for work on site, stationary, report writing etc.

**PPG 8.5.2 Water Quality Sampling** Unit: Sum (per set)

The Contractor shall appoint an accredited laboratory to sample the Works and analyse the samples for the water quality parameters listed under sub-clause PPG 6.2 in accordance with industry-norm methods and procedures and shall allow for all direct and indirect costs associated herewith. Sampling and analyses shall be executed twice per calendar month and results shall be submitted to the Engineer and the Employer as soon as it becomes available.

**PPG 8.5.3 Maintenance of Mechanical and Electrical Equipment** Unit: Sum

The Contractor shall maintain all mechanical and electrical equipment installed under the Contract for the full duration of the defects notification (maintenance) period and shall provide all labour, travel, handling, consumables, oil, lubricants, tools, equipment etc associated herewith.

**PPG 8.5.4 Supply of chemicals** Unit: Sum

The Contractor shall supply and uphold all chemicals required for the operation of the Works for the duration of the trial operation period and shall provide all labour, travel, consumables, tools etc associated herewith.

**PPG 8.5.5 Performance Guarantee** Unit: Sum

The rate tendered shall cover the initial costs as well as maintaining during the defects notification period of a suitable and approved performance guarantee for



the provision of the additional services described above, to the value of the tendered sum for items PPG 8.5.1 to PPG 8.5.4. It is suggested that 2 bonds be issued and that a bond will be returned to the Contractor every six months once all the contractual requirements have been met.

### **PPG 8.6 Trial Operation Period**

The Contractor shall make allowance under this payment items for all direct and indirect costs related to complying with the specified requirements of the Trial Operation Period as described in the Project Specifications.



## *DAWID KRUIJER MUNICIPALITY*

**CONTRACT No: TN003/2026**

**REPLACEMENT OF ABRAHAM HOLBORS SEPTEMBER WATER TREATMENT  
PLANT MOTOR CONTROL CENTRE**

**BUILD OF ELECTRICAL WORKS**

### **C3.5 MANAGEMENT**



## **C3.5 MANAGEMENT**

### **C3.5.1 Management of the Works**

#### **C3.5.1.1 Applicable Specifications**

Specification as defined in PartC3.4 shall be applicable to this Contract.

#### **C3.5.1.2 Concurrent Activities on Site**

The Contractor's attention is drawn to the fact that other contiguous works will be executed concurrently by the Employer or independent Contractor's under separate contracts in the vicinity of the Site.

The other Works which will be in progress or will come into operation on or adjacent to the Site of the Works during the progress or tenancy of this Contract are likely to include, but are not limited to the following:

- Water supply to end use costumers

The Contractor shall ensure that neither its operations nor those of its subcontractors nor the activities of its employees shall interfere with or hinder the operations of the Employer or of other Contractors and it shall indemnify the Employer against all claims arising through default of this requirement.

The Contractor shall hand over portions of the Site of the Works (whether completed or not), or completed portions of the Works, to these Contractors when required by the Employer or detailed elsewhere in this document. The Contractor shall cause no interference with or delays in the execution of these contiguous contracts.

No discount or commission for the Contractor is allowed on these contracts, and it will be assumed that it has fully allowed in the Contract Price for the presence of these Contractors on Site. Any service rendered or assistance given by the Contractor to these Contractors, save as are provided for in the Project Specifications, shall be for their accounts only since the Employer shall in no way be responsible to the Contractor for any payments in this respect.

The Contractor shall protect all known existing services as well as all work being carried out and structures being erected on the Site by other Contractors. Any damage caused to these services or structures, or any obstructions or hindrance caused to other contractors by the Contractor, and all claims arising there from, will be the sole responsibility of the Contractor.

All repair work shall be carried out at the Contractor's expense to the entire satisfaction of the Engineer.



The same obligations shall be imposed on the Employer and on other Contractors in respect of the Works being executed under this Contract.

### **C3.5.1.3 Contractor's Project Management Plan**

The Contractor is required to prepare and submit a project management plan for the construction. The particular contents that should be included in the Contractor's Project Management Plan are listed below:

- Project structures and agreements

The Contractor shall indicate how responsibility for the various work packages will be divided between joint venture partners (where applicable) and sub-contractors. A contract organogram shall be provided showing work apportionment and project management responsibilities. The particular division of work shall match the established capabilities and capacities of each particular partner or subcontractor.

- Quality control plan

The Contractor shall provide to Engineer a detailed quality control plan (QCP) which indicates all the various process step related to manufacturing and building of civil, mechanical, and electrical equipment. The QCP shall clearly show hold points where the contractors, engineers and clients nominated representatives will be required to witness and sign off the relevant stage. These hold points shall be as approved by the Engineer.

- Plant, materials and equipment

The Contractor shall prepare a Plant and Materials procurement plan, indicating the source of key Plant and Materials designated for inclusion in the Works, and demonstrating that such Plant and Materials have a proven track record of successful maintenance support in South Africa.

The Contractor shall also prepare a plan of Contractor's Equipment, indicating the source and details of construction equipment planned for use on the Contract and based on the Contractor's particular approach.

- Staffing plan

The Contractor shall prepare a detailed staffing plan showing in an organogram all key members of the Contractor's Personnel, providing a detailed CV for each such key position. The Contractor shall also show the numbers and source of all non-key staff and indicating the particular local content offering of the Contractor.



- Method statements

The Contractor shall clearly describe the overall methodology proposed for construction of the Works and include particular method statements for each work discipline included in the Works.

#### **C3.5.1.4 Construction Programme**

The Contractor shall submit within the period stated in the Contract Data a suitable and realistic construction programme for the consideration of the Engineer.

The programme shall be in the form of a MS Project Gantt chart and shall include the following details:

- A work breakdown structure, identifying the major activity groups.
- For each activity group further details shall be provided with regard to the scheduled start and end dates of individual activities.
- The linkages between activities shall be clearly indicated and the logical network upon which the programme is based shall be separately submitted to the engineer if requested. Any constraints shall be classified as being time-related or resource-related.
- The critical path(s) shall be clearly indicated and floats on non-critical activities shall be shown.
- The Contractor shall indicate the working hours per day, night, week, and month allowed for in the programme.
- Where relevant the Contractor shall state the production rates for key activities, e.g., earthworks, etc.

Together with the programme as detailed above the contractor shall submit to the engineer a cash flow projection, indicating projected monthly invoice amounts. The cash flow projection shall be updated at monthly intervals to reflect actual payments to date and anticipated further payments.

The programme will be reviewed at the monthly site meetings at which the Contractor shall provide sufficient detail that will allow the comparison of completed work per activity that has fallen behind. The updated programme shall be submitted to the Engineer at least two days prior to the monthly meetings.

If the programme has to be revised by reason of the Contractor falling behind his programme, he shall produce a revised programme showing how he intends to regain lost time in order to ensure completion of the Works within the time for completion or any granted extension of time. Any proposal to increase the tempo of work must be accompanied by positive steps to increase production by providing more labour and plant on site, or by using the available labour and plant in a more efficient manner.



Failure on the part of the Contractor to submit the programme or to work according to the programme or revised programmes shall be sufficient reason for the Engineer to take steps as provided in the General Conditions of Contract.

The approval by the Engineer of any programme shall have no contractual significance other than that the Engineer will be satisfied that the work is carried out according to such programme and that the Contractor undertakes to carry out the work in accordance with the programme. It shall not limit the right of the Engineer to instruct the Contractor to vary the programme if required by circumstances.

#### **C3.5.1.5 Quality Assurance**

The Contractor shall institute a quality assurance system and provide experienced personnel as well as all the necessary transport, instruments, and equipment, to ensure adequate supervision and positive control of the works at all times in order to comply with the requirements. The Contractor shall deliver to the Engineer, for its consideration, quality assurance programmes prior to the Contractor's appointment of any suppliers or commencement of the Works. Failure to comply with these requirements shall be just cause for the Engineer to order supervision of the Works without additional remuneration or for him to recommend termination to the Employer in terms of the Conditions of Contract.

The Contractor shall do at least the quality control tests at the frequencies specified in the Scope of Works. If the scale of the works, construction methods or any other circumstances dictates, the Contractor shall do more tests when required for quality assurance purposes.

The Contractor shall keep systematic records of the test results and all worksheets relating thereto. All test results obtained by the Contractor in the course of his process control of the Works shall be submitted to the Engineer or his Representative prior to requesting inspection of the relevant portions of the Works. Any request for inspection shall be submitted on the prescribed forms.

The employer is at liberty to carry out such tests as he deems necessary to determine compliance with the contract requirements and will make available the results of all tests to the contractor.

Acceptance control, record keeping, and payment certificates shall be done in accordance with the Engineer's standard system except if the Engineer approves that the Contractor's standard system may be used. Such formats shall be supplied the Contractor at or after the site handover meeting.

#### **C3.5.1.6 Site Administration**

- **Daily Site Diary**  
The daily site diary, contents of which shall be approved by the Engineer, shall be kept up to date by the Contractor's Site Agent and will be signed on a daily basis by the Engineer's Representative.



- **Information in Respect of Plant**  
 Information relating to plant on Site shall be recorded in the daily site diary. In addition, the Contractor shall deliver to the Engineer, on a monthly basis, a detailed summary of construction plant kept on the Site, full particulars given for each day of the month. Distinction shall be made between plant in working order and plant out-of-order. Such inventory shall be submitted by the first day of the month following the month to be reported.
- **Information in Respect of Employees**  
 Information relating to labour and management on Site shall be recorded in the daily site diary. In addition, the Contractor shall deliver to the Engineer, on a monthly basis, a detailed summary of supervisory staff, labour employed (own and local labour) by category, and sub-contractors (both local and imported) for each day of the month. Such return shall be submitted by the first day of the month following the month to be reported.
- **Rainfall Records**  
 Rainfall records for the period of construction shall be taken on Site and recorded in the daily site diary. The Contractor shall provide and install all the necessary equipment for accurately measuring the rainfall. The Contractor shall also provide, erect and maintain a security fence plus gate, padlock and keys at each measuring station, all at his own cost. The Engineer or his Representative shall take and record the daily rainfall readings. The Contractor shall be permitted to attend these readings, in the company of the Engineer's Representative. Access to the measuring gauge(s) shall at all times be under the Engineer's control. Alternatively, the use of the nearest local weather station data will be sourced rainfall data (refer to requirements stipulated in Part C1.2 - Contract Data). Such data will be sourced by the Contractor at no additional cost to the Employer.

#### **C3.5.1.7 Site Instructions**

Site instructions by the Engineer, addressed to the Contractor at his office on the Site, will be numbered consecutively and will be deemed to have been received by the Contractor's Representative unless a break in the sequence of numbers is brought to the notice of the Engineer in writing immediately.

#### **C3.5.1.8 Site Meetings**

The Contractor and his authorised representative shall attend all meetings held on the Site with the Employer and the professional team at dates and times to be determined by the Engineer. Such meetings will be held to evaluate the progress of the Contract, and to discuss matters pertaining to the Contract which any of the parties represented may wish to raise. It is not the intention to discuss day-to-day technical matters at such meetings.

#### **C3.5.1.9 Payment Certificates**

Monthly Progress Payment Certificates shall be submitted to the Engineer's Representative on Site not later than the 20<sup>th</sup> of each month (or on the last working day prior to this date) in order to allow



for checking and reconciliation of all quantities, rates, extensions and additions in the certificate. Each progress payment certificate shall include work executed or reasonably expected to be executed up to the 30th day of the specific month. The Engineer's Representative shall have a period of five (5) calendar days to review the draft certificate in collaboration with the Contractor. All quantity calculations and certificates submitted by the Contractor for checking shall be in accordance with the Engineer's standard site administration forms and formats which shall be issued during the construction stage.

Upon agreement by the Engineer's Representative by not later than the 25<sup>th</sup> of each month, the certificate shall be submitted by the Contractor in a neat, typed form in accordance with the prescribed format, and with the correct spelling, to the Engineer by not later than the 28th of each month (or on the first working day thereafter), for certification.

Where dayworks have been instructed by the Engineer, the Contractor shall submit the returns to the Engineer for signature and approval within twenty-four (24) hours of the end of the working day on which the work was executed. Daywork returns shall be submitted on forms according to the Engineer's standard format. Failure to comply with the terms of this clause will result in non-payment for such dayworks.

The tax invoice submitted with the certificate shall be dated the 1st of the month following the period certified. All costs for the preparation and submission of progress certificates shall be borne by the Contractor.

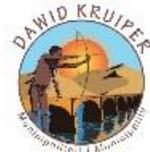
#### **C3.5.1.10 Drawings, Operation and Maintenance Manuals**

All information in the possession of the Contractor that is required by the Engineer's Representative in order to complete the civil as-built drawings and to prepare a completion report for the Employer must be submitted to the Engineer's Representative before a Certificate of Practical Completion will be issued for the Works. Similarly, the Contractor will be required to submit full details of all pipes, valves, meters and specials in a suitable loose bound format, including any special operational and maintenance procedures related thereto, for incorporation in the overall operation and maintenance manual for the Scheme prior to the issue of a Certificate of Completion for the Works.

Only figured dimensions on the Drawings may be used in the interpretation thereof, and the Drawings shall not be scaled unless the Contractor is so instructed by the Engineer in writing. The Contractor shall notify the Engineer in writing of any lack of information or conflict in the information on the Drawings. The Engineer will upon written request provide any dimensions that may have been omitted from the Drawings.

#### **C3.5.2 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 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. Provision has been made in the bill of quantities where the Contractor shall price for these requirements.

The Contractor shall make allowance for a local labour who shall be equipped with the relevant Personal Protective Equipment (PPE) in accordance with the relevant OHS regulations. The proposed allocation for these workers shall be as follow:

- AHS WTW:5 temporary workers for 6 weeks

The minimum rate for remuneration associated with these labourers shall be accepted as **R230.32/person/day (R28.79/hr)**.



## *DAWID KRUIJER MUNICIPALITY*

**CONTRACT No: TN003/2026**

**REPLACEMENT OF ABRAHAM HOLBORS SEPTEMBER WATER TREATMENT  
PLANT MOTOR CONTROL CENTRE**

**BUILD OF ELECTRICAL WORKS**

### **C3.6 HEALTH AND SAFETY SPECIFICATIONS**



# **Project Health and Safety Specification**

In terms of Construction Regulations 2014

## **Client**

**DAWID KRUIJER MUNICIPALITY**

## **Description of Project Works**

**REPLACEMENT OF ABRAHAM HOLBORS SEPTEMBER  
WATER TREATMENT PLANT MOTOR CONTROL CENTRE**

## **Project Location**

**25 STEENBOK AVENUE, SOUTH AFRICA, UPINGTON, 8801**

## **Preparation Date**

**JANUARY 2026**

### **Project Health and Safety Specification developed by:**

Mark Winter PrCHSA, (SACPCMP)  
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- 2.7 Compensation of Occupational Injuries Act 130 of 1993 (COIDA)
- 2.8 Occupational Health and Safety Policy
- 2.9 Health and Safety Organogram
- 2.10 Risk Assessments
- 2.11 Health and Safety Representative(s)
- 2.12 Health and Safety Committee
- 2.13 Medical Certificate of Fitness
- 2.14 Health and Safety Training
  - 2.14.1 Induction
  - 2.14.2 Awareness
- 2.15 Competency
- 2.16 General Record Keeping
- 2.17 General Inspection, Monitoring and Reporting
- 2.18 Emergency Procedures
- 2.19 First Aid Box and First Aid Equipment
- 2.20 Accident / Incident Reporting and Investigation
- 2.21 Hazards and Potential Situations
- 2.22 Occupational Health and Safety Signage
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- 2.24 Stacking of Materials
- 2.25 Housekeeping and General Safeguarding on Construction Sites
- 2.26 Construction Vehicles and Mobile Plant
- 2.27 Electrical Installations and Machinery on Construction Sites



- 2.28 Use and Temporary Storage of Flammable Liquids on Construction Sites
- 2.29 Water Environments
- 2.30 Fire Precautions on Construction Sites
- 2.31 Construction Employees' Facilities
- 2.32 Fall Protection
- 2.33 Temporary Works
- 2.34 Excavation
- 2.35 Demolition Work
- 2.36 Tunnelling
- 2.37 Scaffolding
- 2.38 Bulk Mixing Plant
- 2.39 Rope Access Work
- 2.40 Hazardous Chemical Substances (HCS)
- 2.41 Noise Induced Hearing Loss
- 2.42 Explosives and Blasting
- 2.43 Personal Protective Equipment (PPE)
- 2.44 Asbestos
- 2.45 Pressure Vessels (Including Gas Bottles)
- 2.46 Fire Extinguishers and Fire Fighting Equipment
- 2.47 Lifting Machinery and Tackle
- 2.48 Ladders and Ladder Work
- 2.49 General Machinery
- 2.50 Portable Electrical Tools
- 2.51 High Voltage Electrical Equipment
- 2.52 Public Health and Safety
- 2.53 Night Work
- 2.54 Environmental Conditions and Flora and Fauna
- 2.55 Occupational Health
- 2.56 Suspended Platforms
- 2.57 Material Hoists
- 2.58 Explosive Actuating Fastening Devices
- 2.59 Confined Spaces
- 2.60 Alcohol and Drugs
- 2.61 General Practices when Working at Heights
- 2.62 Traffic Accommodation
- 2.63 Ventilation and Lighting in the Work Place
- 2.64 Nuclear Density Gauge (Troxler)
- 2.65 Ergonomics Regulation of 2019

**Annexure A** Requirements for the Safety Plan Assessment

**Annexure B** Legal Appointments

**Annexure C** Baseline Risk Assessment

**Annexure D** Safety Specification and Baseline Risk Assessment Issue Register



## 1 SPECIFIC PROJECT INFORMATION

### 1.1 INTRODUCTION AND DEFINITIONS

THE REQUIREMENTS OF THE CONSTRUCTION REGULATIONS 2014 (AND GUIDANCE NOTES OF 2017) HAVE BEEN IN EFFECT SINCE 7TH AUGUST 2014. THE REGULATIONS PLACE LEGAL DUTIES UPON PRINCIPAL CONTRACTORS AND CONTRACTORS. ALTHOUGH THIS HEALTH AND SAFETY SPECIFICATION INCLUDES MUCH OF THE CONTENT OF THE REGULATIONS, THE CONTRACTOR WILL BE DEEMED TO BE FAMILIAR WITH THE REQUIREMENTS OF THESE REGULATIONS, AND OTHER ASSOCIATED HEALTH AND SAFETY REGULATIONS, AND TO HAVE FACTORED IN ALL THE DUTIES PLACED UPON CONTRACTORS AND PRINCIPAL CONTRACTORS IN THE TENDER. A COPY OF THE REGULATIONS CAN BE VIEWED ON THE DEPARTMENT OF LABOUR'S WEBSITE.

PLEASE NOTE THAT THE TERMS "CONTRACTOR" AND "PRINCIPAL CONTRACTOR" HAVE THE SAME MEANING AS THAT IN THE CONSTRUCTION REGULATIONS AND ARE USED INTERCHANGEABLY IN THIS DOCUMENT, I.E., REFERENCES TO "CONTRACTOR" REFER TO PRINCIPAL CONTRACTOR AND/OR CONTRACTOR AS THE REGULATIONS PERTAIN TO THEIR FUNCTIONS.

This Health and Safety Specification contains clauses that are generally applicable to construction activities, as well as imposing pro-active controls associated with activities that impact on Health and Safety as it relates to work on site. Compliance to the requirements of the Occupational Health and Safety Act 1993 is an additional requirement of this Health and Safety Specification and is part of the Contractor's responsibility. The Client, and/or their agents, will monitor that all Contractors comply with the requirements of such legislation.

**ALL REFERENCES TO CLIENT IN THIS HEALTH AND SAFETY SPECIFICATION ALSO REFER TO SAFETY AGENT, WHERE SO APPOINTED.**

***Definitions (as per the Construction Regulations 2014) applicable to this Health and Safety Specification:***

"agent" means a competent person who acts as a representative for a Client;

"angle of repose" means the steepest angle of a surface at which a mass of loose or fragmented material will remain stationary in a pile on the surface, rather than sliding or crumbling away;

"bulk mixing plant" means machinery, appliances or other similar devices that are assembled in such a manner so as to be able to mix materials in bulk for the purposes of using the mixed product for construction work;

"client" means any person for whom construction work is being performed;

"competent person" means a person who has, in respect of the work or task to be performed, the required knowledge, training and experience and, where applicable, qualifications, specific to that work or task: Provided that where appropriate qualifications and training are registered in terms of the provisions of the National Qualification Framework Act, 2000 (Act No.67 of 2000), those qualifications and that training must be regarded as the required qualifications and training; and is familiar with the Act and with the applicable regulations made under the Act;



"construction manager" means a competent person responsible for the management of the physical construction processes and the coordination, administration, and management of resources on a construction site;

"construction site" means a workplace where construction work is being performed;

"construction supervisor" means a competent person responsible for supervising construction activities on a construction site;

"construction vehicle" means a vehicle used as a means of conveyance for transporting persons or material, or persons and material, on and off the construction site for the purposes of performing construction work;

"construction work" means any work in connection with –

- the construction, erection, alteration, renovation, repair, demolition or dismantling of or addition to a building or any similar structure; or
- the construction, erection, maintenance, demolition or dismantling of any bridge, dam, canal, road, railway, runway, sewer or water reticulation system; or the moving of earth, clearing of land, the making of excavation, piling, or any similar civil engineering structure or type of work;

"construction work permit" means a document issued in terms of regulation 3;

"Contractor" means an Employer who performs construction work;

Note:

- a) Includes organisations and or self-employed person that contracts with a client, Principal Contractor, or a Contractor to carry out construction work.

"demolition work" means a method to dismantle, wreck, break, pull down or knock down of a structure or part thereof by way of manual labour, machinery, or the use of explosives;

"design" in relation to any structure, includes drawings, calculations, design details and specifications;

"designer" means a competent person who-

- prepares a design;
- checks and approves a design;
- arranges for a person at work under his or her control to prepare a design, including an employee of that person where he or she is the Employer; or
- designs temporary work, including its components;
- an architect or engineer contributing to, or having overall responsibility for a design;
- a building services engineer designing details for fixed plant;
- a surveyor specifying articles or drawing up specifications;
- a Contractor carrying out design work as part of a design and building project; or
- an interior designer, shop-fitter, or landscape architect;

"ergonomics" means the scientific discipline concerned with the fundamental understanding of interactions among humans and other elements of a system, and the profession that applies theory, principles, data, and methods to design in order to optimise human well-being and overall system performance;

"excavation work" means the making of any man-made cavity, trench, pit or depression formed by cutting, digging or scooping;



"explosive actuated fastening device" means a tool that is activated by an explosive charge and that is used for driving bolts, nails, and similar objects for the purpose of providing fixing;

"fall arrest equipment" means equipment used to arrest a person in a fall, including personal equipment, a body harness, lanyards, deceleration devices, lifelines, or similar equipment;

"falsework" means a combined system of formwork and support work;

"formwork" means temporary or permanent shutters used to form wet concrete into elements of a structure, and includes both horizontally and vertically placed shutters;

"fall prevention equipment" means equipment used to prevent persons from falling from a fall risk position, including personal equipment, a body harness, lanyards, lifelines or physical equipment such as guard-rails, screens, barricades, anchorages or similar equipment; 6

"fall protection plan" means a documented plan, which includes and provides for -

- all risks relating to working from a fall risk position, considering the nature of work undertaken;
- the procedures and methods to be applied in order to eliminate the risk of falling; and
- a rescue plan and procedures;

"fall risk" means any potential exposure to falling either from, off or into;

"health and safety file" means a file, or other record containing the information in writing required by these Regulations;

"health and safety plan" means a site, activity or project specific documented plan in accordance with the Client's health and safety specification;

"health and safety specification" means a site, activity or project specific document prepared by the Client pertaining to all health and safety requirements related to construction work;

"material hoist" means a hoist used to lower or raise material and equipment, excluding passengers;

"medical certificate of fitness" means a certificate contemplated in regulation 7(8);

"mobile plant" means any machinery, appliance or other similar device that is able to move independently, and is used for the purpose of performing construction work on a construction site;

"National Building Regulations" means the National Building Regulations made under the National Building Regulations and Building Standards Act, 1977 (Act No. 103 of 1977), and promulgated by Government Notice No. R. 2378 of 30 July 1990, as amended by Government Notices No's R. 432 of 8 March 1991, R. 919 of 30 July 1999 and R. 547 of 30 May 2008;

"person day" means one normal working shift of carrying out construction work by a person on a construction site;

"Principal Contractor" means an Employer appointed by the Client to perform construction work;

"Professional Engineer or Professional Certificated Engineer" means a person holding registration as either a Professional Engineer or Professional Certificated Engineer in terms of the Engineering Profession Act, 2000 (Act No. 46 of 2000);



"Professional Technologist" means a person holding registration as a Professional Engineering Technologist in terms of the Engineering Profession Act, 2000;

"provincial director" means the provincial director as defined in regulation 1 of the General Administrative Regulations, 2003;

"scaffold" means a temporary elevated platform and supporting structure used for providing access to and supporting workmen or materials or both;

"shoring" means a system used to support the sides of an excavation and which is intended to prevent the cave-in or the collapse of the sides of an excavation;

"structure" means-

- any building, steel or reinforced concrete structure (not being a building), railway line or siding, bridge, waterworks, reservoir, pipe or pipeline, cable, sewer, sewage works, fixed vessels, road, drainage works, earthworks, dam, wall, mast, tower, tower crane, bulk mixing plant, pylon, surface and underground tanks, earth retaining structure or any structure designed to preserve or alter any natural feature, and any other similar structure;
- any falsework, scaffold or other structure designed or used to provide support or means of access during construction work; or
- any fixed plant in respect of construction work which includes installation, commissioning, decommissioning, or dismantling and where any construction work involves a risk of a person falling;

"support work" means the temporary structure erected to support the formwork before the casting of a concrete element of a structure.

"suspended platform" means a working platform suspended from supports by means of one or more separate ropes from each support;

"temporary works" means any falsework, formwork, support work, scaffold, shoring or other temporary structure designed to provide support or means of access during construction work;

"the Act" means the Occupational Health and Safety Act, 1993 (Act No. 85 of 1993);

"tunnelling" means the construction of any tunnel beneath the natural surface of the earth for a purpose other than the searching for or winning of a mineral.

**Reference should be made to the following documentation in conjunction with this Safety Specification (including existing surveys, drawings, and reports):**

- Tender documents
- Drawings

#### **IMPORTANT NOTE:**

This Health and Safety Specification has been prepared to comply with the requirements of the Construction Regulations 2014.

## **1.2 BACKGROUND TO THE HEALTH AND SAFETY SPECIFICATION**

Historically, the Construction Industry has had a poor health and safety record. Due to the complex and potentially dangerous operations being undertaken, there is a high risk of incidents, accidents, and injuries. In many instances poor adherence to the Act and Regulations has resulted in severe consequences for Health and Safety performance. The



Client is determined that the highest Health and Safety standards will prevail throughout the Contract and that there will be full commitment from all parties involved.

To achieve this goal the Client has arranged for the preparation of this Health and Safety Specification. The Health and Safety Specification sets out guidelines and minimum levels of awareness and guidance for Health and Safety requirements for the project. Contractual responsibility for adhering to these requirements rests with the Contractors. All employees are encouraged to be pro-active in compliance.

The Client is committed to ensuring the highest Health and Safety standards for all work undertaken within the Contract.

**Contractors as Employers are fully responsible and accountable for compliance with all Health and Safety requirements.**

#### **IMPORTANT NOTE:**

**Compliance with the Occupational Health and Safety Act and Regulations shall not be limited to this Health and Safety Specification and definitions contained in this document.**

**Contractors shall be conversant with the requirements and effects of Health and Safety legislation upon their activities, in particular the Construction Regulations, 2014, and the Occupational Health and Safety Act, 1993, and to have made adequate resource in their tender submission to comply with all legislative requirements.**

**Failure to comply with the requirements of this Safety Specification will result in severe sanction and the severity of the sanction will depend on the severity of the non-compliance.**

### **1.3 PURPOSE OF THE HEALTH AND SAFETY SPECIFICATION**

The Contractor's personnel will be responsible for the auditing of the implementation of the Health and Safety Specification and maintaining the document control and record systems associated with the Health and Safety Specification. The Client will arrange for Health and Safety audits to be conducted on site on their behalf to monitor health and safety compliance by Contractors.

The purpose of this site-specific Health and Safety Specification is to comply with legal requirements and to provide health and safety information about specific project risks known by the Client, Designer and Safety Agent to be applicable to this project. This document also provides minimum health and safety requirements, standards, and expectations that the Contractor must adhere to.

The Contractor must take into account all information in this specification and ensure that their tenders include adequate resource and competence to deal with the matters detailed herein so that all relevant contents are dealt with in a way which is in compliance with legislation and the ethical concerns for the safeguarding of employees, Contractors and other persons affected by the construction activities. Please note that a detailed OHS bill of quantities must be provided by the Contractor on all Construction Work Permit projects. The Bill of Quantities will form part of the Construction Work Permit appellation presented to Department of Labour for approval.

The Health and Safety Specification will be implemented during construction of the works and any construction activity that the Client has control over.



This will also assist in ensuring that all the costs related to the compliance with Occupational Health Act 85 of 1993 and the Construction Regulations 2014, as well as this Health and Safety Specification, are taken into consideration at Tender stage.

No advice, approval of any document required by the Health and Safety Specification such as hazard identification and risk assessment action plans or any other form shall be construed as an acceptance by the Client of any obligation that absolves the Contractor from achieving the required level of performance and compliance with legal requirements.

#### **1.4 IMPLEMENTATION OF THE HEALTH AND SAFETY SPECIFICATION**

The Contractor's personnel will be responsible for the auditing of the implementation of the Health and Safety Specification and maintaining the document control and record systems associated with the Health and Safety Specification. The Client will arrange for Health and Safety audits to be conducted on site on their behalf to monitor health and safety compliance by Contractors.

The purpose of this site-specific Health and Safety Specification is to comply with legal requirements and to provide health and safety information about specific project risks known by the Client, Designer and Safety Agent to be applicable to this project. This document also provides minimum health and safety requirements, standards, and expectations that the Contractor must adhere to.

The Contractor must take into account all information in this specification and ensure that their tenders include adequate resource and competence to deal with the matters detailed herein so that all relevant contents are dealt with in a way which is in compliance with legislation and the ethical concerns for the safeguarding of employees, Contractors and other persons affected by the construction activities. Please note that a detailed OHS bill of quantities must be provided by the Contractor on all Construction Work Permit projects. The Bill of Quantities will form part of the Construction Work Permit application presented to Department of Labour for approval.

The Health and Safety Specification will be implemented during construction of the works and any construction activity that the Client has control over.

This will also assist in ensuring that all the costs related to the compliance with Occupational Health Act 85 of 1993 and the Construction Regulations 2014, as well as this Health and Safety Specification, are taken into consideration at Tender stage.

No advice, approval of any document required by the Health and Safety Specification such as hazard identification and risk assessment action plans or any other form shall be construed as an acceptance by the Client of any obligation that absolves the Contractor from achieving the required level of performance and compliance with legal requirements.

Further, there is no acceptance of liability by the Client which may result from the Contractor failing to comply with the Health and Safety Specification unless the Client has issued an instruction to any requirement, i.e. the Contractor remains responsible for achieving the required performance levels.

This Health and Safety Specification forms an integral part of the Contract, and Contractors shall make it an integral part of their Contracts with other Contractors and Suppliers. Contractors employed by the Client are to ensure that the provisions of the Health and Safety Specification are applied both on the site and in respect of all off site activities relating to the project, in particular in transport activities and project dedicated off site fabrication works.

The Contractor shall enforce the provisions of the Health and Safety Specification amongst all Contractors and suppliers for the project.



The Contractor shall sign the acknowledgment on the last page of this safety specification that he/she has familiarized him/herself with the content of the Health and Safety Specification and shall comply with all obligations in respect thereof.

The successful Contractor will be required to compile a Health and Safety Plan based on the requirements of the Occupational Health Act 85 of 1993 and these Specifications, which will need to be approved by Client (or their appointed safety agent) prior to commencement with construction work.

#### 1.4.1 Client

In terms of the Construction Regulations 2014 the Client (or their Agent, where appointed) has legal duties. Where an Agent (refer to “definitions” section of this document) is appointed in terms of this project, these Health and Safety duties assigned will also apply.

**All references to “Client” will apply to their appointed “Safety Agent”, where so appointed, in this Health and Safety Specification.**

The Client must:

- Prepare a baseline risk assessment for the construction work
- Prepare a suitable, sufficiently documented, and coherent site specific Health and Safety specification for the intended construction work, based on the baseline risk assessment
- Include the health and safety specification in the tender documents
- Ensure that potential Principal Contractors submitting tenders have made adequate provision for the cost of health and safety measures
- Ensure that the Principal Contractor to be appointed has the necessary competencies and resources to carry out the construction work safely
- Take reasonable steps to ensure co-operation between all Contractors appointed by the Client to enable each of those Contractors to comply with the regulations
- Ensure, before work commences, that every Principal Contractor is registered and in good standing with the compensation fund, or with a licensed compensation insurer as contemplated in the Compensation for Occupational injuries and Diseases Act, 1993 (Act no 130 of 1993)
- Appoint each Principal Contractor in writing for the project, or part thereof
- Discuss and negotiate with the Principal Contractor the contents of the Principal Contractor’s safety plan and thereafter finally approve that plan for implementation
- Ensure that a copy of the Principal Contractor’s health and safety plan is implemented and maintained
- Ensure that periodic health and safety audits and document verification are conducted at intervals mutually agreed upon between the Principal Contractor and any Contractor, but at least once every 30 days
- Ensure that a copy of the health and safety audit report is provided to the Principal Contractor within 7 days after the audit
- Stop any Contractor from executing a construction activity which poses a threat to the health and safety of persons which is not in accordance with the Principal Contractor’s health and safety plan for site
- Where changes are brought about to the design or construction work, make sufficient health and safety information and appropriate resources available to the Principal Contractor to execute the work safely
- Ensure that the health and safety file is kept and maintained by the Principal Contractor.
- Where the Client requires additional work to be performed as a result of a design change or error in construction due to the actions of the Client, the Client must ensure that sufficient safety information and appropriate additional resources are available to execute the required work safely.

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 Part C3: Specifications  
 Part C.6: Health and Safety Specifications



- Where more than one Principal Contractor is appointed, the Client must take reasonable steps to ensure co-operation between all Principal Contractors and Contractors to ensure compliance with the Regulations
- Where the Client has appointed a Safety Agent for the project, their details for this project are contained in the Project Directory section of this health and safety specification.

#### 1.4.2 Designer Duties

It must be noted that the Designer also has Health and Safety duties assigned in terms of the Construction Regulations. Where the Contractor fulfils a design function in terms of this project (refer to “definitions” section of this document), these duties will also apply. Please refer to Regulation 6 of the Construction Regulations 2014.

#### Please note that the designer of temporary works must ensure that:

- all temporary works are adequately designed so that it will be capable of supporting all anticipated vertical and lateral loads that may be applied;
- the designs of temporary works are done with close reference to the structural design drawings issued by the Contractor, and in the event of any uncertainty consult the Contractor;
- all drawings and calculations pertaining to the design of temporary works are kept at the office of the temporary works designer and are made available on request by an inspector; and
- the loads caused by the temporary works and any imposed loads are clearly indicated in the design.

### 1.5 PROJECT DIRECTORY

<b>Project Client Contact Person</b>	Dawid Kruiper Municipality Mr M. Mnganga	<b>Tel: 054 338 7052</b> <b>Cell: TBA</b> <b>e-mail:</b> <a href="mailto:mduduzi.mnganga@dkm.gov.za">mduduzi.mnganga@dkm.gov.za</a>
<b>Project Manager Contact Person</b>	Dawid Kruiper Municipality Mario Neethling	<b>Tel: 054 338 7061</b> <b>Cell: 076 187 4969</b> <b>e-mail:</b> <a href="mailto:Mario.neethling@dkm.gov.za">Mario.neethling@dkm.gov.za</a>
<b>Construction Safety Agent Contact Person</b>	Safe Working Practice Mark Winter	<b>Tel: 021 701 0470</b> <b>Cell: 071 603 2213</b> <b>e-mail:</b> <a href="mailto:markw@safeppractice.co.za">markw@safeppractice.co.za</a>

### OTHER PARTIES DIRECTORY

<b>Department of Labour</b> Laboria House Cnr Compound & Pniel Streets, Kimberley Private Bag X5012, Kimberley	<b>Tel: 053 838 1500 / 053 838 1541</b>
<b>Telecommunications, Water, Gas and Electricity</b> Contractor to apply for and refer to wayleave information from service providers for the nature and location of services. Refer all queries to the Project Manager.	



## 1.6 PROJECT DETAILS

### Description of Works

Replacement of Abraham Holbors September Water Treatment Plant Motor Control Centre, including:

- Site set up
- Provision of materials and resources for the project.
- Complete replacement of the Motor Control Centre (MCC)
- Detailed planning and coordination of a plant shutdown to ensure minimal disruption to water treatment operations. Supply, installation, and commissioning of a new main MCC, including all associated electrical connections, protective devices, and control systems.
- Drywall to be removed to allow for the installation of the new MCC and will be reinstated once the installation is complete, restoring the area to its original condition.

This description of the works is not necessarily complete and shall not limit the work to be carried out by the Contractor under this Contract.

### Provisional Start Date

13<sup>th</sup> April 2026

### Anticipated Construction Duration

9 months

### Completion Date

15<sup>th</sup> December 2026

### Construction Work Permit Required for the Project?

No

## 1.7 EXISTING ENVIRONMENT

### Hazards particular to this project by virtue of location:

- Brownfield site, SAPS police station adjoining the WTW site, as well as residential area across the road, but will not be affected by the works.
- Existing WTW will remain operational during works – municipal staff and visitors present.
- The site is fully secured with fencing and controlled access through electronic gates. This ensures that only authorized personnel can enter, enhancing safety, security, and protection of both the equipment and the operational area.
- Live services present
- There are significant safety considerations when energizing and de-energizing the system. The contractor must adhere to strict safety protocols and work practices to ensure the safety of all personnel and prevent damage to equipment during these operations

### Overhead, Above Ground and Underground Services crossing the site:

The existing Motor Control Centre (MCC) will be fully removed and replaced with a new, modern MCC. This includes disconnection of all existing electrical circuits, safe dismantling of the current unit, and the installation, wiring, and commissioning of the new MCC to ensure full operational functionality and compliance with current electrical standards.

**Overhead:** Principal Contractor to check area and take precautions against damage to services and risk of injury to employees. Services not thought to be present.



**Underground:** Principal Contractor to check area and take precautions against damage to services and risk of injury to employees. Services present.

**Ground level:** Principal Contractor to check area and take precautions against damage to services and risk of injury to employees. Ground level services are present - lights, roads, building and existing water treatment works.

**Service Drawings available:** No

**Wayleaves and Permits required:** No

**Isolations required:** Yes, disconnection of all existing electrical circuits, safe dismantling of the current unit, and the installation, wiring, and commissioning of the new MCC to ensure full operational functionality and compliance with current electrical standards.

**Existing structures and surrounding land use (with a significant impact on Health & Safety):**

Site is contained in an existing Water Treatment site with associated structures and facilities. Site will be occupied by client's staff and will remain operational during the works. SAPS police station adjoining the WTW site, as well as residential area across the road, but will not be affected by the works.

**Existing ground conditions and ground survey report:**

n/a

**Existing Traffic Systems**

**Condition:** assumed to be reasonable

**Restrictions to access:** None known

**Speed restrictions:** Posted speed limit signage will be applicable. Decrease speed in construction areas.

## 1.8 AVAILABLE DRAWINGS

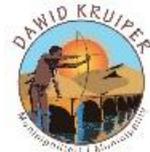
Refer to tender documentation.

## 1.9 PROJECT HEALTH AND SAFETY REQUIREMENTS

**Significant health and safety hazards identified by Designer and Safety Agent:**

**Members of the public** – SAPS police station adjoining the WTW site, as well as residential area across the road, but will not be affected by the works. Existing site is fenced off at premises boundaries. Site is not located close to any existing residential or commercial area. WTW will remain operational during the construction works. Existing WTW is staffed by client personnel and their safety must be taken into account during the works. All necessary steps must be taken to prevent unauthorised entry to site by such municipal employees and other members of the public from any dangers associated with the construction works being undertaken. Access to the WTW and the construction area may result in interface between clients staff, members of the public and construction vehicles

**Lifting Operations** – all operators must provide copies of their competency and medical certificates and driver's license. Loads must be slung by person with appropriate training and competence. Daily plant inspection registers to be completed and records kept in the safety file. Rotating amber lights to



be active when operating mobile cranes on site. Plant must be effectively separated from members of public and unauthorised personnel. Use trained flag persons as applicable. Exclusion zone under crane operations to be in operation as applicable. Ground bearing capacity to support weight of crane must be confirmed before commencing with lifts and wind speed meter will be required to establish conditions for safe lifting for cranes.

**Working at height and use of scaffolding – max height of working will be 2 storeys – Scaffold required for HVAC ducting. The MCC is on second level.** – all scaffold structures must be built as per the SANS Regulations. This must be assessed by the contractor and method statements for these activities to be submitted for approval prior to work commencement. A Fall Protection Plan and Rescue Plan must be approved and in place prior to any works at height taking place. All workers must have Fall Protection Plan training in the form of a toolbox talk with a signed register of attendance. Medical certificates of fitness will be required for all contractors' staff, including those working at height. Workers working at height must have appropriate and sufficient safety equipment. Safety harnesses with securely attached lanyards must be worn in areas where safe working at height access cannot be provided. Edge protection in the form of guard rails and toe boards to prevent materials and people from falling must be in place.

**Electrical works and electrical commissioning** – there are significant safety considerations when energizing and de-energizing the system. The contractor must adhere to strict safety protocols and work practices to ensure the safety of all personnel and prevent damage to equipment during these operations. May only be undertaken after the requisite isolations and permits have been obtained and all required safety measures are in place. All required personal protective equipment must be worn. Live commissioning may only be undertaken by trained and competent contractor's personnel who are authorised and supervised by competent personnel provided by the contractor, and, if so identified, the project client and professional team.

**Noise and Dust control:** Measures to be put in place by the appointed principal contractor to minimize the dust and noise on site.

**Live services** – all necessary precautions must be taken to prevent accidental contact with these services, to prevent damage or risk of causing of injury during construction process. All services to be treated as live.

**Other construction hazards expected are as follows:**

Cutting Off Disc  
 Electric Tools and Electrical Installations  
 Fire  
 Flammable Liquids / Gas  
 Hand tools  
 Hazardous Substances  
 Hot Works  
 Manual Handling of General Items  
 Plant/Vehicle and Equipment Operation  
 Working at Height (excl scaffold)

**NOTE: Please refer to end of this Health and Safety Specification for the baseline risk assessment for these risks.**

**ACTIVITIES REQUIRING APPROVED METHOD STATEMENTS (FOR HEALTH AND SAFETY)**

- Working at heights
- Electrical commissioning
- Hot works



Other method statements to be advised before and during the construction project.

### **ACTIVITIES REQUIRING PERMITS (FOR HEALTH AND SAFETY PURPOSES)**

**Permit to Dig / Enter Excavations:** n/a  
**Permit to Work with Electricity:** Yes  
**Confined Space Permit:** n/a  
**Hot Works Permit:** Yes  
**Permit to Work under Power Lines:** TBA  
**Blasting:** n/a  
**Temporary Works:** n/a  
**Other:** n/a

### **CONTRACTOR SAFETY OFFICER PROVISION**

Records of safety audits undertaken by the Contractor's Safety Officer must be kept on site in the safety file and nonconformances reported by the Safety Officer to the Contractor's management team. All nonconformances identified by the Safety Officer and client's safety agent must be investigated and corrective action taken by the Contractor to prevent re-occurrence.

Please note that as from 7th August 2018 the safety officer must be professionally registered with the SACPCMP. Proof of registration with the SACPCMP must be provided. If registered as a Candidate proof of mentorship and weekly visits by mentor must be available on site. A part time Safety Officer will be required for site. Monthly Visits required, daily visits are required for 5 days once the MCC change is busy to ensure safety.

### **MEDICAL CERTIFICATE OF FITNESS (ANNEXURE 3)**

The Contractor must ensure that their employees on site have a valid medical certificate of fitness, specific to the construction work being performed, issued by an occupational health practitioner in the form of an Annexure 3 template.

### **MANAGEMENT AND SUPERVISION OF CONSTRUCTION WORK**

A Principal Contractor must, in writing, appoint one full-time competent person as the construction manager with the duty of managing all the construction work on a single site, including the duty of ensuring occupational health and safety compliance, and in the absence of the construction manager an alternate competent person must be appointed by the Principal Contractor. Proof of an all-inclusive assessment by the Principal Contractor of the Construction Manager's Competency in construction management and health and safety competency must be available in the Safety File.

PLEASE NOTE THAT WHERE A PRINCIPAL CONTRACTOR HAS APPOINTED A CONTRACTOR (SUB CONTRACTOR) TO CARRY OUT WORKS THERE MUST STILL BE A CONSTRUCTION MANAGER PROVIDED ON SITE ON A FULL TIME BASIS.

The Construction Manager, Alternate Construction Managers, Assistant Construction Managers, and designated construction supervisor/s must, as a minimum, have training in Legal Liability, Construction Regulation 2014 and the OHS Act and Regulations.

### **TRAFFIC MANAGEMENT AND TRAFFIC SAFETY OFFICER PROVISION**

Not thought to be applicable

### **ENVIRONMENTAL CONDITIONS**

Contractor must take into account adverse weather conditions on site activities and implement control measures to mitigate risk. This includes risk of exposure to excessive heat, cold, rain, lightning and wind.

The open nature of the site works will not preclude any of the above.



Summers could be extreme heat and winters cold, wind, poor visibility, high water table, nearby proximity to veld fires, etc. Contractor to comply with environmental management plan for the project.

### **ARRANGEMENTS FOR ACCESS, PARKING, DELIVERIES, ETC.**

**Access to site by Construction Vehicles:** Existing site is fenced off. Access to site off Steenbok Avenue.

**Access to site by Construction Workers and Visitors:** As above. All service providers must sign a 37.2 Mandatory Agreement and must be inducted before they can be allowed on site.

### **ARRANGEMENTS FOR SITE CAMP, ABLUTIONS AND YARD NOTE THAT PRINCIPAL CONTRACTOR MAY MAKE USE OF EXISTING ABLUTION FACILITIES ON SITE IF REQUIRED.**

#### **Site camp location and set up**

- **Restrictions / requirements:** Storage in designated areas only.
- **Storage areas:** Storage areas are to be fenced off.
- **Security:** Site camp Security provision will be the principal contractors' responsibility

Location of camp and storage areas will be approved by the client. Position and layouts will be approved prior to construction by client and with SWP considerations. Contractor to advise in consultation with Professional Team regarding any additional matters

#### **Ablutions and Welfare Arrangements**

Contractor to supply ablutions and facilities in line with the Construction Regulations 2014, refer to section 2.31 of this health and safety specification regarding the below. Please note that toilets should be provided with built in facilities for hand washing:

- **Toilets:** Contractor to arrange for mobile facilities. May not use the WWTW facilities.
- **Washing facilities:** Contractor to arrange. High level facilities required – Effluent exposure.
- **Drinking Water:** Contractor to arrange potable water supply for site.
- **Shelter:** As per Regulation.
- **Showers:** As per Regulation.

### **PROTECTION OF SITE AGAINST UNAUTHORISED ACCESS BY PUBLIC**

**Excavation Fencing:** n/a

**General Fencing of Site:** Note that construction sites in built up areas adjacent to public way must be fenced off and have controlled access points.

The site is fully secured with fencing and controlled access through electronic gates. This ensures that only authorized personnel can enter, enhancing safety, security, and protection of both the equipment and the operational area.

**Warning Notices:** Construction warning signage must be prominently displayed to avoid unauthorised access to site and to warn of dangers associated with construction works.



## PERSONAL PROTECTIVE EQUIPMENT (PPE)

**The Client requires the Contractor to ensure that employees (and others under his/her control) wear the following minimum PPE:**

**Overalls:** Yes

**Safety Harnesses:** Yes, as per contractor's risk assessment

**Hard Hats:** Yes

**Reflective Vests:** Yes

**Goggles / gloves / ear defenders / respiratory protection:** Yes, as per contractor's risk assessment

**Safety Footwear:** Yes

**Specialist Equipment (eg: for confined Spaces):** TBA, contractor's risk assessment

## HAZARDOUS SUBSTANCES

**The following materials and substances have, or may have, to be used in the works and are identified as potentially posing special health and / or safety hazards during the project. Appropriate measures will need to be specified for their control:**

Diesel, petrol, Cement, Epoxies, etc

### 1.10 INTERFACE AND RESTRICTIONS BY CLIENT

**Contractor must note that the following Client activities will continue during construction:**

Existing WTW will remain open and safe access for municipal workers must be maintained.

**The following Client safety rules and/or requirements are to be observed:**

All workers are to receive client's as well as their own induction prior to commencement of work on site.

Other safety rules and requirements to be advised at induction.

Please also refer to tender document.

**Restrictions on times, access or other restrictions by Client**

Please refer to tender document.

No entrance to site without attending clients induction beforehand.

Other restrictions may be advised at induction.

### 1.11 Project Close Out

The Health and Safety files for the Principal Contractors and all Contractors require closure and handover to the Client at the completion of the project in the form of a consolidated safety file. The following list is an example of what should be included but is not exhaustive. The Safety Agent or the Client may require further information at the time of completion and the Principal Contractor is to ensure that all instructions are responded to. Documentation would include all health and safety related records from the start of the project.

All records to be in hard copy or electronic format and submitted to the Safety Agent for approval in adequately formatted lists and folders. Layout should be logical and in the same order as in the site files.

Consolidated Health and Safety close out file requirements include:

- Health and safety specification (most recent version)
- Principal Contractor's health and safety plan/s
- Site safety organograms
- Legal appointments
- Notification to Department of Labour of commencement of work / Construction Work Permit
- Workman's Compensation Letters of Good Standing for the project



- Full safety files for all Contractors as well as their close out reports
- List of all Contractors who worked on site
- Letters of safety plan approval of Contractors by the Principal Contractor
- Mandatory agreements (section 37.2 agreements)
- Incident and accident records / Occupational Disease records
- Contractor Non-conformance records
- Safety agent's audit reports
- Safety Officer reports
- Method Statements
- Risk assessments
- Safe work procedures
- Medical surveillance certificates of fitness. Medical records are to be kept according to the Occupational Health and Safety Act, as amended.
- All temporary works drawings (suspended beams/scaffolds, etc.)
- Copies of test results, policies, and procedures for environmental monitoring (silica, noise, dusts, etc.)
- Detailed registers of all material used
- Copies of all Checklists completed

### **1.12 SAFETY FILE RETURN TO CLIENT**

The consolidated Health and Safety Files for the Project is to be handed over by the Principal Contractor to the Client upon Project Completion in either hard copy or electronic format.

## **2.0 FURTHER REQUIREMENTS**

### **2.1 Duties of Principal Contractor / Contractor in terms of Construction Regulations 2014**

A Principal Contractor must:

- provide and demonstrate to the Client a suitable, sufficiently documented and coherent site specific health and safety plan, based on the Client's documented health and safety specifications, which plan must be applied from the date of commencement of and for the duration of the construction work and which must be reviewed and updated by the Principal Contractor as work progresses;
- open and keep on site a health and safety file, which must include all documentation required in terms of the Act and these Regulations, which must be made available on request to an inspector, the Client, the Client's Safety Agent, or a Contractor; and
- on appointing any other Contractor, in order to ensure compliance with the provisions of the Act –
- provide Contractors who are tendering to perform construction work for the Principal Contractor, with the relevant sections of the health and safety specifications pertaining to the construction work which has to be performed;
- ensure that potential Contractors submitting tenders have made sufficient provision for health and safety measures during the construction process;
- ensure that no Contractor is appointed to perform construction work unless the Principal Contractor is reasonably satisfied that the Contractor that he or she intends to appoint, has the necessary competencies and resources to perform the construction work safely;
- ensure prior to work commencing on the site that every Contractor is registered and in good standing with the compensation fund or with a licensed compensation insurer as contemplated in the Compensation for Occupational Injuries and Diseases Act, 1993;
- appoint each Contractor in writing for the part of the project on the construction site



- take reasonable steps to ensure that each Contractor's health and safety plan is implemented and maintained on the construction site;
- ensure that the periodic site audits and document verification are conducted at intervals mutually agreed upon between the Principal Contractor and any Contractor, but at least once every 30 days;
- stop any Contractor from executing construction work which is not in accordance with the Client's health and safety specifications and the Principal Contractor's health and safety plan for the site or which poses a threat to the health and safety of persons;
- where changes are brought about to the design and construction, make available sufficient health and safety information and appropriate resources to the Contractor to execute the work safely;
- discuss and negotiate with the Contractor the contents of their health and safety plan and finally approve that plan for implementation;
- ensure that a copy of both the Principal Contractor and Contractor's health and safety plan is available on request to an employee, an inspector, a Contractor, the Client, or the Client's Safety Agent;
- hand over a consolidated health and safety file to the Client upon completion of the construction work, to include a record of all drawings, designs, materials used and other similar information concerning the completed structure;
- in addition to the documentation required in the health and safety file include and make available a comprehensive and updated list of all the Contractors on site accountable to the Principal Contractor, the agreements between the parties and the type of work being done;
- ensure that all his or her employees have a valid medical certificate of fitness specific to the construction work to be performed and issued by an occupational health practitioner in the form of Annexure 3.

A Contractor must prior to performing any construction work-

- provide and demonstrate to the Principal Contractor a suitable and sufficiently documented health and safety plan, based on the relevant sections of the Client's health and safety specification and provided by the Principal Contractor, which plan must be applied from the date of commencement of and for the duration of the construction work and which must be reviewed and updated by the Contractor as work progresses;
- open and keep on site a health and safety file, which must include all documentation required in terms of the Act and these Regulations, and which must be made available on request to an inspector, the Client, the Client's Safety Agent or the Principal Contractor;
- before appointing another Contractor to perform construction work be reasonably satisfied that the Contractor that he or she intends to appoint has the necessary competencies and resources to perform the construction work safely;
- co-operate with the Principal Contractor as far as is necessary to enable each of them to comply with the provisions of the Act;
- as far as is reasonably practicable, promptly provide the Principal Contractor with any information which might affect the health and safety of any person at work carrying out construction work on the site, any person who might be affected by the work of such a person at work, or which might justify a review of the health and safety plan.



Where a Contractor appoints another Contractor to perform construction work, the duties that apply to the Principal Contractor will apply to the Contractor as if he or she were the Principal Contractor.

A Principal Contractor must take reasonable steps to ensure co-operation between all Contractors appointed by the Principal Contractor to enable each of those Contractors to comply with these Regulations.

No Contractor may allow or permit any employee or person to enter any site unless that employee or person has undergone health and safety induction training pertaining to the hazards prevalent on the site at the time of entry.

A Contractor must ensure that all visitors to a construction site undergo health and safety induction pertaining to the hazards prevalent on the site and must ensure that such visitors have the necessary personal protective equipment.

A Contractor must at all times keep on his or her construction site records of the health and safety induction training and such records must be made available on request to an inspector, the Client, the Client's Safety Agent or the Principal Contractor.

## **2.2 Management and Supervision of Construction Work**

A Contractor must ensure that all his or her employees have a valid medical certificate of fitness specific to the construction work to be performed and issued by an occupational health practitioner in the form of Annexure 3 (a template of which can be found in the Construction Regulations, 2014).

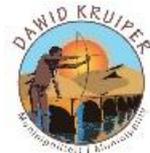
A Principal Contractor must, in writing, appoint one full-time competent person as the construction manager with the duty of managing all the construction work on a single site, including the duty of ensuring occupational health and safety compliance, and in the absence of the construction manager an alternate must be appointed by the Principal Contractor. Proof of all-inclusive assessment of the Construction Manager's Competency in construction management and H & S competency must be available in the Safety File. The Construction Manager must, as a minimum, have a Construction Regulation course. No Contractors may be left unsupervised on site by the Principal Contractor.

A Principal Contractor must upon having considered the size of the project, in writing appoint one or more assistant construction managers for different sections thereof: Provided that the designation of any such person does not relieve the construction manager of any personal accountability for failing in his or her management duties in terms of this regulation.

Where the construction manager has not appointed assistant construction managers, or, in the opinion of an inspector, a sufficient number of such assistant construction managers have not been appointed, that inspector must direct the construction manager in writing to appoint the number of assistant construction managers indicated by the inspector, and those assistant construction managers must be regarded as having been appointed.

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

A Contractor must, after consultation with the Client and having considered the size of the project, the degree of danger likely to be encountered or the accumulation of hazards or risks on the site, appoint a full-time or part-time construction health and safety officer in writing to assist in the control of all health and safety related aspects on the site: Provided that, where



the question arises as to whether a construction health and safety officer is necessary, the decision of an inspector is decisive.

No Contractor may appoint a construction health and safety officer to assist in the control of health and safety related aspects on the site unless he or she is reasonably satisfied that the construction health and safety officer that he or she intends to appoint is registered with a statutory body approved by the Chief Inspector and has necessary competencies and resources to assist the Contractor

A construction manager must in writing appoint construction supervisors responsible for construction activities and ensuring occupational health and safety compliance on the construction site. Proof of all-inclusive assessment of the Construction Supervisor's competency in construction supervision and H&S competency must be available in the Safety File. The Construction Supervisor must, as a minimum, have a supervision course as per Unit Standard 262845 (Civil Engineering), 119080 (Building Construction) and 262884 (Civil Engineering).

A Contractor must, upon having considered the size of the project, in writing appoint one or more competent employees for different sections thereof to assist the construction supervisor, and every such employee has, to the extent clearly defined by the Contractor in the letter of appointment, the same duties as the construction supervisor: Provided that the designation of such employee does not relieve the construction supervisor of any personal accountability for failing in his or her supervisory duties.

Where the Contractor has not appointed such an employee, or, in the opinion of an inspector, a sufficient number of such employees have not been appointed, that inspector must instruct the Employer to appoint the number of employees indicated by the inspector.

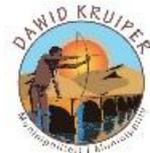
No construction supervisor appointed may supervise any construction work on or in any construction site other than the site in respect of which he or she has been appointed: Provided that if a sufficient number of competent employees have been appropriately designated on all the relevant construction sites, the appointed construction supervisor may supervise more than one site.

### **2.3 Notification of Intention to Commence Construction Work**

The Contractor shall notify the Provincial Director of the Department of Labour of the intention to commence construction work at least 7 days prior to the works commencing if the intended construction work will:

- Include excavation work
- Include work at height where there is a risk of falling
- Include the demolition of a structure, or
- Include the use of explosives to perform construction work.

If the construction work involves construction of a single storey dwelling for a Client, and such Client will be residing in such dwelling upon completion, the contractor must also notify the Provincial Director of the Department of Labour at least 7 days before the works commence. This must be done on a form similar to an Annexure 2 (template of which can be found in the Construction Regulations, 2014). A copy of the notification letter to the Provincial Director shall be forwarded to the Client for record purposes



## **2.4 Construction Work Permit**

Not thought to be applicable

## **2.5 Assignment of Contractor's Responsible Persons to Manage Health and Safety on Site**

The Contractor shall submit management and supervisory appointments as well as any relevant appointments in writing (as stipulated by the Construction Regulations 2014 and the Occupational Safety and Health Act 1993), prior to commencement of work (refer to **Annexure B** at the end of this Health and Safety Specification).

## **2.6 Competency for Contractor's Responsible Persons**

The Contractor's responsible persons shall be competent in health and safety and be familiar with the Occupational Health and Safety Act 1993, and applicable regulations. Valid proof of pertinent health and safety courses attended by such persons will be required to be presented to the Client.

## **2.7 Compensation of Occupational Injuries and Diseases Act 130 of 1993 (COIDA)**

The successful Contractor shall submit to the Client a valid letter of good standing with the Compensation Insurer prior to appointment.

## **2.8 Occupational Health and Safety Policy**

The Contractor shall submit their Health and Safety Policy, prior to construction commencement, signed by the Chief Executive Officer. The Policy must outline objectives and how they will be achieved and implemented within the company operations. The Policy must be communicated to all employees and proof thereof must be available in the Safety File.

## **2.9 Health and Safety Organogram**

The Contractor shall submit an organogram, prior to construction commencement, outlining the Health and Safety Site Team that will be assigned to the project, if successful with the tender. In cases where appointments have not been made, the organogram shall reflect the position. The organogram shall be updated when there is a change in the site team.



## 2.10 Risk Assessments

### Baseline Risk Assessment

The Client shall cause a baseline risk assessment to be conducted by a competent person before the design process and tender process commence, and the assessed risks shall form part of the health and safety specifications.

The Contractor must, before commencement of any construction work, and during construction work, have risk assessments performed by a competent person appointed in writing, which risk assessments form part of the health and safety plan to be applied on the site and must include:

- The identification of the risks and hazards to which persons may be exposed to;
- An analysis and evaluation of the risks and hazards identified; based on a documented method
- A documented plan and applicable safe work procedures to mitigate, reduce or control the risks and hazards that have been identified;
- A monitoring plan; and
- A review plan

The Contractor must ensure that, as far as is reasonably practicable, ergonomic related hazards are analysed, evaluated, and addressed in a risk assessment.

The Contractor must ensure that all employees under his control are informed, instructed and trained by a competent person regarding any hazard and the related work procedures and/or control measures **before any work commences** and thereafter **at the times determined in the risk assessment monitoring and review plan of the relevant site.**

The Principal Contractor must ensure that all Contractors are informed regarding any hazard that is stipulated in the risk assessment **before any work commences** and thereafter **at the times determined in the risk assessment monitoring and review plan of the relevant site.**

The Contractor must consult with the health and safety committee or with a representative trade union or representative group of employees if no health and safety committee exists, on the monitoring and review of the risk assessments for the site.

The Contractor must ensure that copies of risk assessment for this site are available on site for inspection purposes by interested parties (inspector, the Client, Client's Safety Agent, any Contractor, any employee, a representative trade union, a health and safety representative or safety committee member.

A Contractor must review the relevant risk assessment where changes are effected to the design and/or construction that result in a change to the risk profile, or when an incident has occurred.

**Preventative measures must first address the elimination of the hazard or risk. Should PPE be required to reduce risk, the equipment or clothing to be used must be SABS approved.**



In general, the Contractor must ensure that the Risk Assessment involves identifying the hazards present in a work activity on site. This is followed by an evaluation of the extent of the risk involved taking into account those precautions already being taken.

The following general principle should be followed when conducting a risk assessment:

- All relevant risks and/or hazards should be systematically addressed;
- The risk assessment should address what actually happens in the workplace during the work activity;
- All employees and those who may be affected must be considered, including maintenance staff, security guards, visitors, and Contractors;
- The risk assessment should highlight those groups and individuals who may be required to work alone or who have disabilities;
- The risk assessment process should take into account the existing safety measures and controls.
- The level of detail on a risk assessment should be appropriate to the level of risk.

### **2.11 Health and Safety Representative(s)**

The Contractor shall ensure that Health and Safety Representative(s) is/are elected and trained to carry out his / her functions. The Safety Representative(s) must be democratically nominated, elected, and appointed in writing. The Health and Safety Representative(s) shall carry out regular inspections, keep records and report to the supervisor to take appropriate action. The Safety Representative(s) shall attend Health and Safety Committee Meetings. The Health and Safety Representative shall be part of the team that will investigate incidents, accidents, and non-conformances. The Safety Representative(s) must be (a) full time employee(s) who is/are acquainted with conditions and activities at that workplace or section thereof. The Safety Representatives must have Safety Representative training and must be capable of performing their duties.

### **2.12 Health and Safety Committee**

Where two or more health and safety representatives have been appointed on site, the Contractor shall ensure that monthly health and safety meetings are held with such representatives and minutes are kept on record. Meetings must be organized and chaired by the Contractor's Health and Safety Committee Chairperson. Minutes of these meetings must be available for the employees of the Contractor to refer to.

**PLEASE NOTE THAT THE SAFETY AGENT MAY REQUIRE THAT THE PRINCIPAL CONTRACTOR CONVENES A SAFETY COMMITTEE MEETING ON SITE IN THE INTERESTS OF HEALTH AND SAFETY ON SITE. SUCH COMMITTEE MEETING MAY REQUIRE ATTENDANCE OF CONTRACTORS SAFETY OFFICERS/SAFETY REPRESENTATIVES, CONSTRUCTION SUPERVISION AND THE SAFETY AGENT.**

### **2.13 Medical Certificate of Fitness**

The Contractor must ensure that their employees on site have a valid medical certificate of fitness, specific to the construction work being performed, issued by an occupational health practitioner in the form of an Annexure 3 template (refer to the Construction Regulations 2014 on the Department of Labour website for a sample of this form).

Employees required to perform work at heights or from fall risk position must be medically fit to perform such work, such employee's medicals must specify "Fall Risk" or "Working at heights" in the exposure section of the annexure 3 template.



## **2.14 Health and Safety Training**

The Contractor shall quarterly conduct a training needs analysis to ascertain what health and safety training is required. A plan of action should be devised and forwarded to the Client for records. Once the identified people have attended the training, the Contractor must provide the Client with copies of certificates obtained.

### **2.14.1 Induction**

No Contractor may allow or permit any employee or person to enter site unless they have undergone health and safety induction training pertaining to the hazards prevalent on site at the time of entry. This includes visitors to site. The Contractor must ensure that visitors to site have the necessary protective equipment (PPE). A copy of attendance registers of all employees who attend inductions shall be kept.

### **2.14.2 Awareness**

The Contractor shall conduct periodic toolbox talks on site, weekly or before any hazardous work takes place. The talks shall cover the relevant activity and an attendance register must be signed by all attendees. This record of who attended and the content of the topic will be kept on the site health a safety file as evidence of training.

## **2.15 Competency**

After the Contractor has identified the training to be conducted as part of the competency requirement, and based on Risk Assessment, he shall send the relevant persons on appropriate courses and keep certificates of training for reference. Familiarity with the Health and Safety Act and Regulations is an integral part of the definition of competence. All training must be conducted by an accredited training provider and the certificates must display the applicable unit standards and the expiry dates thereof.

## **2.16 General Record Keeping**

The Contractor shall keep and maintain Health and Safety records to demonstrate compliance with the Health and Safety Specification and the Occupational Health and Safety Act. The Contractor shall ensure that all records of incidents, spot fines, training, etc. are kept on site. All documents shall be available for inspection by the Client, or the Department of Labour's Inspectors.

## **2.17 General Inspection, Monitoring and Reporting**

The Contractor shall carry out inspections as required by this Health and Safety Specification, as well as by health and safety legislation.



## 2.18 Emergency Procedures

The Contractor shall submit a detailed Emergency Procedure for approval by the Client prior to commencement on site. The procedure shall detail the response plan including the following:

- List of key personnel;
- Details of emergency services;
- Actions or steps to be taken in the event of the emergency; and
- Information on hazardous materials / situations, including each material's hazardous potential impact or risk on the environment or human and measures to be taken in the event of an accident.

Emergency procedure(s) shall include, but shall not be limited to, fire, spills, accidents to employees, use of hazardous substances, dangers as a result of riot / service delivery protests / intimidation, etc. The Contractor shall advise the Client in writing of any on-site emergencies, together with a record of action taken, within 24 hours of the emergency occurring. A contact list of all service providers (Fire Department, Ambulance, Police, Medical and Hospital, etc.) must be maintained and available to site personnel.

## 2.19 First Aid Box and First Aid Equipment

The Contractor shall provide first aid box/es and appoint, in writing, First Aider(s) for this project in line with the results of the Contractor's risk assessment for the project, this health and safety specification as well as the provisions of the General Safety Regulations. The appointed First Aider(s) are to be sent for accredited first aid training before starting on site. Valid certificates are to be kept on site.

- First Aid box/es must be adequately stocked at all times, accessible and be controlled by a qualified First Aider.
- Perishables to be checked and replaced when expired.
- Stock per content list as per the General Safety Regulations Annexure.
- Signage to be in place.
- To be numbered and sealed with name of first aider on or above the First aid box.
- Dressing logbook to be available in the first aid box.
- If more than 5 employees are present, there must be a first aid box available.
- Register to be checked by a Competent person.



## **2.20 Accident / Incident Reporting and Investigation**

The Contractor shall, in addition to the prescribed requirements of the Occupational Health and Safety Act and General Safety Regulations, investigate, record, and report all Section 24 reportable incidents to the Client within 24 hours of the incident occurring. Incident investigations shall be conducted by the Contractor's appointed Accident Investigator – this Investigator must be a competent person or persons who have sufficient knowledge to carry out an investigation.

In the event of a fatality or a permanent disabling injury the Contractor must submit proof of reporting of incident to Department of Labour as well as proof of preventative measures to the Client. The Client reserves the right to conduct investigations into any

## **2.21 Hazards and Potential Situations**

The Contractor shall immediately notify other Contractors of any hazardous or potentially hazardous situations, which may arise during performance of the activities.

## **2.22 Occupational Health and Safety Signage**

The Contractor shall ascertain and provide adequate on site health and safety signage. This signage shall include, but shall not be limited to, Hard Hat / Helmet Area; Safety Shoes to be worn on site; Dust Masks to be worn in areas where there might be exposure to excessive dust; Ear Plugs / Muffs to be worn where there might be noise exposure over 85 dB; Gloves; Safety Goggles; Safety Harness, Workers in Excavation, traffic management, etc. The Contractor shall be responsible to maintain the quality and replacement of signage. Signage must comply with the requirements of SABS.

## **2.23 Management of Contractors by Principal Contractor**

The Principal Contractor shall ensure that all Contractors under his control are complying with the respective Health and Safety Plans, as well as Health and Safety Legislation.

## **2.24 Stacking of Materials**

In addition to the provisions for the stacking of articles in the General Safety Regulations, 2003, the Contractor must ensure that –

- a competent person is appointed in writing with the duty of supervising all stacking and storage on a construction site;
- adequate storage areas are provided;
- there are demarcated storage areas; and
- storage areas are kept neat and under control.

## **2.25 Housekeeping and General Safeguarding on Construction Sites**

A Contractor must, in addition to compliance with the Environmental Regulations for Workplaces, 1987, promulgated by Government Notice No. R. 2281 of 16 October 1987, ensure that suitable housekeeping is continuously implemented on each construction site, including-

- the proper storage of materials and equipment;
- the removal of scrap, waste and debris at appropriate intervals;
- ensuring that materials required for use, are not placed on the site so as to obstruct means of access to and egress from workplaces and passageways;
- ensuring that materials which are no longer required for use, do not accumulate on and are removed from the site at appropriate intervals;
- ensuring that waste and debris are not disposed of from a high place with a chute, unless the chute complies with the requirements set out in the regulations;
- ensuring that construction sites in built-up areas adjacent to a public way are suitably and sufficiently fenced off and provided with controlled access points to prevent the entry of unauthorized persons; and
- ensuring that a catch platform or net is erected above an entrance or passageway or above a place where persons work or pass under or fencing off the danger area if work is being performed above such entrance, passageway, or place so as to ensure



that all persons are kept safe in the case of danger or possibility of persons being struck by falling objects.

## 2.26 Construction Vehicles and Mobile Plant

A Contractor must ensure that all construction vehicles and mobile plant-

- are of an acceptable design and construction;
- are maintained in a good working order;
- are used in accordance with their design and the intention for which they were designed, having due regard to safety and health;
- are operated by a person who-
- has received appropriate training, is certified competent and in possession of proof of competency and is authorised in writing to operate those construction vehicles and mobile plant;
- has a medical certificate of fitness to operate those construction vehicles and mobile plant, issued by an occupational health practitioner in the form of Annexure 3.
- have safe and suitable means of access and egress;
- are properly organized and controlled in any work situation by providing adequate signalling or other control arrangements to guard against the dangers relating to the movement of vehicles and plant, in order to ensure their continued safe operation;
- are prevented from falling into excavations, water, or any other area lower than the working surface by installing adequate edge protection, which may include guard-rails and crash barriers;
- are fitted with structures designed to protect the operator from falling material or from being crushed should the vehicle or mobile plant overturn;
- are equipped with an acoustic warning device which can be activated by the operator;
- are equipped with an automatic acoustic reversing alarm;
- are equipped with fire extinguishers (2.5 – 4.5 kg); and
- are inspected by the authorised operator or driver on a daily basis using a relevant checklist prior to use and that the findings of such inspection are recorded in a register kept in the construction vehicle or mobile plant.

A Contractor must ensure that-

- no person rides or is required or permitted to ride on a construction vehicle or mobile plant otherwise than in a safe place provided thereon for that purpose;
- every construction site is organized in such a way that, as far as is reasonably practicable, pedestrians and vehicles can move safely and without risks to health;
- the traffic routes are suitable for the persons, construction vehicles or mobile plant using them, are sufficient in number, in suitable positions and of sufficient size;
- every traffic route is, where necessary, indicated by suitable signs;
- all construction vehicles and mobile plant left unattended at night, adjacent to a public road in normal use or adjacent to construction areas where work is in progress, have appropriate lights or reflectors, or barricades equipped with appropriate lights or reflectors, in order to identify the location of the vehicles or plant;
- all construction vehicles or mobile plant when not in use, have buckets, booms, or similar appendages, fully lowered, or blocked, controls in a neutral position, motors stopped, wheels chocked, brakes set, and ignition secured;
- whenever visibility conditions warrant additional lighting, all mobile plant are equipped with at least two headlights and two taillights when in operation;
- tools, material, and equipment are secured and separated by means of a physical barrier in order to prevent movement when transported in the same compartment with employees;
- vehicles used to transport employees have seats firmly secured and adequate for the number of employees to be carried; and



- all construction vehicles or mobile plant travelling, working, or operating on public roads comply with the requirements of the National Road Traffic Act, 1996.
- all plant and vehicles are to be fitted with amber rotating beacons and reverse alarms.
- ALL construction site vehicles must be inspected daily especially if it has dangerous "items" (fuel, explosives, etc.) on vehicle, completed inspection registers must also be available for inspection.
- the vehicles must resemble the original manufacturer's product. Levers, alarms, and amber lights to be fitted to construction vehicle for notification of vehicle.
- fire extinguishers, signage, and licence disc to be correctly mounted and displayed.
- when the vehicle is stationary no key to be left in or on vehicle or plant.
- Drip tray must be present when stationary.

### **2.27 Electrical Installations and Machinery on Construction Sites**

A Contractor must, in addition to compliance with the Electrical Installation Regulations and the Electrical Machinery Regulations, ensure that –

- before construction commences and during the progress thereof, adequate steps are taken to ascertain the presence of and guard against danger to workers from any electrical cable or apparatus which is under, over or on the site;
- all parts of electrical installations and machinery are of adequate strength to withstand the working conditions on construction sites;
- the control of all temporary electrical installations on the construction site is designated to a competent person who has been appointed in writing for that purpose;
- all temporary electrical installations used by the Contractor are inspected at least once a week by a competent person and the inspection findings are recorded in a register kept on the construction site; and
- all electrical machinery is inspected by the authorized operator or user on a daily basis using a relevant checklist prior to use and the inspection findings are recorded in a register kept on the construction site.

### **2.28 Use and Temporary Storage of Flammable Liquids on Construction Sites**

A Contractor must, in addition to compliance with the provisions for the use and storage of flammable liquids in the General Safety Regulations, 2003, ensure that –

- where flammable liquids are being used, applied, or stored at the workplace concerned, it is done in a manner that does not cause a fire or explosion hazard, and that the workplace is effectively ventilated;
- no person smokes in any place in which flammable liquid is used or stored, and the Contractor must affix a suitable and conspicuous notice at all entrances to any such areas prohibiting such
- smoking;
- an adequate amount of efficient fire-fighting equipment is installed in suitable locations around the flammable liquids store with the recognized symbolic signs;
- only the quantity of flammable liquid needed for work on one day is taken out of the store for use;
- all containers holding flammable liquids are kept tightly closed when not in actual use and, after their contents have been used up, are removed from the construction site and safely disposed of;
- where flammable liquids are decanted, the metal containers are bonded and earthed; and
- no flammable material, including cotton waste, paper, cleaning rags or similar material is stored together with flammable liquids
- proper containers are to be used for fuel. Marked and labelled as per the content.
- diesel on site; more than 800 litres must have a certificate, fire safe certificate. Locked in a ventilated, secure area with a drip tray and have a designated, responsible person to use it.



## 2.29 Water environments

Not thought to be applicable to this project.

## 2.30 Fire precautions on Construction Sites

A Contractor must, in addition to compliance with the Environmental Regulations for Workplaces, 1987, ensure that –

- all appropriate measures are taken to avoid the risk of fire;
- sufficient and suitable storage is provided for flammable liquids, solids, and gases;
- smoking is prohibited and notices in this regard are prominently displayed in all places containing readily combustible or flammable materials;
- in confined spaces and other places in which flammable gases, vapours or dust can cause danger-
- only suitably protected electrical installations and equipment, including portable lights, are used;
- there are no flames or similar means of ignition;
- there are conspicuous notices prohibiting smoking;
- oily rags, waste, and other substances liable to ignite are without delay removed to a safe place; and
- adequate ventilation is provided;
- combustible materials do not accumulate on the construction site;
- welding, flame cutting, and other hot work are done only after appropriate precautions have been taken to reduce the risk of fire;
- suitable and sufficient fire-extinguishing equipment is placed at strategic locations or as may be recommended by the Fire Chief or local authority concerned, and that such equipment is maintained in a good working order;
- the fire equipment contemplated above is inspected by a competent person, who has been appointed in writing for that purpose, in the manner indicated by the manufacturer thereof;
- a sufficient number of workers are trained in the use of fire-extinguishing equipment;
- where appropriate, suitable visual signs are provided to clearly indicate the escape routes in the case of a fire;
- the means of escape is kept clear at all times;
- there is an effective evacuation plan providing for all -
- persons to be evacuated speedily without panic;
- persons to be accounted for; and
- plant and processes to be shut down; and
- a siren is installed and sounded in the event of a fire.

## 2.31 Construction Employees' Facilities

A Contractor must, in terms of the Construction Regulations 2014, provide:

- Shower facilities after consultation with the employees or employees' representatives, or at least one shower facility for every 15 persons;
- at least one sanitary facility for each sex and for every 30 workers;
- Toilets to be within walking distance
- Hygiene registers to be completed
- Proof of safe disposal of effluent waste disposal certificates to be obtained
- changing facilities for each sex;
- sheltered/shaded eating area.
- Protection from the Elements and raised off the ground.
- Sufficient clean water for all employees. 500ml to each employee every hour.

A Contractor must provide reasonable and suitable living accommodation for the workers at construction sites who are far removed from their homes and where adequate transportation between the site and their homes, or other suitable living accommodation, is not available.



### **2.32 Fall protection**

A Contractor must provide reasonable and suitable living accommodation for the workers at construction sites who are far removed from their homes and where adequate transportation between the site and their homes, or other suitable living accommodation, is not available.

The Contractor must:

- designate a competent person to be responsible for the preparation of a fall protection plan
- ensure that the fall protection plan contemplated above is implemented, amended where and when necessary and maintained as required; and
- take steps to ensure continued adherence to the fall protection plan.

A fall protection plan contemplated above must include-

- a risk assessment of all work carried out from a fall risk position and the procedures and methods used to address all the risks identified per location;
- the processes for the evaluation of the employees' medical fitness necessary to work at a fall risk position and the records thereof;
- a programme for the training of employees working from a fall risk position and the records thereof;
- the procedure addressing the inspection, testing, and maintenance of all fall protection equipment; and
- a rescue plan detailing the necessary procedure, personnel and suitable equipment required to affect a rescue of a person in the event of a fall incident to ensure that the rescue procedure is implemented immediately following the incident.

A contractor must ensure that a construction manager appointed under regulation 8(1) is in possession of the most recently updated version of the fall protection plan.

A contractor must ensure that all unprotected openings in floors, edges, slabs, hatchways, and stairways are adequately guarded, fenced, or barricaded or that similar means are used to safeguard any person from falling through such openings;

Also that no person is required to work in a fall risk position, unless such work is performed safely as contemplated in above and fall prevention and fall arrest equipment are approved as suitable and of sufficient strength for the purpose for which they are being used, having regard to the work being carried out and the load, including any person, they are intended to bear; and securely attached to a structure or plant, and the structure of plant and the means of attachment thereto are suitable and of sufficient strength and stability for the purpose of safely supporting the equipment and person who could fall, and fall arrest equipment is used only where it is not reasonably practicable to use fall prevention equipment.

### **2.33 Temporary works**

Not thought to be applicable to this project.

### **2.34 Excavation**

Not thought to be applicable to this project.

### **2.35 Demolition Work**

Not thought to be applicable to this project.

### **2.36 Tunnelling**

Not thought to be applicable to this project.



### 2.37 Scaffolding

A contractor must appoint a competent person in writing to ensure that all scaffolding work operations are carried out under their direct supervision. This appointed person must verify that all scaffold erectors, team leaders, and inspectors are competent to carry out their work in accordance with the SANS 10085-1:2024 standard. The competency of these individuals must be validated through recognised training and certification programs.

A contractor using access scaffolding must ensure that the scaffolding, when in use, complies with the safety standards as specified in the SANS 10085-1:2024 and relevant regulations under section 44 of the Occupational Health and Safety Act. The following specific requirements must be adhered to:

- **Level and Balanced Footing:**

Scaffolding must be level and balanced on the correct footing, including the use of base jacks, U-jacks, or mobile wheels, as specified in SANS 10085-1:2024. Regular inspections must confirm that the scaffold remains level and stable, with all footings securely in place and adjusted as necessary.

- **Ledgers and Bracing:**

Scaffolding frames and standards must be secured using appropriate ledgers and bracing methods. These must be installed in accordance with the design specifications and the guidelines in SANS 10085-1:2024 to ensure full stabilisation against lateral forces.

- **Platform Boarding and Edge Protection:**

All working platforms must be fully boarded and equipped with the correct edge protection, including guardrails and toe boards, as required by SANS 10085-1:2024. Platforms should be securely fastened, ensuring no gaps that could pose a fall hazard.

- **Platform Load Capacity:**

Working platforms must adhere to the load classifications specified in Table 6 of SANS 10085-1:2024. Contractors must ensure that no platform is overloaded beyond its designated capacity, and that load distribution is even across the scaffold structure.

- **Access Points:**

The scaffold must include proper access points, such as ladders or stairways, integrated within the scaffold structure. These access points must comply with SANS 10085-1:2024 requirements. While trap doors are optional, safe access to working platforms must be ensured.

- **Securing the Scaffold:**

Scaffolding must be secured using appropriate fastening methods, such as reveal ties and fixed ties, in accordance with SANS 10085-1:2024. Where necessary, buttresses must be employed to ensure stability, particularly in high-wind areas or when the scaffold height exceeds the limits specified by the standard.

- **Signage:**

Clearly visible signage must be displayed on the scaffold to indicate safe load limits, user restrictions, and other critical safety information as required by SANS 10085-1:2024. The signage should reflect the scaffold's current safety status following each inspection or modification.

Please note that there must be evidence of frequent scaffold inspections based on the risk profile of this project (at least once a week).

Please be advised that **generic interlocking (H-frame) scaffolds are not permitted** on site.



**Construction Regulation Requirement** Regulation 8 of the Construction Regulations 2014 states that all scaffolding must **comply with SANS 10085**

#### **Scope of SANS 10085-1:2024**

Clause 1.3 of SANS 10085-1:2024 **explicitly excludes “frame scaffolds”** (including interlocking, walk-through and part walk-through frames) from its prescriptive requirements.

#### **No alternative South African standard exists.**

There is currently no separate South African standard that normatively covers generic H-frame scaffolds. As the Construction Regulations tie scaffold design to SANS 10085, and SANS 10085 excludes frame scaffolds, we **cannot allow** H-frame scaffolding in any form on this site.

Use only scaffold types covered by SANS 10085-1:2024—namely, steel tube-and-fitting scaffolds or type-tested system scaffolds with the appropriate Certificates of System Design. Any deviation must be designed and approved as a “special scaffold” in full accordance with Clauses 4.2–4.4 of SANS 10085-1 by a competent person.

#### **2.38 Bulk mixing plant**

Not thought to be applicable to this project.

#### **2.39 Rope Access Work**

Not thought to be applicable to this project.

#### **2.40 Hazardous Chemical Substances (HCS)**

In addition to the requirements in the HCS Regulations, the Principal Contractor must provide proof in the Health and Safety Plan that:

- Material Safety Data Sheets (MSDS’s) of the relevant materials / hazardous chemical substances are available prior to use by the Contractor. All MSDS’s shall be available for inspection by the agent at all times.
- Risk assessments are done at least once every 6 months.
- Exposure monitoring is done according to OESSM and by an Approved Inspection Authority (AIA) and that the medical surveillance programme is based on the outcomes of the exposure monitoring.
- How the relevant HCS’s are being/going to be controlled by referring to:
  - Limiting the amount of HCS
  - Limiting the number of employees
  - Limiting the period of exposure
  - Substituting the HCS
  - Using engineering controls
  - Using appropriate written work procedures
  - The correct PPE is being used.
  - HCS are stored and transported according to SABS 072 and 0228.
  - Training with regards to these regulations was given.

The Health and Safety plan should make reference to the disposal of hazardous waste on classified sites and the location thereof (where applicable).

The First Aider must be made aware of the MSDS and trained in how to treat HCS incidents appropriately.



#### **2.41 Noise Induced Hearing Loss**

Where noise is identified as a hazard the requirements of the NIHL regulations must be complied with and the following must be included / referred to in the Health and Safety Plan:

- Proof of training with regards to these regulations.
- Risk assessment done within 1 month of commencement of work.
- That monitoring carried out by an AIA and done according to SABS 083.
- Medical surveillance programme established and maintained for the necessary employees.
- Control of noise by referring to:
  - Engineering methods considered
  - Admin control (number of employees exposed) considered
  - Personal protective equipment considered/decided on
- Describe how records are going to be kept for 40 years.

#### **2.42 Explosives and Blasting**

Not thought to be applicable to this project.

#### **2.43 Personal Protective Equipment (PPE)**

The Contractor shall carry out PPE or clothing needs analysis in accordance with his risk assessment, to determine the necessary PPE or clothing to be used during construction. The Contractor shall make provision to keep adequate quantities of appropriate, SABS approved PPE or clothing on site at all times.

The Contractor must ensure that personnel are trained in the correct use of PPE to be used. The Contractor must ensure that lost, stolen, worn out or damaged PPE is replaced as required and receipt signed for by employees on site.

#### **2.44 Asbestos**

Not thought to be applicable to this project.

#### **2.45 Pressure Vessels (Including Gas Bottles)**

The Contractor shall comply with Pressure Vessel Regulations, including:

- Providing competency and awareness training to the operators;
- Providing PPE or clothing;
- Providing and maintain appropriate signage in areas where pressure vessels are used, as applicable;
- Inspect equipment regularly and keep records of inspections;
- Providing appropriate firefighting equipment (Fire Extinguishers).
- Under pressure vessels to have the following in place;
  - Service date
  - Seals on valves with no leaks and not broken
  - flash arrestors
  - Should be stored and chained together
  - Oxygen / Acetylene bottles to have clips
  - Signage to be visible
  - Gauges in working condition and be visible
  - Permits for use
- Pressure equip Regs 6. (1) The user shall ensure that the pressure equipment is operated and maintained within its design and operating parameters.



## 2.46 Fire Extinguishers and Fire Fighting Equipment

The Contractor shall provide adequate, regularly serviced fire extinguishers located at strategic points on site. The Contractor shall keep spare serviced portable fire extinguishers. The Contractor shall have adequate persons trained or competent to use the Fire Fighting Equipment.

Safety signage shall be posted up in all areas where fire extinguishers are located.

## 2.47 Lifting Machinery and Tackle

The Contractor shall ensure that lifting machinery and tackle is inspected before use and on a monthly basis. The Contractor shall have lifting machinery and tackle inspector who will inspect the equipment at intervals required by the Driven Machinery Regulations, taking into account that:

- All lifting machinery and tackle have a safe working load clearly indicated
- Regular inspection and servicing is carried out
- Records are kept of inspections and of service certificates
- Thorough examinations are carried out by competent personnel at the frequencies required by legislation
- There is proper supervision in terms of guiding the loads which includes a trained banks man to direct and check lifting tackle if it is safe for use
- Forklift to be inspected every year and lift plan every 2 years
- Load test certificate to be no older than 6 months
- Sufficient props to be used and max weight to be displayed
- Slings to be checked with regard to integrity, chains, serial numbers, checked for tears, cuts links and all other materials
- Hooks to be oiled, not in a fixed position and closed to prevent materials from slipping/falling off
- Lifting equipment must be used for the scope of work carried out

## 2.48 Ladders and Ladder work

The Contractor shall ensure that all ladders are numbered and inspected regularly keeping record of inspections. It should be noted that Aluminium ladders are preferred to wooden ladders.

## 2.49 General Machinery

The Contractor shall comply with the Driven Machinery Regulations, which include inspecting machinery regularly, appointing a competent person to inspect and ensure maintenance, issuing PPE or clothing and training those that use machinery and enforce compliance.

## 2.50 Portable Electrical Tools

The Contractor shall ensure that use and storage of all explosive actuating fastening devices and portable electrical tools are in compliance with relevant legislation.

The Contractor shall consider that:

- A competent person undertakes routine inspections;
- Only authorised persons use the tools;
- There are safe working procedures applied;
- Awareness training is carried out and compliance is enforced at all times; and
- PPE and clothing is provided and maintained.

## 2.51 High Voltage Electrical Equipment

The Contractor shall ensure that, where the work is under, on or near high-voltage electrical equipment the Electrical Installation Regulations, together with safety instructions (Regulations of the Owner of the Equipment) are complied with. Such equipment includes:



- Eskom and the Local Authority equipment
- The Contractor's own power supply; and
- Electrical equipment being installed but not yet taken over from a Contractor by The Client.

### **2.52 Public Health and Safety**

The Contractor shall ensure that each person working on or visiting a site, and the surrounding community, shall be made aware of the dangers likely to arise from onsite activities and the precautions to be observed to avoid or minimize those dangers. Appropriate health and safety signage shall be posted at all times.

### **2.53 Night Work**

The Contractor shall not undertake any night work without prior arrangement and a written permit from the Client. The Contractor shall ensure that adequate lighting is provided for all night work and failure to do so shall result in work being stopped.

### **2.54 Environmental Conditions and Flora and Fauna**

The Contractor must be mindful of adverse weather conditions upon the health and safety of the workforce. This includes inclement weather, strong wind, heat stress, extreme cold, etc. The Contractor's risk assessment process must take into account the risks associated with such weather conditions. The same is true when working in an environment where there is a risk to employees' health and safety from presence of poisonous flora, or wildlife (including bees, snakes, etc). The Contractor's risk assessment process must take these risks into account.

### **2.55 Occupational Health**

Exposure of workers to occupational health hazards and risks are quite common in any work environment, especially in construction. Occupational health hazards and risks exposure is a major problem and all Contractors are to ensure that proper health and hygiene measures are put in place to prevent exposure to these hazards and risks.

The occupational hazards and risks may enter the body in three ways:

- Inhalation through breathing e.g. cement dust;
- Ingestion through swallowing maybe through food intake;
- Absorption through the skin (pores) e.g. painting or use of thinners.

The Contractor is required to ensure that all his personnel are medically fit prior to being allowed onto the work site.

All Contractors should ensure that Occupational Hygiene surveys are conducted as per the Occupational Health and Safety Act to ensure employees are not exposed to hazards. Risk Assessments should identify areas where surveys are to be conducted.

### **2.56 Suspended Platforms**

Not thought to be applicable to this project.

### **2.57 Material Hoists**

Not thought to be applicable to this project.

### **2.58 Explosive Actuated Fastening Device**

No contractor may use or permit any person to use an explosive actuated fastening device, unless-

- the user is provided with and uses suitable protective equipment;
- the user is trained in the operation, maintenance and use of such a device
- the explosive actuated fastening device is provided with a protective guard around the muzzle end, which effectively confines any flying fragments or particles; and



- the firing mechanism is so designed that the explosive actuated fastening device, will not function unless-
- it is held against the surface with a force of at least twice its weight; and
- the angle of inclination of the barrel to the work surface is not more than 15 degrees from a right angle.

A contractor must ensure that-

- only cartridges suited for the relevant explosive actuated fastening device, and the work to be performed, are used;
- an explosive actuated fastening device is cleaned and examined daily before use and as often as may be necessary for its safe operation by a competent person who has been appointed for that purpose;
- the safety devices of an explosive actuated fastening device are in good working order prior to use;
- when not in use, an explosive actuated fastening device and its cartridges are locked up in a safe place, which is inaccessible to unauthorized persons;
- an explosive actuated fastening device is not stored in a loaded condition;
- a warning notice is displayed in a conspicuous manner in the immediate vicinity wherever an explosive actuated fastening device is used; and
- the issuing and collection of cartridges and nails or studs of an explosive actuated fastening device are-
  - controlled and done in writing by a person having been appointed in writing for that purpose; and
  - recorded in a register by a competent person and that the recipient has accordingly signed for the receipt thereof as well as the returning of any spent and unspent cartridges.

### **2.59 Confined Spaces**

Not thought to be applicable to this project.

### **2.60 Alcohol and drugs (GSR 2)**

A Contractor shall not permit any person who is or who appears to be under the influence of intoxicating liquor or drugs, to enter or remain at a site.

No employee shall be under the influence of or have in his or her possession or partake of or offer any other person intoxicating liquor or drugs.

An Employer or a user, as the case may be, shall, in the case where a person is taking medicines, only allow such person to perform duties at the site if the side effects of such medicine do not constitute a threat to the health or safety of the person concerned or other persons at such site.

### **2.61 General Practices when Working at Heights**

- No Homemade structures or ladders will be permitted on the project.
- Trestle tables are not to be fully extended and must be fully boarded, no drums to be used.
- Surroundings to be clear of rubble.
- Fall protection, fall prevention, and fall rescue plans to be in place and communicated to site employees.
- Ladders to be structurally sound and not broken and in accordance with GSR 13A.
- Only competent persons may be allowed to work at heights
- Correct personal protective equipment to be used (safety harness and lanyard) and edge protection / lifelines to be used, all as applicable.



- GSR (6) 6. No employer shall require or permit any person to work in an elevated position and no person shall work in an elevated position, unless such work is performed safely from
- Construction regulation 10 of 2014 to be implemented when working at heights and to prevent any person from falling from heights.
- Employees required to perform work at heights or from fall risk position must be medically fit to perform such work, such employee's medicals must specify "Fall Risk" or "Working at heights" in the exposure section of the annexure 3 template.

### **Working at Height Training Requirements**

All employees who are required to work at height shall:

- Be trained in accordance with Regulation 10(2)(d) and 10(2)(e) of the Construction Regulations, 2014 under the Occupational Health and Safety Act (Act 85 of 1993). Receive instruction on the safe use of fall protection systems, procedures to be followed while working at height, and relevant emergency/rescue plans. Undergo this training prior to performing any work at height and thereafter at intervals not exceeding two years, or more frequently where work processes or risks change.
- **Competency of Training Provider** Training must be conducted by a competent person, as defined by the OHS Act, who possesses: The necessary knowledge, experience, and qualifications in fall protection; and Recognition from a suitable industry body or authority, such as an accredited SETA, or a QCTO-approved provider.
- **Records and Verification** Contractors shall maintain documented proof of training for each employee working at height. These records must be available on request for inspection by the client or designated safety officer.

### **2.62 Traffic Accommodation**

Not thought to be applicable to this project.

### **2.63 Ventilation and Lighting in the Work Place**

Every Employer shall cause every workplace in his undertaking to be lighted in accordance with the illuminance values specified in the Schedule to the General Safety Regulations:

Provided that where specialised lighting is necessary for the performance of any particular type of work, irrespective of whether that type of work is listed in the Schedule or not, the Employer of those employees who perform such work shall ensure that such specialised lighting is available to and is used by such employees.

The Contractor must ensure that:

- the average illuminance at any floor level in a workplace within five meters of a task is not less than one fifth of the average illuminance on that task;
- glare in any workplace is reduced to a level that does not impair vision;
- lighting on rotating machinery in such that the hazard of stroboscopic effects is eliminated; and
- luminaires and lamps are kept clean and, when defective, are replaced or repaired forthwith.

With a view to the emergency evacuation of indoor workplaces without natural lighting or in which persons habitually work at night, every Employer shall, in such workplaces, provide emergency sources of lighting which are such that, when activated, an illuminance of not less than 0.3 lux is obtained at floor level to enable employees to evacuate such workplaces: Provided that where it is necessary to stop machinery or shut down plant or processes before



evacuating the workplace, or where dangerous materials are present or dangerous processes are carried out, the illuminance shall be not less than 20 lux.

The Contractor must ensure that the emergency sources of lighting prescribed above:

- are capable of being activated within 15 seconds of the failure of the lighting prescribed by subregulation (1);
- will last long enough to ensure the safe evacuation of all indoor workplaces;
- are kept in good working order and tested for efficient operation at intervals of not more than three months; and
- where directional luminaires are installed, these are mounted at a height of not less than two meters above floor level and are not aimed between 10° above and 45° below the horizontal line on which they are installed.

The Contractor must ensure that all rooms, stairways, passageways, gangways, basements, and other places where danger may exist through lack of natural light, to be lighted such that it will be safe.

The Contractor must ensure that every workplace in his undertaking is ventilated either by natural or mechanical means in such a way that –

- the air breathed by employees does not endanger their safety;
- the time-weighted average concentration of carbon dioxide therein, taken over an eight-hour period, does not exceed one half per cent by volume of air;
- the carbon dioxide content thereof does not at any time exceed three per cent by volume of air;
- the prescribed exposure limits for airborne substances therein are not exceeded; and
- the concentration therein of any explosive or flammable gas, vapour or dust does not exceed the lower explosive limit of that gas, vapour, or dust.

#### **2.64 Nuclear Density Gauge (Troxler)**

Not thought to be applicable to this project.

#### **2.65 Ergonomics Regulation of 2019**

"competent person" in relation to ergonomics, means a person who– (a) has in respect of the work or task to be performed the required knowledge, training and experience in ergonomics and, where applicable, qualifications specific to ergonomics: provided that where appropriate qualifications and training are registered in terms of the provisions of the National Qualifications Framework Act, 2008 (Act No. 67 of 2008), those qualifications and that training must be regarded as the required qualifications and training; and (b) is familiar with the Act and the applicable regulations made under the Act;

"ergonomic risk" means a characteristic or action in the workplace, workplace conditions, or a combination thereof that may impair overall system performance and human well-being;

"ergonomic risk assessment" means a programme, process, or investigation to identify, analyse, value and prioritise any risk from exposure to ergonomic risks associated with the workplace;

"ergonomics" means the scientific discipline concerned with the fundamental understanding of interactions among humans and other elements of a system, and the profession that applies theory, principles, data and methods to design in order to optimise human well-being and overall system performance;

The ergonomics regulations will apply to any Employer or self-employed person who carries out work at the workplace who may expose any person to an ergonomic risk in the work place and any designer, manufacturer, importer or supplier of machinery, plant, or work systems for the work place.



An Employer must, before the commencement of any work that may expose employees to ergonomic risks, have an ergonomic risk assessment performed by a competent person.

The ergonomic risk assessment must be done at intervals not exceeding two years and must include the following;

- a complete hazard identification and all persons who may be affected by the ergonomic risk.
- how employees may be affected by the ergonomic risks;
- the analysis and evaluation of the ergonomic risks;
- the prioritisation of ergonomic risks.

An Employer must review the relevant ergonomic risk assessment if:

- such assessment is no longer valid;
- control measures are no longer effective;
- technological or scientific advances allow for more effective control methods;
- there has been a change in –
- the work methods;
- the type of work carried out; or
- the type of equipment used to control the exposure; and
- an incident occurs or medical surveillance reveals an adverse health effect, where ergonomic risks are identified as a contributing factor.

An Employer must ensure that an employee is placed under medical surveillance, which is overseen by an occupational medicine practitioner, if–

- the ergonomic risk assessment referred to in regulation 6 indicates the need for the employee to be placed under medical surveillance; or
- an occupational health practitioner recommends that relevant employees must be under Medical surveillance, in which case the Employer may call upon an occupational medicine practitioner to ratify the appropriateness of such recommendation.

An Employer must ensure that the medical surveillance consists of–

- in the case of a new employee, an initial health examination before the employee commences employment or within 30 days of commencement of such employment;
- a periodic health examination informed by the ergonomic risk assessment, at intervals specified by an occupational medicine practitioner, but not exceeding two years; and
- an exit health examination informed by the ergonomic risk assessment.



Both the Client and the Contractor have a duty in terms of health and safety legislation to do all that is reasonably practicable to make members of the public and others being affected by the construction processes aware of possible risks and put preventative measures in place to mitigate the risks. The public and/or visitors shall go through a brief health and safety induction detailing hazards and risks they may be exposed to and what measures are in place to control these hazards and risks.



## OTHER HEALTH AND SAFETY SPECIFICATION REQUIREMENTS

The Contractor must be aware of the following additional requirements:

What	When	Output
Awareness training (Toolbox Talks)	At least weekly and before hazardous work is carried out	Attendance Register
Health and Safety Committee Meetings	Monthly	Minutes signed by the Employer (Contractor) covering: <ul style="list-style-type: none"> <li>•Health and Safety Representative Checklist</li> <li>•Safety report from Safety Officer and Safety Agent</li> </ul>
Health and Safety Reports	Monthly	Report covering: <ul style="list-style-type: none"> <li>•Incidents/Accidents and Investigations</li> <li>•Non-conformance</li> <li>•Health and Safety Training</li> <li>•HIRA Updates</li> <li>•Internal and External Audits</li> </ul>
General Inspections	As per Health and Safety Specification and OHSa	Report on Health and Safety Specification and OHSa compliance: <ul style="list-style-type: none"> <li>•Scaffolding</li> <li>•Lifting Machinery</li> <li>•Excavation</li> </ul>
General Inspections	Monthly	Covering: <ul style="list-style-type: none"> <li>•Firefighting Equipment</li> <li>•Portable Electrical Equipment</li> <li>•Ladders</li> </ul>
Record keeping	Ongoing	Covering: <ul style="list-style-type: none"> <li>•General complaints</li> <li>•Fines</li> <li>•General incidents</li> <li>•MSDS</li> <li>•Surveillance Medicals</li> <li>•Inspection Register</li> <li>•Dept of Labour Notices</li> </ul>
Permits	Before commencement with certain activities	As stipulated by the Health and Safety Specification and the OHSa / Construction Regulations

Key:

OHSa – Occupational Health and Safety Act, 1993



## ANNEXURE A – REQUIREMENTS FOR THE SAFETY PLAN ASSESSMENT

The Contractor must note that the information below is pertinent to the compilation of their safety plan response to this site-specific safety specification and it would be preferred if the Safety Plan is written in the order of the assessment documented below.

No	Item	Notes
1	<b>Project Directory</b>	Please state details of Project Client, Project Manager/Principal Agent, Safety Agent, Consulting Engineer, etc. (Name, address, contact details).
2	<b>Contractors Directory</b>	Please indicate if you will be using Contractors on this project, if yes, include their details, trade, and FEM details.
3	<b>Other Parties Directory</b>	Please indicate contact details for any services applicable (electricity, water, etc.) as well as Department of Labour and Emergency Services.
4	<b>Project Safety Statement</b>	The Project Safety Statement must be included in the Safety Plan.
5	<b>Health and Safety standards for the project (OHS Act, construction regulations, basic conditions of employment, etc.)</b>	Health and Safety standards must be included in the Safety Plan.
6	<b>Project Particulars</b>	Scope of works must be included in the Safety Plan. This is critical.
7	<b>Existing environment – Structures and Surroundings, Services (Electrical, Water, Sewerage, etc.), Traffic Arrangements, Parking, Access to Site, Storage of Plant and Materials</b>	Please include these items in the plan. The items must be Site Specific, the location of services and services that will be affected must be mentioned.
8	<b>Management Structure for safety on the Project</b>	A structured organogram with names of the responsible people must be included.
9	<b>Appointed Persons, Supervision</b>	The required appointments must be identified. A list of the appointed persons must be included in the Safety Plan.
10	<b>Security Procedures</b>	Please indicate if a security company will be appointed and include the contact information in the Safety Plan.
11	<b>Registers list and inspection frequency</b>	A list of the Inspection Registers that will be on file must be included in the Safety Plan.
12	<b>Design Co-ordination</b>	Please indicate your procedure for implementation of design changes by designer on the project, and the procedures for liaison and implementation of temporary works design on the project.
13	<b>Contractor Co-ordination</b>	Mention must be made of how Contractors will be co-ordinated on site to ensure that they work together and not adversely affected health and safety.



No	Item	Notes
14	<b>Housekeeping, stacking and storage</b>	Housekeeping policies and procedures must be included in the Safety Plan.
15	<b>Waste Disposal Arrangements</b>	Waste disposal arrangements procedures must be included in the Safety Plan.
16	<b>Noise and dust control</b>	Please indicate if any noisy operations (more than 85 decibels) will be carried out and what measures will be used to reduce noise exposure to workforce.
17	<b>Training Requirements</b>	Training requirements must be identified and recorded.
18	<b>Plant and Equipment</b>	A list of plant and equipment to be used on site must be included in the Safety Plan.
19	<b>Safety Monitoring Arrangements</b>	The name, contact details and SACPCMP registration status of the Safety Officer must be included in the Safety Plan. State how often the Safety officer will be on site (note safety specification requirement in section 1.7).
20	<b>Information for Contractors</b>	State how information will be given to Contractors on site.
21	<b>Consultation/communication arrangements with Employees</b>	State how information will be given to employees e.g. notice board.
22	<b>Selection of Contractors Procedures</b>	Principal Contractor must state what health and safety procedures they will use to assess the competence and resources of their Contractors on site.
23	<b>Activities with risk to Health and Safety (Risk Assessment)</b>	A Baseline Risk Assessment must be included in the Safety Plan, it must address the Risks identified in the Safety Specification as well as the risk of any other hazards that the Principal Contractor is aware of that are relevant to the site.
24	<b>Hazardous Substances</b>	Must be listed in the Safety Plan and addressed in the Risk Assessment.
25	<b>First Aid and Medical Procedures</b>	Please indicate name of first aider, position of first aid box, location of nearest medical facility and emergency numbers.
26	<b>Fire and Emergency Procedures</b>	List of emergency telephone numbers must be drawn up and included in the Safety Plan. The position of Fire Extinguishers, Assembly Point location, fire drill frequencies, numbers of fire marshals, etc.
27	<b>Accident and Incident Reporting and investigation</b>	State the Accident and Incident Reporting and investigation procedures of your company.
28	<b>Welfare and Site Facilities</b>	Elaborate on toilets and eating areas, water provision, ablution provision, how will workers be protected during wet weather conditions etc.
29	<b>Site Rules</b>	The Site Rules must be included in the Safety Plan.
30	<b>Personal Protective Equipment</b>	The necessity must be identified by Risk Assessments, the required PPE for site risks and control measures.
31	<b>Health &amp; Safety File arrangements</b>	Please indicate arrangements for the return of the Health and Safety File to the safety agent at the end of the project.



No	Item	Notes
32	<b>Method Statements/Safe System of Works</b>	A list of Method Statements/Safe System of Works must be included in Safety Plan for all High-risk activities.
33	<b>Permits and wayleaves</b>	List of activities that Principal Contractor anticipates will require permits and wayleaves (including those stated in the safety specification) to be included.
34	<b>Fall Prevention and Protection Plan and Fall Rescue Plan</b>	A copy of the Fall Prevention and Protection Plan, fall rescue plan and fall risk assessment must be included in the Safety Plan.
35	<b>Demolition method statement</b>	A copy of the Demolition Method Statement must be included in the Safety Plan.
36	<b>Confined spaces</b>	The Principal Contractors' procedures for managing access, egress and work in confined spaces must be specified in the Safety Plan. Includes permit procedures, air monitoring, PPE, etc.
37	<b>Safety Representatives and Safety Committees</b>	When a project has more than 20 employees a designated employee must be chosen by the labourers to represent them. A safety committee must be established if 2 or more safety representatives are appointed. Please note Safety Specification requirements regarding this section (section 2.12).
38	<b>Have the significant hazards from the safety specification been addressed?</b>	See section 1.9 of the Specifications and ensure practical measures have been detailed in the safety plan.
39	<b>Safety File - Safety Policies in File and Signed by 16(1) CEO.</b>	Safety Policies must be signed and explained to employees.
40	<b>Safety File - A copy of the valid Letter of Good standing from FEM / Workman's Compensation must be on file.</b>	A copy of the valid Letter of Good standing from FEM / Workman's Compensation must be on file.
41	<b>Safety File - Signed copy of the 37.2 Mandatary Agreement</b>	A 37.2 Mandatary Agreement needs to be signed between the Client and the Principal Contractor.
42	<b>Safety File - Appointment letter from Client (as well as 5.1.K)</b>	The Client must appoint the Principal Contractor in writing.
43	<b>Safety File – Notification / Permit</b>	A copy of the Annexure 2 Notification (and proof of submission) to Department of Labour must be available. This can be in the form of a Department stamp, email, or copy of Construction Work Permit.

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 Portion 2: Contract  
 Part C3: Specifications  
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### ANNEXURE B – LEGAL APPOINTMENTS

The Contractor shall make the following appointments, as required:

Chief Executive Officer (OSH Act 16(1))
Contract Director/Manager (OSH Act 16(2))
Construction Manager (CR 8(1))
Construction Supervisor (CR 8(7))
Assistant Construction Supervisor (CR 8(8))
Construction Safety Officer (CR 8(5))
Traffic Safety Officer
Safety Representative (where > 20 employees on site)
Temporary work Designer (CR 12(1))
Temporary work Supervisor (CR12(2))
Construction risk assessor (CR 9(1))
Excavation Supervisor (CR13(1)(a))
Demolition Supervisor (CR14(1))
Scaffold Supervisor (CR16(1))
Suspended Platform Supervisor (CR17(1))
Material Hoist Inspector (CR19(8)(a))
Material Hoist Operator (CR19(6))
Bulk Mixing Plant Supervisor (CR20(1))
Bulk Mixing Plant Operator (CR20(2))
Controller of Explosive Actuated Fastening Devices Nails, Cartridges or Studs Issue and Collection (CR21(2)(g)(1))
Construction Vehicle and Mobile Plant Operator (CR23(1)(d)(i))
Controller of Temporary Electrical Installations (CR24(c))
Stacking Supervisor (CR28(a))
Fire Extinguishing Equipment Inspector (CR29(h))
Fall Protection Plan Developer (CR 10(1)(a))
Incident Investigator (OSH Act 9(2))
Competent Person – Confined Spaces (GAR 5(1))



## ANNEXURE C - BASELINE RISK ASSESSMENT FOR PROJECT

Irrespective of the risk presented on site, it will be ensured that sufficient supervision is in place on site, that personnel are trained in accordance with legislation, including the requirement for site specific inductions on site to inform personnel on site of the risks and hazards applicable to the site. Site supervision is responsible for ensuring that the control measures required below are implemented on site.

NO	HAZARD	RISK	MINIMUM CONTROL MEASURES
1.	Cutting Off Disc	Noise Cuts from machine Fire (particularly at refuelling) Flying debris Blade shattering Contamination by fume created or exhaust fume	<ul style="list-style-type: none"> <li>Use competent personnel.</li> <li>Hot works control- fire extinguisher, fire watchman. (Permit may be required)</li> <li>PPE to include gloves, eye protection, hearing protection</li> <li>Solid working position.</li> <li>Clear working area</li> <li>Correct grade of blade must be used.</li> <li>Good ventilation to be provided (forced if necessary).</li> <li>Changing of wheels to be by competent persons only</li> <li>Cut off discs must not be used for grinding (grinding disc thicker)</li> <li>Bystanders to wear hearing protection, as applicable</li> </ul>
2.	Electrical Commissioning	Electric shock	<ul style="list-style-type: none"> <li>Personnel to comply with permits to work issued by Client</li> <li>Personal protective equipment to be worn by employees to prevent electric shock</li> <li>First aid treatment to be readily available</li> <li>Only competent and trained persons may decommission or commission electrical equipment</li> </ul>
3.	Electric Tools and Electrical Installations	Electric shock Fire	<ul style="list-style-type: none"> <li>Electric tools and installations to be in good condition</li> <li>Inspect electric tools before use</li> <li>Do not use electric tools in wet/damp conditions</li> <li>Use personal protective equipment such as insulated gloves</li> <li>Electrical installations register to be maintained, inspected by competent person</li> </ul>
4.	Fire	Injuries to workers, pedestrians, residents, road users, damage to property through fire	<ul style="list-style-type: none"> <li>No littering on site which could become fire hazard, maintain site in clean condition.</li> <li>No fires to be lit on site. Have a working fire extinguisher at hand at all times.</li> <li>No smoking or naked flame near flammable substances or in unauthorised areas</li> <li>Ensure proper storage/use of Petrol/diesel/flammable substances – post warning notices</li> </ul>
5.	Flammable Liquids and Gases (Use of)	Fire Explosion	<ul style="list-style-type: none"> <li>No littering on site which could become fire hazard, maintain site in clean condition.</li> <li>Have a working fire extinguisher at hand at all times.</li> <li>No smoking or naked flame near flammable substances or in unauthorised areas</li> <li>Ensure proper storage/use of Petrol/diesel/flammable substances – post warning notices</li> <li>Equipment must be in good condition, maintained</li> <li>Personnel using substances must be trained in safe use and risks</li> </ul>
6.	Hand tools	Injuries caused by use of hand tool Impact with the tool Falls due to access problems Contamination with substance being worked	<ul style="list-style-type: none"> <li>Ensure:</li> <li>Tool is correct for job</li> <li>Tool is in good order and suitably sharp</li> <li>Personnel must be competent/instructed in tool usage and tool safely</li> <li>Lighting is sufficient</li> <li>Access is safe, working platform is secure, leading edge is guarded</li> <li>Operative is wearing all necessary PPE</li> </ul>
7.	Hazardous Substances	Injuries to workers through use of hazardous substances, e.g. injuries to eyes, skin, etc.	<ul style="list-style-type: none"> <li>Use substances in accordance with data sheet, particularly reference protective clothing required (example: gloves, goggles, etc.)</li> <li>Know what First Aid measures are</li> <li>Have welfare facilities available for washing of hands, etc.</li> </ul>



No	HAZARD	RISK	MINIMUM CONTROL MEASURES
8.	Hot Works	Burns to eyes or other parts of the body	<ul style="list-style-type: none"> <li>•Personal Protective Equipment to include eye, skin and hearing protection</li> <li>•Respirator maybe be required where cutting galvanized steel or anywhere else toxic fumes and gases arise. Dust can also be a problem and forced ventilation may be required.</li> </ul>
9.	Lifting Operations	Falling material Crushing by materials Hand injuries to the slinger Toppling crane	<ul style="list-style-type: none"> <li>•Check test certificate</li> <li>•Check examination certificate</li> <li>•Check inspection have been carried out</li> <li>•Check certificates for lifting equipment (chains, slings, shackles, etc.)</li> <li>•Ensure lifting gear is rated to carry load (SWL)</li> <li>•Ensure materials being lifted are properly packaged and slung.</li> <li>•Be aware that there should be a minimum clearance of 600mm between any slewing parts of a crane and any fixed installation to prevent being trapped.</li> <li>•Access to the work area during lifting operations is to be restricted to those involved with and trained in the work in hand. Do not allow members of the public to gain access to the area.</li> <li>•Only trained banksmen to be used.</li> <li>•The crane driver and the banksman are to ensure that the signals given are clearly understood.</li> </ul>
10.	Manual Handling of General Items	Muscular skeletal injuries if the load is too heavy or awkward Operative falling/ tripping Contamination from the substance being carried Fall of material being carried	<ul style="list-style-type: none"> <li>•Personnel should be aware of safe manual handling techniques</li> <li>•Personnel to wear Personal Protective Equipment when carrying items, e.g. safety footwear and gloves.</li> <li>•Ensure good housekeeping against tripping/fall hazards.</li> <li>•Operative to get assistance if load too heavy- team lift if necessary.</li> <li>•Utilise mechanical lifting and carrying aids where possible.</li> <li>•Personnel to ensure access equipment, ladders will take weight of operative and load being carried.</li> <li>•Personnel to ensure item being carried is properly bonded or is not be liable to break apart whilst being manually handled.</li> </ul>
11.	Members of Public – Protection of	Injury to member of public and road users from site works	<ul style="list-style-type: none"> <li>•Barriers and signage to be in place</li> <li>•Workers must warn away any members of public from the works</li> <li>•Footpaths and bridges which are open to public must be closed off if in area of works or otherwise made safe so that no injury occurs to members of public</li> <li>•Traffic turning into site – traffic management and signage as required.</li> <li>•Signage to be on road at site entrance warning motorists that construction traffic turning into/out of site access. Keep roads free of mud where possible</li> <li>•Refer to plant risk assessment for details on plant safety precautions</li> <li>•NOTE: SIGNAGE TO BE POSTED ON SITE TO WARN OF CONSTRUCTION TRAFFIC MOVEMENTS. SAFE MEANS OF ACCESS FOR BOTH CONSTRUCTION TRAFFIC TO SITE AND WTW USERS MUST BE AGREED.</li> </ul>
12.	Mobile Crane Erection and Dismantling and Use	Collapse of structure Overturning of structure Falling materials	<ul style="list-style-type: none"> <li>•Ensure emergency procedures are in place and all operative are aware of the details</li> <li>•Only use trained and competent operators for the erection and dismantling and use of cranes</li> <li>•Ensure crane driver is trained and holds certification as proof. Must have valid medical certificate of fitness.</li> <li>•Ensure there is safe means of access available at all times</li> <li>•Ensure the mobile crane driver has 360° vision if not ensure a fully trained banksman is used</li> <li>•Banksman to wear reflector vest to identify himself to the crane driver</li> <li>•Ensure all personnel wear suitable and sufficient personal protective equipment</li> <li>•Consider creating exclusion areas</li> </ul>
13.	Noise and Dust	Breathing in dust can cause long term health problems, noise can damage hearing	<ul style="list-style-type: none"> <li>•Wear respiratory and hearing protection</li> <li>•Dampen down and minimise dust where possible.</li> </ul>

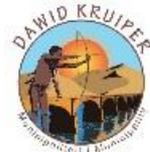


NO	HAZARD	RISK	MINIMUM CONTROL MEASURES
14.	Overhead Services (Working near)	Contact with live services causing injury to personnel Damage caused to services	<ul style="list-style-type: none"> <li>•Maintain safe clearance levels</li> <li>•Establish presence of any services via proper walk through survey of site and/or means of service drawings</li> <li>•Wear personal protective clothing</li> <li>•Ensure height of plant/vehicles does not compromise or exceed clearance levels for overhead services</li> <li>•Obtain information on clearance levels from service provider</li> </ul>
15.	Painting	Contact with paint	<ul style="list-style-type: none"> <li>•Refer to safety data sheet for usage instructions, hazards and precautions required.</li> <li>•When working at height, refer to risk assessment addressing this hazard below.</li> </ul>
16.	Plant or Vehicles and Equipment Operation	Workers injured by passing traffic Road users and pedestrians at risk from plant operation Noise	<ul style="list-style-type: none"> <li>•Implement traffic protection measures</li> <li>•Trained and competent operators must be used</li> <li>•Check plant and vehicles on daily basis before use and record inspections. Maintain vehicles in safe condition.</li> <li>•Medical certificates of fitness required for construction plant.</li> <li>•Crossing of road by construction vehicles or machines must be limited to the practical minimum</li> <li>•Plant and vehicles must be fitted with amber rotating beacons and reverse alarms.</li> <li>•Wear appropriate protective clothing/equipment, e.g. goggles, gloves, ear defenders, etc. as appropriate.</li> </ul>
17.	Plastering	Falling materials Fall from height Contact with materials	<ul style="list-style-type: none"> <li>•Ensure standard safety procedures are followed</li> <li>•Ensure there is a safe working area</li> <li>•Ensure safe access and egress</li> <li>•Ensure competent personnel are used</li> </ul>
18.	Scaffold Erection/ Dismantling	Personnel falling from a height Items of scaffold falling onto personnel Scaffold collapsing onto those below	<ul style="list-style-type: none"> <li>•Ensure</li> <li>•scaffold is designed to take the imposed loads</li> <li>•scaffolding is constructed properly</li> <li>•scaffold is not overloaded</li> <li>•scaffolders are fully trained</li> <li>•scaffolding is regularly checked by competent person and record of inspection retained. Written inspections to be recorded on weekly basis</li> <li>•scaffolders must adhere to the safe systems of work.</li> <li>•all fall arrest equipment to be checked and certified in good working order</li> <li>•that ALL understand the safe system of work</li> </ul>
19.	Tower (Mobile Aluminium Tower) Scaffold	Over Turning Falls	<ul style="list-style-type: none"> <li>•Tower to be on firm level ground with wheels or feet properly supported.</li> <li>•Height not to exceed 3 times the base dimension. i.e. 2x3m Base Tower not exceed 6m.</li> <li>•Erection by competent person</li> <li>•Inspection before first use</li> <li>•Weekly record of inspection required</li> <li>•Guard rails and Toe boards as per normal scaffolds</li> <li>•Beware when moving of overhead obstructions, such as power lines</li> <li>•Never move in strong winds</li> </ul>
20.	Underground Services	Striking of buried services	<ul style="list-style-type: none"> <li>•Make all necessary enquiries to establish what services are in the area. Consult drawings and advice from service provider (e.g. Municipality or ESKOM) when planning work.</li> <li>•Assume all service to be live (Unless confirmation is received to confirm that services are isolated or otherwise made safe). Do not work near live services without authorisation from site management.</li> <li>•Comply with the requirements of the safe system of work for underground services.</li> <li>•Where available, locate services with a locator</li> <li>•Hand dig around services</li> </ul>

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NO	HAZARD	RISK	MINIMUM CONTROL MEASURES
21.	Working at Height	Personnel falling from height Falling debris Those beneath being injured	<ul style="list-style-type: none"> <li>•All access equipment is properly constructed (inspections record must be maintained)</li> <li>•Only trained personnel construct, dismantle or control the access equipment</li> <li>•All access equipment must have full toe boards and guardrails - comply with SANS 10085 on erection, use and dismantling of scaffolding</li> <li>•No access equipment may be loaded above the level of the guardrail</li> <li>•No access equipment to be loaded above its safe working load</li> <li>•Where work involves leaning out on an open leading edge, then all personnel are to be fitted with full body harness. The harness must be connected at all times</li> <li>•All fall arrest equipment to be correctly maintained</li> <li>•Ensure if ladders are being used for access, they are either footed or tied. Also the ladder must be set at the correct level of 1 in 4 or approximately 75°</li> </ul>



## ANNEXURE D – SAFETY SPECIFICATION AND BASELINE RISK ASSESSMENT ISSUE REGISTER

Date of Original Safety Specification Compilation	Compiled By	Issue Date
January 2025	Mark Winter	3rd November 2025

**Acknowledgement:**

I, \_\_\_\_\_ representing

\_\_\_\_\_ (Contractor), have satisfied myself with the content of this Health and Safety Specification and shall ensure that our employees and Contractors on site comply with the requirements of this document, our safety documentation and health and safety legislation.

\_\_\_\_\_  
 Signature of Contractor Date

**Comments:**

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NOTULE : TENDERTOEKENNINGSKOMITEEVERGADERING GEHOU OP DINSDAG, 25 FEBRUARIE 2025 OM 08:00 IN DIE KANTOOR VAN DIE DIREKTEUR ONTWIKKELING EN BEPLANNING

**Komitee lede**

Hoof Finansiële Bestuurder  
 Direkteur Ontwikkeling en Beplanning  
 Direkteur Korporatiewe Dienste  
 Direkteur Generaalkapsdienste - Pos vakant  
 Bestuurder Voorsieningskasaalbestuur

1. VERKLARING VAN BELANGE : (TTK) : 3.1.3.3.2.29 : (DIREKTORAAT KORPORATIEWE DIENSTE)

1/03.1/2025 BESLUIT

Dat kennis geneem word dat die lede van die Komitee en die lede op uitnodiging verklaar het dat hulle geen belang by die items onder bespreking het nie.

2. BEKRAGTIGING VAN DIE NOTULE : (TTK) : 3.1.3.3.2.29 : (DIREKTORAAT KORPORATIEWE DIENSTE)

2/03.1/2025 (TTK) BESLUIT

Dat die bekragtiging van die Notule van die Vergadering gehou op 6 en 12 Desember 2024, 31 Januarie 2025 en 17 Februarie 2025 oorstaan.

3. EQUIPMENT STANDARDIZATION: WATER PURIFICATION AND SEWERAGE TREATMENT: BAC: : (DIRECTORATE CIVIL ENGINEERING)

3/02.2/2025 (BAC) RESOLUTION

On unanimous decision of the members of the Bid Adjudication Committee, it is recommended to the Municipal Manager –

1. That it be Standardized on certain specialized equipment and update annually;
  - 1.1 Endress and Hauser – all level indicator probes and electronic flow meters
  - 1.2 Sulzer – Upington raw water pumps
  - 1.3 Hach – lab testing equipment
  - 1.4 Grundfos – chemical dosing equipment
  - 1.5 Rotock – actuator valves
  - 1.6 Spectrum – all telemetry and scada control
  - 1.7 Huber- Automatic wastewater screen, screw press and degriters
  - 1.8 Schneider - PLC's, telemetry and scada control – water and sewerage
  - 1.9 Auma- actuator valves – sewerage
  - 1.10 Drager - Self-Contained Breathing Apparatus

- 1.11 Goeman Rupp - sewerage pumps
- 1.12 Nylem Slygt - Submersible pumps and Dissolved Oxygen Meters
- 1.13 Vega - Methane gas flare system
- 1.14 Evoqua's Wallace and Tiernan - chlorine gas dosing equipment sewerage

2. That the the equipment list be Updated annually including having annual performance reviews of each service provider.
3. That SLA's for supply of spares, repairs and maintenance with the aforementioned Original Engineering Manufacturers / or their appointed agents/ channel partners / system intergrators be concluded.
4. That the equipment and services be procured for the duration of which the asset is in the system.
5. That it be deviated from formal procurement by means of section 36 of the Supply Chain Management Policy (SCMP)

**36. Deviation from, and ratification of minor breaches of, procurement processes**

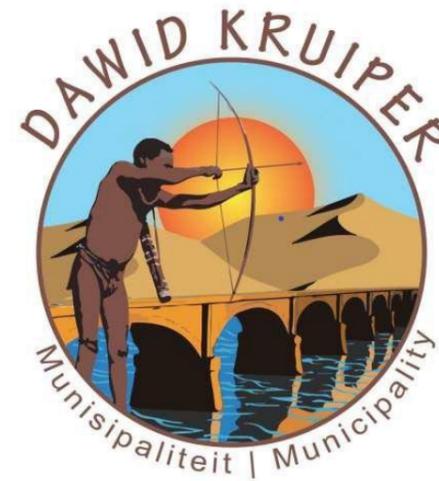
*dispense with the official procurement processes established by this Policy and to procure any required goods or services through any convenient process, which may include direct negotiations, but only –*

- (i) in an emergency;*
- (ii) if such goods or services are produced or available from a single provider only;*
- (iii) for the acquisition of special works of art or historical objects where specifications are difficult to compile;*
- (iv) acquisition of animals for zoos and/or nature and game reserves; or*
- (v) in any other exceptional case where it is impractical or impossible to follow the official procurement processes; and*

*(b) ratify any minor breaches of the procurement processes by an official or committee acting in terms of delegated powers or duties which are purely of a technical nature.*

Approved:

  
MUNICIPAL MANAGER



# ***DAWID KRUIJER MUNICIPALITY***

**CONTRACT NUMBER: TN003/2026**

## **REPLACEMENT OF ABRAHAM HOLBORS SEPTEMBER WATER TREATMENT PLANT MOTOR CENTRE**

**VOLUME 4: BOOK OF DRAWINGS**

**CLOSING DATE: 13 March 2026 at 14H00**

*Employer:*  
**DAWID KRUIJER MUNICIPALITY**  
Private Bag X6003 UPINGTON 8800  
[www.dkm.gov.za](http://www.dkm.gov.za)  
General Enquiries: Mr M. Neethling  
Tel: +27 54 338 7061  
E-Mail: [mario.neethling@dkm.gov.za](mailto:mario.neethling@dkm.gov.za)



**BACK ELEVATION**  
SCALE 1:10

**FRONT ELEVATION**  
SCALE 1:10

**SECTION A-A**  
SCALE 1:10

**FIXING DETAIL 1**  
SCALE 1:10

**FIXING DETAIL 2**  
SCALE 1:10  
**ALTERNATIVE FIXING DETAILS**

VERSION		
NO.	DATE	DESCRIPTION

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**REPLACEMENT OF ABRAHAM HOLBORS SEPTEMBER WATER TREATMENT PLANT MOTOR CENTRE**

**CONTRACT NAME BOARD**

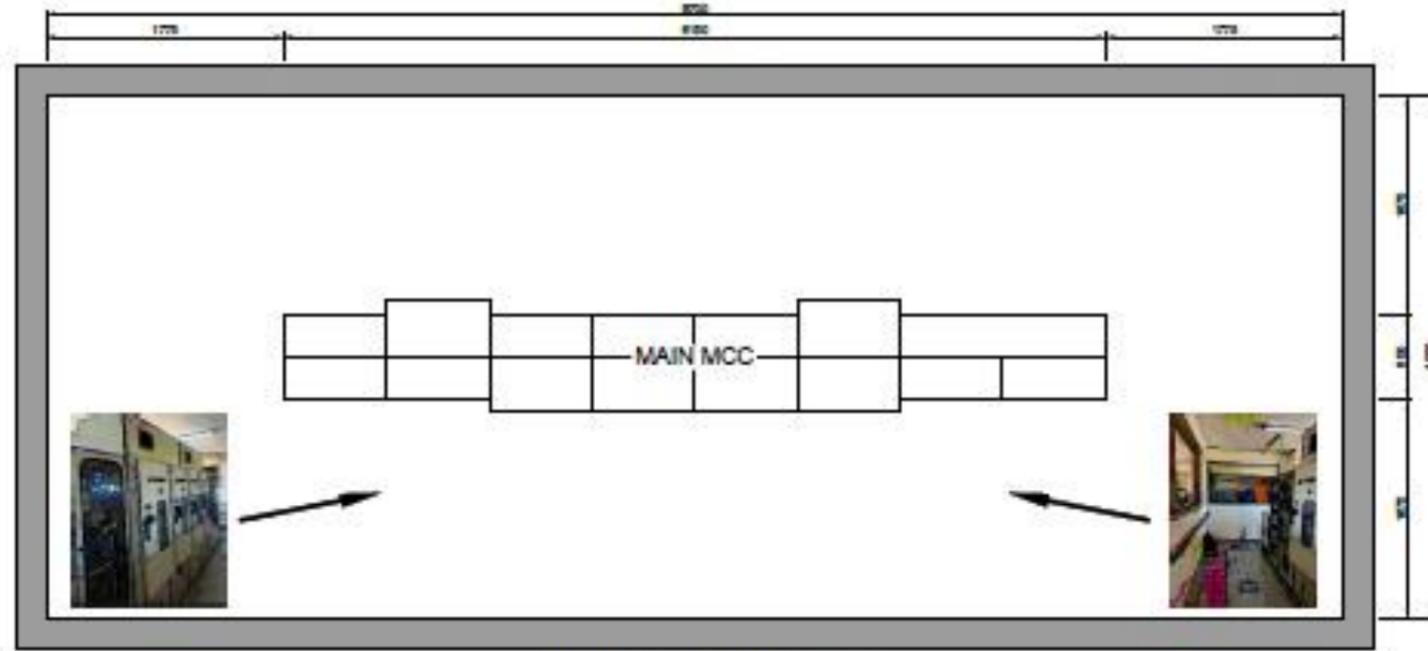


APPROVED BY:	DATE:

PROJECT NO:	3872.20.01.AAA.01.D001
REVISION:	1







MAIN MCC ROOM LAYOUT  
SCALE 1:25



MAIN MCC LAYOUT  
SCALE 1:25

VERSION	
Rev	Description
01	Issue for Review
02	Issue for Approval
03	Issue for Construction
04	Issue for Commissioning
05	Issue for Handover
06	Issue for Closeout

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 Project # 18-11-18-001  
 2018/10/01



REPLACEMENT OF ABRAHAM HOLBORS  
 SEPTEMBER WATER TREATMENT PLANT  
 MOTOR CENTRE  
 ABRAHAM HOLBORS SEPTEMBER  
 WATER TREATMENT WORKS  
 MAIN MCC LAYOUT



APPROVED AS SHOWN	
DESIGNED BY	DATE
CHECKED BY	DATE
APPROVED BY	DATE

APPROVED AS SHOWN	
DESIGNED BY	DATE
CHECKED BY	DATE
APPROVED BY	DATE
PROJECT NO.	3872.20.01.PWA.70.D001
REVISION	1