CONTRACT NO: BW316/UPSHRMP/22

VOLUME 1: TECHNICAL PROPOSAL

VAAL CENTRAL WATER

UPGRADING OF PUMP STATIONS ON THE HENKRIES RISING MAIN PIPELINE

PROCUREMENT DOCUMENT

January 20224

TENDER SUBMITTED BY:

Registered Name of Company:……..

Address:……

Telephone Number:……..

Fax Number:……

E-mail:……

Issued by:

Vaal Central Water
PO Box 30121
Pellissier
9322

ISSUE DATE: 30 JANUARY 2024

BRIEFING SESSION: 13 FEBRUARY 2024 (COMPULSORY)

CLOSING DATE: 29 FEBRUARY 2023

VAAL CENTRAL WATER

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PART T1:

TENDERING PROCEDURES

VAAL CENTRAL WATER

CONTRACT NO.

BW316/UPSHRMP/22

UPGRADING OF PUMP STATIONS ON THE HENKRIES RISING MAIN PIPELINE

TENDERING PROCEDURES

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VAAL CENTRAL WATER

CONTRACT NO.

BW316/UPSHRMP/22

UPGRADING OF PUMP STATIONS ON THE HENKRIES RISING MAIN PIPELINE

SECTION T1.1

TENDER NOTICE AND INVITATION TO TENDER

Tender Notice and Invitation to Tender

CONTRACT NUMBER: BW316/UPSHRMP/22

PROJECT DESCRIPTION: UPGRADING OF PUMP STATIONS ON THE HENKRIES RISING MAIN PIPELINE

Section T1.1: Tender Notice and Invitation to Tender

Vaal Central Board (Former Bloem Water) derives its primary mandate from the Water Services Act, Act 108 of 1997 and is, in terms of the Public Finance Management Act (PFMA), Act 1 of 1999, Schedule 3B, a National Government business entity, which reports to the Executive Authority, represented by the Minister of Water and Sanitation through the Department of Water and Sanitation (DWS).

Vaal Central is a Water Board with the mandate to provide water services to the Southern and Central areas of the Free State Province and the Northern Cape respectively to include the entire jurisdictional area that was previously serviced by Sedibeng Water as gazetted on 26 July 2022 by the minister of Water of Water and Sanitation.

Vaal Central Water accordingly invites interested Service Providers to tender for the following construction contract.

Contract BW316/UPSHRMP/22: UPGRADING OF PUMP STATIONS ON THE HENKRIES RISING MAIN PIPELINE

Scope of Works

Supply, delivery, installation, testing and commissioning as well as upholding during the Defects Liability Period of the following:

Section A:

Refurbishment of the Henkriesmond raw water booster pump station, with a nominal capacity of 290 litres per second upgradeable to 435 litres per second in the future.

Section B:

Refurbishment of the water treatment works at Henkries, with a nominal capacity of 270 litres per second upgradeable to 405 litres per second in future.

Section B:

Refurbishment of the Doringwater clear water booster pump station, with a nominal capacity of 270 litres per second upgradeable to 405 litres per second in future.

Where bid documents can be obtained:

National Treasury Website – eTender Publication: www.etenders.gov.za
Vaal Central Water Website: www.vaalcentralwater.co.za

A ***compulsory briefing session*** with representatives of the employer will be take place on **Tuesday, 13 February 2024** at **Vaal Central Water Boardroom at Okiep Pump Station**.

- The office coordinates are - **29°35'34.74'' S 17°53'11.76'' E**

The service provider should in all respects comply with the conditions as set out below and as specified in the tender document. It is estimated that tenderers tenderers should have a CIDB Contractor Grading designation of **7 ME or higher**, in accordance with Regulation 25(1B) or 25(7A) of the Construction Industry Development Regulations, 2004. **Potentially emerging (PE)** enterprises who satisfy the criteria stated in the bid document may submit bid offers.

Only tenderers that satisfy the eligibility criteria stated in the tender document will be eligible to submit tenders.

Vaal Central Water promotes Broad Black Economic Empowerment. The name of the firm submitting the tender shall be clearly shown on all correspondence. An appointment will be made in terms of the approved Supply Chain Management Policy of the Board of Vaal Central Water.

Completed proposals must be addressed as below and deposited before 12:00 on Thursday, **29 February 2024** at the Tender Box situated at the Vaal Central Water Reception Area for Attention:

Supply Chain Management
Vaal Central Water,
2 Mzuzu Street,
Pellissier,
Bloemfontein,
9322

Each bidder must submit an envelope clearly marked **Contract No. BW316/UPSHRMP/22: UPGRADING OF PUMP STATIONS ON THE HENKRIES RISING MAIN PIPELINE** with the bidder's name and address. The name of the firm submitting the tender shall be clearly shown on all correspondence. An appointment will be made in terms of the approved Supply Chain Management Policy of the Board of Vaal Central Water.

Tenders may only be submitted on the tender documentation that has been issued. **A two-envelope system will be followed**.

Each proposal must be submitted in **2 separate envelopes clearly marked**:

1. BW316/UPSHRMP/22– Request for Proposal (RFP): UPGRADING OF PUMP STATIONS ON THE HENKRIES RISING MAIN PIPELINE **– Technical Proposal.**

2. BW316/UPSHRMP/22– Request for Proposal (RFP): UPGRADING OF PUMP STATIONS ON THE HENKRIES RISING MAIN PIPELINE **– Financial Proposal (must include a USB or DISC with electronic BoQ inside the envelope).**

Proposals which are incomplete, filled incorrectly, or telegraphic, telephonic, telex, facsimile, e-mail and late tenders will not be accepted. Should you do not receive any feedback from Vaal Central Water after 120 days of submission, consider your tender unsuccessful. Vaal Central Water reserves the right NOT to appoint any Service Provider or to withdraw this request for bids.

Service Providers who meet the specified quality criteria will be further evaluated in line with the Preferential Procurement Policy Framework Act (PPPFA) principle of 90/10. Vaal Central Water reserves the right not to award the tender to the highest scoring bidder.

Technical Queries can be directed to:
Mr Grant Isaacs
Engineering and Projects Department
Tel: 051 - 403 0800
Fax: 051 – 422 5333
Email: granti@vcwater.co.za

Tender Administrative Queries can be directed to:
Mr T Khaeane or Mr L Moeketsi
Supply Chain Management
Tel: 051 - 403 0800
Fax: 051 – 422 5333
Email: thatok@vcwater.co.za or leratom@vcwater.co.za

NB: Service Providers to all departments, constitutional institutions and public entities listed in schedule 2 and 3 of the PFMA are required to self-register on the Central Supplier Database.

VAAL CENTRAL WATER

CONTRACT NO.

BW316/UPSHRMP/22

UPGRADING OF PUMP STATIONS ON THE HENKRIES RISING MAIN PIPELINE

SECTION T1.2

TENDER DATA

VAAL CENTRAL WATER

CONTRACT NO.

BW316/UPSHRMP/22

UPGRADING OF PUMP STATIONS ON THE HENKRIES RISING MAIN PIPELINE

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's Board Notice 423 of 2019 (contained in Government Gazette No. 42622 of 08 August 2019), bound into Section T1.3.

The Standard Conditions of Bid makes several references to the Bid Data. The Bid Data also contains project specific amendments to the Standard Conditions of Bid applicable to this document. The Bid Data shall have precedence in the interpretation of any ambiguity or inconsistency between it and the Standard Conditions of Bid.

Each item of data given below is cross referenced to the clause in the Standard Conditions of Bid to which it mainly applies.

Clause	Addition or Variation to Standard Conditions of Tender
1.1	The Employer is Vaal Central Water
1.2	The tender documents issued by the employer comprises of two volumes. Each volume consists of the following: **TENDER DOCUMENT** **VOLUME 1: TECHNICAL PROPOSAL** Part T1 Tendering Procedures Section T1.1 Tender Notice and Invitation to Tender Section T1.2 Tender Data Section T1.3 Standard Conditions of Tender Part T2 Returnable Documents and Schedules Section T2.1 Returnable Schedules Required for Bid Evaluation Purposes Section T2.2 Other Documents Required for Bid Evaluation Purposes Section T2.3 Checklist Part C3 Scope of Work Section C3.1 Description of the Works Section C3.2 Standard Specifications Section C3.3 Project Specifications Section C3.4 Particular Specifications Part C4 Site Information Annexure A Tender Drawings Annexure B Environmental Management Plan **VOLUME 2: FINANCIAL PROPOSAL** Part C1 Agreements and Contract Data Section C1.1 Forms of Offer and Acceptance Section C1.2 Contract Data Part C2 Pricing Data Section C2.1 Pricing Instructions Section C2.2 Schedule of Quantities Section C2.3 Summary of Schedules Section C2.4 Banking Details

Claus e	Addition or Variation to Standard Conditions of Tender
1.3.2	Replace this sub-clause with the following: These Conditions of Bid, the Bid Data, List of Returnable Documents and Returnable Schedules which are required for bid evaluation purposes, shall form part of the Contract arising from the invitation to bid.
1.4	The Employer's Agent is (also referred to as the Engineer): **BVi Consulting Engineers Central (Pty) Ltd** 17 President Steyn Avenue Westdene Bloemfontein 9301
1.5 1.5.1	**The Employer's right to accept or reject any tender offer** Replace the contents of the clause with the following: The Employer may accept or reject any bid or portion thereof, variation, deviation, tender offer, or alternative tender offer, and may cancel the tender process and reject all tender offers at any time before the formation of a contract. The employer shall not accept or incur any liability to a tenderer for such cancellation and rejection, but shall give reasons for such action
1.6.1	Replace the contents of the clause with the following: The Employer reserves the right, within unambiguous and justifiable reasoning, to not necessarily conclude a contract with the tenderer who in terms of F.3.11 is the highest ranked or the tenderer scoring the highest number of tender evaluation points, as relevant, based on the tender submissions that are received at the closing time for tenders. The Employer reserves the right to accept, where applicable, a part or portion of any bid or where possible accepts bids or proposals from multiple bidders.
2.1	Only those tenderers who satisfy the following criteria are eligible to submit tenders: The bidder's primary business is to provide supplies or services as per the bid invitation Accept that all returnable documents and schedules which are required to be certified are done so by a registered Commissioner of Oaths of the Republic of South Africa. **a)** The Employer will only enter into a formal contract with a tenderer who is registered on the National Treasury Central Supplier Data Base. In the case of Joint Venture partnerships this requirement will apply individually to each party of the Joint Venture.

Contractor	Witness 1	Witness 2	Employer	Witness 1	Witness 2

Clause	Addition or Variation to Standard Conditions of Tender
	b) CIDB registration and Grading The following tenderers who are registered with the CIDB, or are capable of being so registered prior to the evaluation of submissions, are eligible to have their tenders evaluated: 1- Contractors who have 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) of 25 (7A) of the Construction Industry Development Regulations, for a level 7ME are eligible to submit bids for this contract. 2- Contractors registered as potentially emerging enterprises with the CIDB who are registered in one contractor grading designation lower than that required in terms of (a) above and who satisfy the following criteria: • the Employer is satisfied that such a contractor has the potential to develop and qualify to be registered in that higher grade as determined in accordance with the provisions of the CIDB Specification for Social and Economic Deliverables in Construction Works Contracts; and • the Employer agrees to provide the financial, management or other support that is considered appropriate to enable the contractor to successfully execute that contract. 3- Joint ventures are eligible to submit bids provided that: 1. every member of the joint venture is registered with the CIDB within 10 days from the closing date of bids; 2. the lead partner has a contractor grading designation in the **7ME** or **6ME PE** class of construction work; and 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 bidded for a **7ME** or **6ME PE** class of construction work The Employer may, in its discretion, subject to the provision of Section 4(1)(d) of the State Tender Board Act (Act 86 of 1968), condone any failure to comply with the foregoing condition. **c)** The tender has not failed to perform on any previous contracts and has been given a written notice to this effect. **d)** The Tenderer or any of its Directors is not listed on the Register of Tender Defaulters in terms of the Prevention and Combating of Corrupt Activities Act of 2004 as a person prohibited from doing business with the public sector. **e)** Only authorised signatories may sign the original and all copies of the tender offer where required in terms of Clause F.2.13.4 of these conditions of tender. **f)** Tenderers shall be registered and in good standing with the South African Revenue Services (SARS) and should be able to submit a valid tax compliance pin issued by SARS. Each party to a Consortium/Joint Venture should be able to submit a separate valid Tax Clearance Certificate and attach it to the schedule. **g)** The tenderer should be able to complete the Compulsory Enterprise Questionnaire and confirm that there are no conflicts of interest which may impact on the tenderer's ability to perform the contract in the best interests of the employer or potentially compromise the tender process and persons in the employ of the state are not permitted to submit tenders or participate in the contract. **h)** Standard Bidding Documents (SBD) The following standard SBD's should be completed (if applicable) legibly and in full in terms of the requirements of the Department of National Treasury of the Republic of South Africa: SBD1: Invitation to bid and company information SBD4: Disclosure Forms

Clause	Addition or Variation to Standard Conditions of Tender
	i) The tenderer should be able to submit the following Certificate: Certified copy of certificate of Incorporation if tenderer is a company or; Certified copy of founding statement if tenderer is a closed corporation or; Certified copy of Partnership agreement if tenderer is a partnership or; Certified copy of Identity document if tenderer is a one man concern or; Certified copy of joint venture agreement if tenderer is a joint venture. **j)** Original (or certified copy) of municipal rates clearance certificate or a certified copy of the lease agreement with the lessor's municipal rates certificate - Not older than 3 months (Vaal Central Water reserves the right to conduct physical verification of premises). **k)** The tenderer should be able to attach certified proof of registration and in Good Standing with the Compensation Commissioner or with a licensed compensation insurer. **l)** The Bidder should be able to provide a Financial References. **m)** Certificate copy of latest Unemployment Insurance Fund (UIF) return (if not stated on the valid tax compliance pin)
2.2.	Bidders must utilise the National Treasury's Central Supplier Database (CSD) for identification of potential subcontractors from the pool of EMEs or QSEs to advance designated groups. The responsibility to subcontract with competent and capable sub-contractors' rests with the main contractor/ supplier. As far as possible, the bidder must consider subcontractors from the area/s where the project will be taking place. Where CIDB related works are subcontracted, each Subcontractor must also be registered with the appropriate CIDB grading in accordance with the value of the work to be undertaken by that Subcontractor.
2.2.1	Add the following to sub-clause 2.2.1: Accept that the Employer will not compensate the bidder for any costs incurred in attending interviews in the office of the Employer or the Employer's Agent (if required).
F2.6	Add the following to the clause: Failure to acknowledge receipt of any addenda will result in disqualification. It is the responsibility of the tenderer to provide accurate and clear information on the attendance register or Purchase of Tender document register. The Employer's agent will not follow-up on incorrect or unclear information provided.

2.7	A compulsory clarification meeting and site visit will be held as follows: Location : Vaal Central Boardroom at Okiep Pump Station Date : Tuesday, 13 January 2024 Time : 11h00 For a joint venture, one of the partners has to attend the compulsory clarification meeting. Confirmation of attendance will be recorded, on site, in the Site Inspection Certificate included in Section T2.1 of the Document. Tender documents will not be made available at the site visit or clarification meeting. Detail relating to the collection of tender documents is indicated in the Tender Notice and Invitation to Tender (Section T1.1 of the document). Failure to fill the attendance register and/or the "Site Inspection Certificate" will result in a disqualification. Bidders should be represented at the site visit/clarification meeting by a person who is suitably qualified and experienced to comprehend the implications of the work involved. Addenda will be issued only to those tendering entities appearing on the attendance list.
2.8	Replace the contents of the clause with the following: Request clarification of the bid documents, if necessary, by notifying the Employer's Agent, as indicated in the Bid Notice and Invitation to Bid, at least seven (7) working days before the closing time stated in the Bid Data.
2.9	Add the following to the clause: The Contractor shall be responsible to affect all insurance as required for the purposes of executing the Contract

Clause	Addition or Variation to Standard Conditions of Tender
2.11	Replace the last sentence of the clause with the following: 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. Corrections in terms of price may not be made by means of a correction fluid such as Tipp-Ex or a similar product. If correction fluid has been used on any specific item price, such item will not be considered. No correction fluid may be used in a Bill of Quantities where prices are calculated to arrive at a total amount. If correction fluid has been used the bid as a whole will not be considered. Tampering with or taking the documents apart is strictly prohibited."
2.12.1	Add the following to the clause: All alternative tender offers shall be referred to in Section T2.2.1 – Alterations to Tender
2.13.2	Replace the contents of the clause with the following: Return the complete set of documents as listed in the Tender Data with all the required information supplied and completed in all respects. All volumes are to be left intact in its original format and no pages shall be removed or re-arranged.
2.13.3	Only one (1) original bid offer is required. It is recommended that all pages be numbered. One (1) scanned copy of the document is also required on a memory stick.
2.13.4	Add the following to the clause: Only authorised signatories may sign the original and all copies of the bid offer where required in terms of 2.13.3. **Accept that failure to submit proof of authorisation to sign the bid shall result in a Bid Offer being regarded as non-responsive.** In the case of a ONE-PERSON CONCERN submitting a bid, this shall be clearly stated. In case of a COMPANY submitting a bid, include a certified copy of the Certificate of Incorporation of such company, together with a resolution by its board of directors authorising a director or other official of the company to sign the documents on behalf of the company. In the case of a CLOSED CORPORATION submitting a bid, include a certified copy of the Founding Statement of such corporation, together with a resolution by all its members authorising a member or other official of the corporation to sign the documents on each member's behalf. In the case of a PARTNERSHIP submitting a bid, all the partners shall sign the documents, unless one partner or a group of partners has been authorised to sign on behalf of each partner, in which case proof of such authorisation/resolution by partners shall be included in the Bid. In the case of a JOINT VENTURE submitting a bid, include a certified copy of the Certificate of Incorporation or Founding Statement or Partnership (as applicable) of each Joint Venture member, a draft Joint Venture Agreement and a resolution of each Joint Venture member authorising an official to sign documents on behalf of the Joint Venture member (in accordance with the requirements above) and a resolution by all Joint Venture members authorising a member of the Joint Venture to sign the documents on behalf of the Joint Venture.
2.13.5	Refer to the Tender Notice and Invitation to Tender (Section T1.1) for the Employer's address for delivery of tender offers and identification details to be shown on each tender offer package are: **Location of tender box**: Tender Box **Physical address**: Ground Floor Main Entrance, 2 Mzuzu Street, Pellissier, Bloemfontein, 9300 **Identification details**: Tender number: BW316/UPSHRMP/22 Title of tender: UPGRADING OF PUMP STATIONS ON THE HENKRIES RISING MAIN PIPELINE Sealed tenders with the Tenderer's name and address and the endorsement "TENDER NO. BW316/UPSHRMP/22: on the envelope, must be placed in the appropriate official tender box at the abovementioned address.

Clause	Addition or Variation to Standard Conditions of Tender
2.13.6	A two-envelope procedure will be followed.
2.13.10	Add the following sub- clause 2.13.10: Accept that all conditions, which are printed or written upon any stationary used by the Bidder for the purpose of or in connection with the submission of a bid offer for this Contract, which are in conflict with the conditions laid down in this document shall be waived, renounced and abandoned.
2.14	Add the following to the clause: The Bidder is required to enter information in the following sections of the document: Section T2.2 : Returnable Schedules Section C1.1 : Form of Offer and Acceptance Section C1.2 : Contract Data (Part 2) Section C1.3 : Form of Guarantee Section C1.4 : Health and Safety Agreement Form Section C2.2 : Bill of Quantities Section C2.3 : Summary of Schedules Section C2.4 : Banking Details The above sections shall be signed by the Bidder (and witnesses where required). Individual pages should only be initialled by the successful Bidder and by the witnesses after acceptance by the Employer of the Bid Offer. The Bidder shall complete and sign the Form of Offer prior to the submission of a Bid Offer. The Schedule of Deviations (if applicable) shall be signed by the successful Bidder after acceptance by the Employer of the Bid Offer. Accept that failure on the part of the Bidder to submit any one of the Returnable Documents listed in clauses 2.13 and 2.23 within the period stipulated, shall be just cause for the Employer to consider the Bid offer as being regarded as non-responsive. Accept that the Employer shall in the evaluation of bid offers take due account of the Bidder'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 Employer's Agent 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. 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 2.23) shall be regarded as justifiable and compelling reasons not to accept the Bid Offer of the Bidder scoring the highest number of bid evaluation points.
2.15.1	Add the following to the clause: The closing time for submission of tender offers is as stated in the Tender Notice and Invitation to Tender. Telephonic, telegraphic, telex, facsimile or e-mailed tender offers will not be accepted.
2.16.1	The bid offer validity period is **90 days**.
2.16.1	Add the following to the clause: If the bid validity expires on a Saturday, Sunday or public holiday, the bid shall remain valid and open for acceptance until the closure of business on the following working day.

Clause	Addition or Variation to Standard Conditions of Tender
2.16.5	Add the following new clause: Accept that should the Bidder unilaterally withdraw his bid during the bid validity period, the Employer shall, without prejudice to any other rights he may have, be entitled to accept any less favourable bid for the Works from those received, or to call for fresh bids, or to otherwise arrange for execution of the Works, and the Bidder shall pay on demand any additional expense incurred by the Employer on account of the adoption of the said courses, as well as either the difference in cost between the bid withdrawn (as corrected in terms of clause 3.9 of the Conditions of Bid) and any less favourable bid accepted by the Employer, or the difference between the bid 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.
F2.17	Clarification of tender offer after submission Provide clarification of a tender offer in response to a request to do so from the Employer during the evaluation of tender offers. This may include providing a breakdown of rates or prices and correction of arithmetical errors resulting from the product of the unit rate and the quantity by the adjustment of certain line item totals. No change in the unit rate or prices or substance of the tender offer is sought, offered, or permitted. The total of the prices shall be adjusted to reflect the arithmetically correct summation of corrected line item totals and shall be binding upon the tenderer. Note: Sub-clause F.2.17 does not preclude the negotiation of the final terms of the contract with a preferred tenderer following a competitive selection process, should the Employer elect to do so.
2.18.1	Add the following to the clause: Accept that if requested, the Bidder 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. Accept that the Employer or his agent, reserves the right to approach the Bidder's banker or guarantor(s) as indicated in the bid 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 Bidder or of the individual member of such venture.
2.22	Return all retained bid documents prior to the closing time for the submission of Bid Offers.
2.23	Refer eligibility criteria as specified in clause F2.1.1, information and data to be completed in all respects as per clause F.2.14, and the test for responsiveness as specified in clause F3.8.1.
2.24 (New clause)	Add new clause: Accept that no Bidder shall make any attempt either directly or indirectly to canvass any of the Employers officials or the Employer's Agent in respect of his bid, after the opening of the bids but prior to the Employer arriving at a decision thereon. No Bidder shall make any attempt to obtain particulars of any relevant information, other than that disclosed at the opening of bids.

Clause	Addition or Variation to Standard Conditions of Tender
2.25 (New clause)	Add new clause: Accept that the Employer is prohibited to award a bid to a person:- a) who is in the service of the State; or b) if that person is not a natural person, of which any director, manager, principal shareholder or stakeholder is a person in the service of the State; or c) a person who is an advisor or consultant contracted with the municipality or municipal entity. "**In the service of the State**" means to be – a) a member of – • any Municipal Council; • any provincial legislature; or 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; e) provincial public entity or constitutional institution within the meaning of the Public Finance Management Act, 1999 (Act No.1 of 1999); f) a member of the accounting authority of any national or provincial public entity; or an employee of Parliament or a provincial legislature.
2.26 (New clause)	Add new clause: Accept that the notes to the Employer's annual financial statements must disclose particulars of any award of more than R 2 000 to a person who is a spouse, child or parent of a person in the service of the state (defined in clause 2.25), or has been in the service of the state in the previous twelve months, including – a) the name of that person; b) the capacity in which that person is in the service of the state; and c) the amount of the award. In order to give effect to the above, the questionnaire for the declaration of interests in the bid of persons in service of state in Section T2.2 must be completed.
3.1	Replace the contents of the clause with the following: Respond to a request for clarification received up to seven (7) working days before the closing time stated in the Bid Data and notify all Bidders who collected procurement documents within two (2) working days of the same date.
3.4	Bids will be opened immediately after the closing time for bids, at the same venue.
3.8.1	Test for responsiveness A responsive tender will be evaluated in terms of the following: Accept that failure to comply with any one of this requirements, shall result in a tender offer being regarded as non-responsive • the eligibility requirements of Clause F2.1.1, • attendance at the clarification meeting as per Clause F2.7, • all required documents signed by the authorised signatories as per Clause F2.13.4, • acknowledge addenda as per Clause F3.2 • Information and Data required to be Completed in all respects as per Clause F.2.14

Clause	Addition or Variation to Standard Conditions of Tender
3.9	Replace the contents of the clause with the following: Check responsive bid offers for arithmetical errors, correcting them in the following manner: a) Where there is a discrepancy between the amounts in figures and in words, the amount in words shall govern. b) If a bill of quantities (or schedule of quantities or schedule of rates) applies and there is 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. 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 Bidder's addition of prices, the corrected total of the prices shall govern. d) Where there is a discrepancy between the amount indicated in the Bidder's bid offer and the corrected amount obtained after completing the above steps, the corrected amount shall govern. Notify a Bidder upon written request received after the closing date of bids of all arithmetical errors made by that particular bidder. Consider the rejection of a bid offer if the Bidder does not accept the correction of the arithmetical errors in the manner described above.
3.11	The Bid will be evaluated based on the pre-qualification requirement as described in the Preferential Procurement Policy Framework 2022, Regulation 4 that requires Bids to sub-contract 30% of the contract value for Bids above R 30 million. Following the evaluation of the pre-qualification requirement above, Functionality, Price and Preference will be used to evaluate all responsive Bid Offers, as follows: a) Score functionality, rejecting all tender offers that fail to achieve the minimum number of points for functionality. Evaluate bids that have achieved the minimum qualification score for functionality in terms of the following items b, c, and d b) Score bid evaluation points for price c) Score points for B-BBEE contribution d) Add the points scored for price and B-BBEE to obtain the total number of points scored. Bidder must subcontract a minimum of 30% of the value of the contract to an EME or QSE/s that is a minimum 51% black owned. The following evidence must be submitted: • A signed subcontracting agreement stipulating the percentage to be subcontracted. • CSD report/s for subcontractor/s. • CIDB Registration for subcontractor/s where CIDB related works are subcontracted, each subcontractor must also be registered with the appropriate CIDB grading in accordance with the value of work to be undertaken by that subcontractor, or are capable of being so prior to the evaluation of submission, in a contractor grading designation equal to or higher than a contractor grading designation determined in accordance with the CIDB grading of this bid , in accordance with CIDB prescripts. Where the CIDB requirement for sub-contracted work is not met, this test for responsiveness has not been met. • Proof of B-BBEE status for subcontractor/s.

	Price Analysis Vaal Central Water uses a Financial Tolerance Range also referred to as standard deviation to in order to assess how reasonable the market response prices are (the consultant estimate). These ranges will assist with eliminating bid prices that are deemed to be excessively high or low to complete the works. The higher limit ensures that Vaal Central Water does not pay more that it believes the value of service or goods is worth, and the lower limit ensures that Vaal Central Water is not exposed to risk of work not being completed or prices increasing subsequent to the award because the award price was too low to complete said scope. The financial tolerance range for this bid is -20% to +20%.
	Objective Criteria Vaal Central Water shall apply objective criteria in accordance with the PPPFA. Rotation of suppliers for bids will be done on the following conditions: a) Aggregate value of R250 million (inclusive of all taxes) awarded. b) Where an award to be made to the supplier results in the cumulative value exceeding the rotation threshold for bids, that award can be made which will constitute the last award to the supplier in the financial year. c) As its objective criteria, Vaal Central Water shall therefore not award to a Bidder that scores the highest points, if such Bidder has already exceeded the rotation threshold for bids. In making the determination on the aggregate value of work awarded to a supplier, Vaal Central Water shall consider the supplier's relations and as such, where Vaal Central Water had awarded work to entities and/or persons that are related and/or inter-related to the supplier, the value of such awards shall be used as a measure of assessing the aggregate value of the work awarded to the supplier.

Clause	**Addition or Variation to Standard Conditions of Tender**

No bid must be regarded as an acceptable bid if it fails to achieve the minimum qualifying score for functionality as indicated in the bid invitation and elaborated further in the Bid Data.
Functionality will be scored as follows:

Technical Evaluation Criteria

Description of Evaluation Criteria	**Points**
1. Company Experience in the applicable class of works (Attach Appointment letters / Purchase orders with contactable reference)	**30**
Demonstrate company experience in Projects that relates to Upgrading/ Refurbishment/ Construction of Pump Stations, completed in the last 10 years with project value of more than R 15 million per project. a) 4 or more Projects – **30 Points** b) 2 - 3 Projects – **20 Points** c) 1 Project – **10 Points** *N.B: VAAL CENTRAL WATER reserves the right to verify references provided.*	

Contractor	Witness 1	Witness 2	Employer	Witness 1	Witness 2

2. Expertise of personnel doing site supervision, related to this project (*Attach CV and qualification certificates)* (Contract/Project Manager + Site foreman/team leader)**	**25**
a) Contract/Project Manager with BEng/BTech in mechanical or electrical engineering with more than 10 years' of relevant experience in Pump Stations – **15 Points** b) Contract/Project Manager with BEng/BTech in mechanical or electrical engineering with between 5 and 10 years' of relevant experience in Pump Stations – **10 Points** a) Site foreman/team leader with more than 10 years of relevant experience in Pump Stations – **10 Points** b) Site foreman/team leader with between 5 to 9 years of relevant experience in Pump Stations – **5 Points**	
3. Contractors' plant resources	**10**
The tenderer must demonstrate ownership or access to resources (lease agreement); Plant, equipment and tools for the works. 3 or more resources – **10 points** 1 – 2 resources - **5 Points**	
4. Methodology and Programme	**20**
The Bidder must submit a proposed programme of work illustrating their understanding of works. This representation should show phases of the tasks and where necessary, sub-tasks. The work programme must be presented in a Gantt chart (MS Projects) illustrating the dates at which critical milestones can be reached and indicating the critical path. • Methodology and proposed approach indicating the understanding of the scope of work (Limited to 10 A4 pages) – **15 Points** • Programme in a Gantt Chart format – **5 Points**	
5. Quality Management System	**5**
ISO 9001 Certification /proof of In-house Quality Management System (must include proof of a Document Control System and proof of a Non-conformity Management System) including Sample/template of Quality Control Plan and appointment of Quality Representative • ISO 9001 Certification – **5 Points** • In-house Quality Management System – **3 Points**	
6. Locality	
a. Vaal Central Water area of supply - **10 Points** **b.** Office based outside of Vaal Central Water area of supply - **0 Points** *Original (or certified copy) of municipal rates clearance certificate or a certified copy of the lease agreement with the lessor municipal rates certificate (Vaal Central Water reserves the right to conduct physical verification of premises). Not older than 3 months"*	**10**
Total Points	**100**

The Bidder must comply with the minimum requirements in accordance with the functionality criteria listed above and must score at least **75 points** for Functionality. Bids that fall below the minimum threshold of 75 points will be regarded technically unacceptable and **will not be considered for further evaluation.**

Contractor	Witness 1	Witness 2	Employer	Witness 1	Witness 2

<table>
<tr><th>Clause</th><th>Addition or Variation to Standard Conditions of Tender</th></tr>
<tr><td></td><td>Only Bidders scoring a minimum of 75 of a 100 points will be considered for further evaluation.
The points scoring for price and B-BBEE contribution will be a function of the financial value in accordance with:
a) Clause 3.11.3 where the financial value inclusive of VAT of one or more responsive bid offers equals or is less than R50 000 000; or
b) Clause 3.11.4 where the financial value inclusive of VAT of all responsive bids received have a value in excess of R50 000 000.</td></tr>
<tr><td>3.11.3</td><td>Add the following sub-clause:
The 80/20 preference point system for acquisition of services, works or goods up to Rand value of R50 million will apply.
a) The following formula must be used to calculate the points for price in respect of bids (including price quotation) with a rand value equal to, or above R 30 000 and up to Rand value of R50 000 000 (all applicable taxes included):
$Ps = 80 \times \left[1 - \frac{Pt - Pmin}{Pmin}\right]$
Where:
Ps = Points scored for comparative price of bid or offer under consideration;
Pt = Comparative price of bid or offer under consideration; and
P_{min} = Comparative price of lowest acceptable bid or offer.
b) An employer of state may apply the formula in paragraph (a) for price quotations with a value less than R30 000, if and when appropriate
c) Subject to subparagraph (d), points must be awarded to a bid for attaining the B-BBEE status level of contributor in accordance with the table below:
<table>
<tr><th>B-BBEE status level of contributor</th><th>Number of points</th></tr>
<tr><td>1</td><td>20</td></tr>
<tr><td>2</td><td>18</td></tr>
<tr><td>3</td><td>16</td></tr>
<tr><td>4</td><td>12</td></tr>
<tr><td>5</td><td>8</td></tr>
<tr><td>6</td><td>6</td></tr>
<tr><td>7</td><td>4</td></tr>
<tr><td>8</td><td>2</td></tr>
<tr><td>Non-compliant contributor</td><td>0</td></tr>
</table>
d) A maximum of 20 points may be allocated in accordance with subparagraph (c).</td></tr>
</table>

<table>
<tr><th>Clause</th><th>Addition or Variation to Standard Conditions of Tender</th></tr>
<tr><td>3.11.4</td><td>Add the following sub-clause:
The 90/10 preference points system for acquisition of services, works or goods with a Rand value above R 50 million.
a) The following formula must be used to calculate the points for price in respect of bids (including price quotation) with a rand value equal to, or above R 30 000 and up to Rand value of R50 000 000 (all applicable taxes included):
$$Ps = 90 \times \left[1 - \frac{Pt - Pmin}{Pmin}\right]$$
Where:
Ps = Points scored for comparative price of bid or offer under consideration;
Pt = Comparative price of bid or offer under consideration; and
P_{min} = Comparative price of lowest acceptable bid or offer.
b) An employer of state may apply the formula in paragraph (a) for price quotations with a value less than R30 000, if and when appropriate
c) Subject to subparagraph (d), points must be awarded to a bid for attaining the B-BBEE status level of contributor in accordance with the table below:
<table><tr><th>B-BBEE status level of contributor</th><th>Number of points</th></tr><tr><td>1</td><td>10</td></tr><tr><td>2</td><td>9</td></tr><tr><td>3</td><td>8</td></tr><tr><td>4</td><td>5</td></tr><tr><td>5</td><td>4</td></tr><tr><td>6</td><td>3</td></tr><tr><td>7</td><td>2</td></tr><tr><td>8</td><td>1</td></tr><tr><td>Non-compliant contributor</td><td>0</td></tr></table>d) A maximum of 10 points may be allocated in accordance with subparagraph (c).</td></tr>
<tr><td>3.16.2</td><td>Replace the contents of the clause with the following:
Notice of non-acceptance of bid will not be sent to individual unsuccessful Bidders. Particulars of the accepted bid can be obtained from the employer's agent.</td></tr>
<tr><td>3.17</td><td>The successful Bidder shall receive one copy of the signed contract.</td></tr>
</table>

Contractor	Witness 1	Witness 2	Employer	Witness 1	Witness 2

Clause	Addition or Variation to Standard Conditions of Tender
4.3	General Supply Chain Management conditions applicable to tenders In terms of its Supply Chain Management Policy the Employer may not consider a tender unless the provider who submitted the tender: a) has furnished the Employer with that provider's: - full name; - identification number or company or other registration number; and - tax reference number and VAT registration number, if any; - Certificate of attendance at a compulsory site inspection, where applicable. b) has indicated whether: - the provider is in the service of the state, or has been in the service of the state in the previous twelve months; - the provider is not a natural person, whether any of the directors, managers, principal shareholders or stakeholders is in the service of the state, or has been in the service of the state in the previous twelve months; or - whether a spouse, child or parent of the provider or of a director, manager, shareholder or stakeholder referred to above is in the service of the state, or has been in the service of the state in the previous twelve months. Irrespective of the procurement process followed, the Employer is prohibited from making an award to a person: - who is in the service of the state; - if the person is not a natural person, a juristic entity of which any director, manager, principal shareholder or stakeholder is in the service of the state; or In this regard, Bidders shall complete Schedule 1, Part T2.2: Returnable Schedules: Compulsory Enterprise Questionnaire. Failure to complete this schedule may result in the tender not being considered.
F4.4	Combating abuse of the Supply Chain Management Policy In terms of its Supply Chain Management Policy, the Employer may reject the tender of any Bidder if that Bidder or any of its directors has: a) failed to pay municipal rates and taxes or municipal service charges and such rates, taxes and charges are in arrears for more than three months: b) failed, during the last five years, to perform satisfactorily on a previous contract with the Employer or any other organ of state after written notice was given to that Bidder that performance was unsatisfactory; c) abused the supply chain management system of the Employer or has committed any improper conduct in relation to this system; d) been convicted of fraud or corruption during the past five years; e) wilfully neglected, reneged on or failed to comply with any government, municipal or other public sector contract during the past five years; or f) been listed with the Register of Tender Defaulters in terms of section 29 of the Prevention and Combating of Corrupt Activities Act (No 12 of 2004) or has been listed on National Treasury's database as a person or juristic entity prohibited from doing business with the public sector. In this regard, Bidders shall complete Schedule 2 and 4, Part T2.2: Returnable Schedules: Certificate of Independent Tender Determination and Declaration in terms of the Public Finance Management Act. Failure to complete these schedules may result in the tender not being considered.

Clause	Addition or Variation to Standard Conditions of Tender
F.4.8	Claims arising after submission of tender No claim for any extras arising out of any doubt or obscurity as to the true intent and meaning of anything contained in the Conditions of Contract and Scope of Work, will be admitted by the Employer after the submission of any tender and the Bidder shall be deemed to have: 1) Fully understood the Conditions of Contract. 2) Read and fully understood the whole text of the Scope of Work and thoroughly acquainted him with the nature of the works proposed and generally of all matters which may influence the Contract. 3) Visited the site of the proposed works, carefully examined existing conditions, the means of access to the site, the conditions under which the work is to be done, and acquainted himself with any limitations or restrictions that may be imposed by the Employer or other Authorities in regard to access and transport of materials, plant and equipment to and from the site and made the necessary provisions for any additional costs involved thereby. 4) Requested the Employer or his duly authorised agent to make clear the actual requirements of anything contained in the Scope of Work, the exact meaning or interpretation of which is not clearly intelligible to the Bidder.
F.4.10	Requests for contract documents, or parts thereof, in electronic format The Employer shall not formally issue tender documents in electronic format as contemplated in F.2.13.3 and shall only issue tender documents in hardcopy. An electronic version of the issued tender documents may be made available to the Bidder, upon written request in terms of this clause, subject to the following: a) The electronic version shall not be regarded as a substitute for the issued tender documents. b) The Employer shall not accept tenders submitted in electronic format. Bidders may not complete and submit a printed copy of the electronic version of the tender document or part thereof. Only those tenders that have been completed on the issued hard copy tender document shall be considered. c) The Employer accepts no responsibility or liability arising from any reliance on or use of the electronic version provided in terms of this clause. The Employer further does not guarantee that the electronic version corresponds with the issued tender documents in all respects. Bidders are alerted to the fact that electronic versions of the tender documents may not reflect any notices or addenda that amend the tender document. d) Any non-compliance with these provisions, including effecting any unauthorised alterations to the tender document as contemplated in F.2.11, shall render the tender invalid. The Employer reserves the right to take any action against such Bidder allowed in law including, in circumstances where the tender had already been awarded, the right to cancel the contract. e) In requesting the electronic version of the tender document or parts thereof, the Bidder is deemed to have read, understood and accepted all of the above conditions.

VAAL CENTRAL WATER

CONTRACT NO.

BW316/UPSHRMP/22

UPGRADING OF PUMP STATIONS ON THE HENKRIES RISING MAIN PIPELINE

SECTION T1.3

STANDARD CONDITIONS OF CONTRACT

VAAL CENTRAL WATER

CONTRACT NO.

BW316/UPSHRMP/22

UPGRADING OF PUMP STATIONS ON THE HENKRIES RISING MAIN PIPELINE

STANDARD CONDITIONS OF TENDER

INDEX

These standard conditions of tender are identical to those published in SANS 294:2004 (Annex F)

VAAL CENTRAL WATER CONTRACT NO.

BW316/UPSHRMP/22

UPGRADING OF PUMP STATIONS ON THE HENKRIES RISING MAIN PIPELINE

STANDARD CONDITIONS OF TENDER

1. GENERAL

1.1 Actions

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

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

Note: 1) *A conflict of interest may arise due to a conflict of roles which might provide an incentive for improper acts in some circumstances. A conflict of interest can create an appearance of impropriety that can undermine confidence in the ability of that person to act properly in his or her position even if no improper acts result.*

2) *Conflicts of interest in respect of those engaged in the procurement process include direct, indirect or family interests in the tender or outcome of the procurement process and any personal bias, inclination, obligation, allegiance or loyalty which would in any way affect any decisions taken*.

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

1.2 Tender documents

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

1.3 Interpretation

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

1.3.2 These conditions of tender, the tender data and tender schedules which are only required for tender evaluation purposes, shall not form part of any contract arising from the invitation to tender.

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

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

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

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

d) **fraudulent practice** means the misrepresentation of the facts in order to influence the tender process or the award of a contract arising from a tender offer to the detriment of the employer, including collusive practices intended to establish prices at artificial levels;

1.4 Communication and employer's agent

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

1.5 The Employer's right to accept or reject any tender offer

1.5.1 An organ of state may, prior to the award of the tender, cancel a tender if-

a) due to changed circumstances, there is no longer a need for the services, works or goods requested; or
b) funds are no longer available to cover the total envisaged expenditure; or
c) no acceptable tenders are received.

1.5.2 The decision to cancel a tender must be published in the CIDB website and in the government Tender Bulletin for the media in which the original tender invitation was advertised.

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

1.6 Procurement procedures

1.6.1 General

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

1.6.2 Competitive negotiation procedure

1.6.2.1 Where the tender data require that the competitive negotiation procedure is to be followed, tenderers shall submit tender offers in response to the proposed contract in the first round of submissions. Notwithstanding the requirements of 3.4, the employer shall announce only the names of the tenderers who make a submission. The requirements of 3.8 relating to the material deviations or qualifications which affect the competitive position of tenderers shall not apply.

1.6.2.2 All responsive tenderers, or not less than three responsive tenderers that are highest ranked in terms of the evaluation method and evaluation criteria stated in the tender data, shall be invited in each round to enter into competitive negotiations, based on the principle of equal treatment and keeping confidential the proposed solutions and associated information. Notwithstanding the provisions of 2.17, the employer may request that tenders be clarified, specified and fine-tuned in order to improve a tenderer's competitive position provided that such clarification, specification, fine-tuning or additional information does not alter any fundamental aspects of the offers or impose substantial new requirements which restrict or distort competition or have a discriminatory effect.

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

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

1.6.3 Proposal procedure using the two stage-system

1.6.3.1 Option 1

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

1.6.3.2 Option 2

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

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

2. TENDERER'S OBLIGATIONS

2.1 Eligibility

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

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

2.2 Cost of tendering

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

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

2.3 Check documents

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

2.4 Confidentiality and copyright of documents

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

2.5 Reference documents

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

2.6 Acknowledge addenda

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

2.7 Site visit and clarification meeting

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

2.8 Seek clarification

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

2.9 Insurance

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

2.10 Pricing the tender offer

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

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

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

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

2.11 Alterations to documents

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

2.12 Alternative tender offers

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

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

2.12.3 An alternative tender offer may only be considered in the event that the main tender offer is the winning tender.

2.13 Submitting a tender offer

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

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

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

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

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

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

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

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

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

2.14 Information and data to be completed in all respects

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

2.15 Closing time

2.15.1 Ensure that the employer receives the tender offer at the address specified in the tender data not later than the closing time stated in the tender data. Proof of posting shall not be accepted as proof of delivery. The employer shall not accept tender offers submitted by telegraph, telex, facsimile or e-mail, unless stated otherwise in the tender data.

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

2.16 Tender offer validity

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

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

2.16.3 Accept that a tender submission that has been submitted to the employer may only be withdrawn or substituted by giving the employer's agent written notice before the closing time for tenders that a tender is to be withdrawn or substituted.

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

2.17 Clarification of tender offer after submission

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

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

2.18 Provide other material

2.18.1 Provide, on request by the employer, any other material that has a bearing on the tender offer, the tenderer's commercial position (including notarized joint venture agreements), preferencing arrangements, or samples of materials, considered necessary by the employer for the purpose of a full and fair risk assessment. Should the tenderer not provide the material, or a satisfactory reason as to why it cannot be provided, by the time for submission stated in the employer's request, the employer may regard the tender offer as non-responsive.

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

2.19 Inspections, test and analysis

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

2.20 Submit securities, bonds, policies, etc.

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

2.21 Check final draft

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

2.22 Return of other tender documents

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

2.23 Certificates

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

3. EMPLOYER'S UNDERTAKINGS

3.1 Respond to requests from the tenderer

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

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

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

3.2 Issue addenda

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

3.3 Return late tender offers

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

3.4 Opening of tender submissions

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

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

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

3.5 Two envelope system

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

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

3.6 Non-disclosure

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

3.7 Grounds for rejection and disqualification

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

3.8 Test for responsiveness

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

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

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

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

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

3.9 Arithmetical errors, omissions and discrepancies

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

3.9.2 Check the highest ranked tender or tenderer with the highest number of tender evaluation points after the evaluation of tender offers in accordance with 3.11 for:
a) the gross misplacement of the decimal point in any unit rate;
b) omissions made in completing the pricing schedule or bills of quantities; or
c) arithmetic errors in:
   i) line item totals resulting from the product of a unit rate and a quantity in bills of quantities or schedules of prices; or
   ii) the summation of the prices.

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

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

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

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

3.10 Clarification of a tender offer

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

3.11 Evaluation of tender offers

The Standard Conditions of Tender standardize the procurement processes, methods and procedures from the time that tenders are invited to the time that a contract is awarded. They are generic in nature and are made project specific through choices that are made in developing the Tender Data associated with a specific project. Conditions of tender are by definition the document that establishes a tenderer's obligations in submitting a tender and the employer's undertakings in soliciting and evaluating tender offers. Such conditions establish the rules from the time a tender is advertised to the time that a contract is awarded and require employers to conduct the process of offer and acceptance in terms of a set of standard procedures.

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

The activities associated with evaluating tender offers are as follows:

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

3.11.1 General

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

3.12 Insurance provided by the employer

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

3.13 Acceptance of tender offer

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

a) is not under restrictions, or has principals who are under restrictions, preventing participating in the employer's procurement,
b) can, as necessary and in relation to the proposed contract, demonstrate that he or she possesses the professional and technical qualifications, professional and technical competence, financial resources, equipment and other physical facilities, managerial capability, reliability, experience and reputation, expertise and the personnel, to perform the contract,
c) has the legal capacity to enter into the contract,
d) is not insolvent, in receivership, under Business Rescue as provided for in chapter 6 of the Companies Act, 2008, bankrupt or being wound up, has his affairs administered by a court or a judicial officer, has suspended his business activities, or is subject to legal proceedings in respect of any of the foregoing,
e) complies with the legal requirements, if any, stated in the tender data, and
f) is able, in the opinion of the employer, to perform the contract free of conflicts of interest.

3.14 Prepare contract documents

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

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

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

3.15 Complete adjudicator's contract

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

3.16 Registration of the award

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

3.17 Provide copies of the contracts

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

3.18 Provide written reasons for actions taken

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

VAAL CENTRAL WATER

CONTRACT NO.

BW316/UPSHRMP/22

UPGRADING OF PUMP STATIONS ON THE HENKRIES RISING MAIN PIPELINE

PART T2:

RETURNABLE DOCUMENTS AND SCHEDULES

VAAL CENTRAL WATER

CONTRACT NO.

BW316/UPSHRMP/22

UPGRADING OF PUMP STATIONS ON THE HENKRIES RISING MAIN PIPELINE

RETURNABLE DOCUMENTS

INDEX

VAAL CENTRAL WATER

CONTRACT NO.

BW316/UPSHRMP/22

UPGRADING OF PUMP STATIONS ON THE HENKRIES RISING MAIN PIPELINE

SECTION T2.1

RETURNABLE SCHEDULES REQUIRED FOR BID EVALUATION PURPOSES

VAAL CENTRAL WATER

CONTRACT NO.

BW316/UPSHRMP/22

UPGRADING OF PUMP STATIONS ON THE HENKRIES RISING MAIN PIPELINE

T2.1 RETURNABLE SCHEDULES REQUIRED FOR BID EVALUATION PURPOSES

The tenderer must complete the following returnable documents:

VOLUME 1 & 2: TENDER DOCUMENT in its entirety.

The information the tenderer shall supply in his tender or attached to his tender shall include, but not be limited to the documents and schedules as set out below.

Other documents required for tender evaluation purposes:

Standard Bidding Documents (SBD)

The following standard SBD's should be completed (if applicable) legibly and in full in terms of the requirements of the National Treasury of the Republic of South Africa:

SBD1: Invitation to bid and company
information SBD4: Disclosure Form

SBD 1

PART A
INVITATION TO BID

YOU ARE HEREBY INVITED TO BID FOR REQUIREMENTS OF THE (*NAME OF DEPARTMENT/ PUBLIC ENTITY*)					
BID NUMBER:		CLOSING DATE:		CLOSING TIME:	
DESCRIPTION					
THE SUCCESSFUL BIDDER WILL BE REQUIRED TO FILL IN AND SIGN A WRITTEN CONTRACT FORM (SBD7).					

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

SUPPLIER INFORMATION					
NAME OF BIDDER					
POSTAL ADDRESS					
STREET ADDRESS					
TELEPHONE NUMBER	CODE		NUMBER		
CELLPHONE NUMBER					
FACSIMILE NUMBER	CODE		NUMBER		
E-MAIL ADDRESS					
VAT REGISTRATION NUMBER					
	TCS PIN:		**OR**	CSD No:	
B-BBEE STATUS LEVEL VERIFICATION CERTIFICATE [TICK APPLICABLE BOX]	☐ Yes ☐ No		B-BBEE STATUS LEVEL SWORN AFFIDAVIT	☐ Yes ☐ No	
IF YES, WHO WAS THE CERTIFICATE ISSUED BY?					

AN ACCOUNTING OFFICER AS CONTEMPLATED IN THE CLOSE CORPORATION ACT (CCA) AND NAME THE APPLICABLE IN THE TICK BOX	☐	AN ACCOUNTING OFFICER AS CONTEMPLATED IN THE CLOSE CORPORATION ACT (CCA)
	☐	A VERIFICATION AGENCY ACCREDITED BY THE SOUTH AFRICAN ACCREDITATION SYSTEM (SANAS)
	☐	A REGISTERED AUDITOR
		NAME:

[A B-BBEE STATUS LEVEL VERIFICATION CERTIFICATE/SWORN AFFIDAVIT(FOR EMEs& QSEs) MUST BE SUBMITTED IN ORDER TO QUALIFY FOR PREFERENCE POINTS FOR B-BBEE]

ARE YOU THE ACCREDITED REPRESENTATIVE **IN SOUTH AFRICA FOR THE GOODS /SERVICES /WORKS OFFERED?**	☐Yes ☐No [IF YES ENCLOSE PROOF]	ARE YOU A FOREIGN BASED SUPPLIER FOR **THE GOODS /SERVICES /WORKS OFFERED?**	☐Yes ☐No [IF YES ANSWER PART B:3 BELOW]
SIGNATURE OF BIDDER	……	**DATE**	
CAPACITY UNDER WHICH THIS BID IS SIGNED (Attach proof of authority to sign this bid; e.g. resolution of directors, etc.)			
TOTAL NUMBER OF ITEMS OFFERED		**TOTAL BID PRICE (ALL INCLUSIVE)**	
BIDDING PROCEDURE ENQUIRIES MAY BE DIRECTED TO:		**TECHNICAL INFORMATION MAY BE DIRECTED TO:**	

Contractor	Witness 1	Witness 2	Employer	Witness 1	Witness 2

DEPARTMENT/ PUBLIC ENTITY		CONTACT PERSON	
CONTACT PERSON		TELEPHONE NUMBER	
TELEPHONE NUMBER		FACSIMILE NUMBER	
FACSIMILE NUMBER		E-MAIL ADDRESS	
E-MAIL ADDRESS			

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. BIDDERS MUST REGISTER ON THE CENTRAL SUPPLIER DATABASE (CSD) TO UPLOAD MANDATORY INFORMATION NAMELY: (BUSINESS REGISTRATION/ DIRECTORSHIP/ MEMBERSHIP/IDENTITY NUMBERS; TAX COMPLIANCE STATUS; AND BANKING INFORMATION FOR VERIFICATION PURPOSES). B-BBEE CERTIFICATE OR SWORN AFFIDAVIT FOR B-BBEE MUST BE SUBMITTED TO BIDDING INSTITUTION.

1.4. WHERE A BIDDER IS NOT REGISTERED ON THE CSD, MANDATORY INFORMATION NAMELY: (BUSINESS REGISTRATION/ DIRECTORSHIP/ MEMBERSHIP/IDENTITY NUMBERS; TAX COMPLIANCE STATUS MAY NOT BE SUBMITTED WITH THE BID DOCUMENTATION. B-BBEE CERTIFICATE OR SWORN AFFIDAVIT FOR B-BBEE MUST BE SUBMITTED TO BIDDING INSTITUTION.

1.5. THIS BID IS SUBJECT TO THE PREFERENTIAL PROCUREMENT POLICY FRAMEWORK ACT 2000 AND THE PREFERENTIAL PROCUREMENT REGULATIONS, 2017, THE GENERAL CONDITIONS OF CONTRACT (GCC) AND, IF APPLICABLE, ANY OTHER LEGISLATION OR 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 TAX COMPLIANCE STATUS (TCS) 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 BIDDERS MAY ALSO SUBMIT A PRINTED TCS TOGETHER WITH THE BID.

2.5 IN BIDS WHERE CONSORTIA / JOINT VENTURES / SUB-CONTRACTORS ARE INVOLVED, EACH PARTY MUST SUBMIT A SEPARATE PROOF OF TCS / PIN / CSD NUMBER.

2.6 WHERE NO TCS IS AVAILABLE BUT THE BIDDER IS REGISTERED ON THE CENTRAL SUPPLIER DATABASE (CSD), A CSD NUMBER MUST BE PROVIDED.

3. QUESTIONNAIRE TO BIDDING FOREIGN SUPPLIERS

3.1. IS THE BIDDER A RESIDENT OF THE REPUBLIC OF SOUTH AFRICA (RSA)? ☐ YES ☐ NO

3.2. DOES THE BIDDER HAVE A BRANCH IN THE RSA? ☐ YES ☐ NO

3.3. DOES THE BIDDER HAVE A PERMANENT ESTABLISHMENT IN THE RSA? ☐ YES ☐ NO

3.4. DOES THE BIDDER HAVE ANY SOURCE OF INCOME IN THE RSA? ☐ YES ☐ NO

IF THE ANSWER IS "NO" TO ALL OF THE ABOVE, THEN, IT IS NOT A REQUIREMENT TO OBTAIN A TAX COMPLIANCE STATUS / TAX COMPLIANCE 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.

Contractor	Witness 1	Witness 2	Employer	Witness 1	Witness 2

SBD 4

BIDDER'S DISCLOSURE

1. PURPOSE OF THE FORM

Any person (natural or juristic) may make an offer or offers in terms of this invitation to bid. In line with the principles of transparency, accountability, impartiality, and ethics as enshrined in the Constitution of the Republic of South Africa and further expressed in various pieces of legislation, it is required for the bidder to make this declaration in respect of the details required hereunder.

Where a person/s are listed in the Register for Tender Defaulters and / or the List of Restricted Suppliers, that person will automatically be disqualified from the bid process.

2. Bidder's declaration

2.1 Is the bidder, or any of its directors / trustees / shareholders / members / partners or any person having a controlling interest1 in the enterprise, employed by the state? **YES/NO**

2.1.1 If so, furnish particulars of the names, individual identity numbers, and, if applicable, state employee numbers of sole proprietor/ directors / trustees / shareholders / members/ partners or any person having a controlling interest in the enterprise, in table below.

Full Name	**Identity Number**	**Name of State institution**

[1] the power, by one person or a group of persons holding the majority of the equity of an enterprise, alternatively, the person/s having the deciding vote or power to influence or to direct the course and decisions of the enterprise.

2.2 Do you, or any person connected with the bidder, have a relationship with any person who is employed by the procuring institution? **YES/NO**

2.2.1 If so, furnish particulars:

……
……

2.3 Does the bidder or any of its directors / trustees / shareholders / members / partners or any person having a controlling interest in the enterprise have any interest in any other related enterprise whether or not they are bidding for this contract?

YES/NO

2.3.1 If so, furnish particulars:

……
……

3 DECLARATION

I, the undersigned, (name)…… in submitting the accompanying bid, do hereby make the following statements that I certify to be true and complete in every respect:

3.1 I have read and I understand the contents of this disclosure;

3.2 I understand that the accompanying bid will be disqualified if this disclosure is found not to be true and complete in every respect;

3.3 The bidder has arrived at the accompanying bid independently from, and without consultation, communication, agreement or arrangement with any competitor. However, communication between partners in a joint venture or consortium2 will not be construed as collusive bidding.

3.4 In addition, there have been no consultations, communications, agreements or arrangements with any competitor regarding the quality, quantity, specifications, prices, including methods, factors or formulas used to calculate prices, market allocation, the intention or decision to submit or not to submit the bid, bidding with the intention not to win the bid and conditions or delivery particulars of the products or services to which this bid invitation relates.

3.4 The terms of the accompanying bid have not been, and will not be, disclosed by the bidder, directly or indirectly, to any competitor, prior to the date and time of the official bid opening or of the awarding of the contract.

3.5 There have been no consultations, communications, agreements or arrangements made by the bidder with any official of the procuring institution in relation to this procurement process prior to and during the bidding process except to provide clarification on the bid submitted where so required by the institution; and the bidder was not involved in the drafting of the specifications or terms of reference for this bid.

[2] Joint venture or Consortium means an association of persons for the purpose of combining their expertise, property, capital, efforts, skill and knowledge in an activity for the execution of a contract.

Contractor	Witness 1	Witness 2	Employer	Witness 1	Witness 2

3.6 I am aware that, in addition and without prejudice to any other remedy provided to combat any restrictive practices related to bids and contracts, bids that are suspicious will be reported to the Competition Commission for investigation and possible imposition of administrative penalties in terms of section 59 of the Competition Act No 89 of 1998 and or may be reported to the National Prosecuting Authority (NPA) for criminal investigation and or may be restricted from conducting business with the public sector for a period not exceeding ten (10) years in terms of the Prevention and Combating of Corrupt Activities Act No 12 of 2004 or any other applicable legislation.

I CERTIFY THAT THE INFORMATION FURNISHED IN PARAGRAPHS 1, 2 and 3 ABOVE IS CORRECT.
I ACCEPT THAT THE STATE MAY REJECT THE BID OR ACT AGAINST ME IN TERMS OF PARAGRAPH 6 OF PFMA SCM INSTRUCTION 03 OF 2021/22 ON PREVENTING AND COMBATING ABUSE IN THE SUPPLY CHAIN MANAGEMENT SYSTEM SHOULD THIS DECLARATION PROVE TO BE FALSE.

…… ……
Signature Date

…… ……
Position Name of bidder

SBD 6.1

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

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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 **80/20** preference point system.

b) **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.

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

(a) Price; and

(b) Specific Goals.

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

The maximum points for this tender are allocated as follows:

	POINTS
PRICE	
SPECIFIC GOALS	
Total points for Price and SPECIFIC GOALS	**100**

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

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

2. 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).

3. FORMULAE FOR PROCUREMENT OF GOODS AND SERVICES

3.1. POINTS AWARDED FOR PRICE

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

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

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

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

Where

Ps = Points scored for price of tender under consideration

Pt = Price of tender under consideration

Pmin = Price of lowest acceptable tender

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

3.2.1. POINTS AWARDED FOR PRICE

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

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

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

Where

Ps = Points scored for price of tender under consideration

Pt = Price of tender under consideration

Pmax = Price of highest acceptable tender

4. POINTS AWARDED FOR SPECIFIC GOALS

4.1. In terms of Regulation 4(2); 5(2); 6(2) and 7(2) of the Preferential Procurement Regulations, preference points must be awarded for specific goals stated in the tender. For the purposes of this tender the tenderer will be allocated points based on the goals stated in table 1 below as may be supported by proof/ documentation stated in the conditions of this tender:

4.2. In cases where organs of state intend to use Regulation 3(2) of the Regulations, which states that,

if it is unclear whether the 80/20 or 90/10 preference point system applies, an organ of state must, in the tender documents, stipulate in the case of—

(a) an invitation for tender for income-generating contracts, that either the 80/20 or 90/10 preference point system will apply and that the highest acceptable tender will be used to determine the applicable preference point system; or

(b) any other invitation for tender, that either the 80/20 or 90/10 preference point system will apply and that the lowest acceptable tender will be used to determine the applicable preference point system,

then the organ of state must indicate the points allocated for specific goals for both the 90/10 and 80/20 preference point system.

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

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

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

CATEGORIES OF PEOPLE HISTORICALLY DISADVANTAGED INDIVIDUALS	Requirements	Number of points(80/20 system)	Number of points(90/10 system)	Number of points allocated (90/10 system) (To be completed by the Tenderer)	Number of points allocated (90/10 system) (To be completed by the Tenderer)
Blacks and people who had no franchise on national elections before 1994 constitution (more than 50% ownership)	Certified ID copy and CIPC registration/ CSD report	5	3		
Women (more than 50% ownership)	Certified ID copy and CIPC registration/ CSD report	5	2		
Youth (more than 50% ownership)	Certified ID copy and CIPC registration/ CSD report	3	1		
People with disability (more than 50% ownership)	Medical report sanctioned by qualified professional and	3	1		

CATEGORIES OF PEOPLE HISTORICALLY DISADVANTAGED INDIVIDUALS	Requirements	Number of points(80/20 system)	Number of points(90/10 system)	Number of points allocated (90/10 system) (To be completed by the Tenderer)		Number of points allocated (90/10 system) (To be completed by the Tenderer)	
	CIPC registration/ CSD report						
				CATEGORIES OF RDP GOALS			
Promotion of BBBEE companies	Sworn affidavits/ CIPC/ BBBEE certificate	4 or 3	BBBEE level	1	2	3	4+
			Points(80/20)	4	3	1	0
			Points(90/10)	3	2	1	0
			Please tick applicable column				
				Total Points Claimed			

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]

Contractor	Witness 1	Witness 2	Employer	Witness 1	Witness 2

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: ……
……
……

FORM 2.1.1 RECORD OF ADDENDA TO BID DOCUMENTS

We confirm that the following communications received from the Procuring Department before the submission of this bid offer, amending the bid documents, have been taken into account in this bid offer:

	Date	Title or Details
1		Confirmatory notes of compulsory site/clarification meeting
2		
3		
4		
5		
6		
7		
8		
9		

Attach additional pages if more space is required.

…… ……

Signature of Authorized person: Date:

Name: ……..…. Position: ……..

FORM 2.1.2 CERTIFICATE OF ATTENDANCE AT CLARIFICATION MEETING

This is to certify that *(tenderer)*…….. of *(address)*.....

..... *was represented by the person(s) named below at the compulsory meeting held for all tenderers at (location)*……..on *(date)*..... starting at *(time)* ……..

I / We acknowledge that the purpose of the meeting was to acquaint myself / ourselves with the Site of the Works and its surroundings and / or matters incidental to doing the work specified in the Tender Documents in order for me / us to take account of everything necessary when compiling our rates and prices included in the tender. I / We also acknowledge that I / we have examined the Site Data made available by the Employer (including borehole cores and related information).

Particulars of person(s) attending the meeting:

Name: ..... Signature: .....

Capacity: .....

Name: ..... Signature: .....

Capacity: .....

Attendance of the above person(s) at the meeting is confirmed by the Employer's representative, namely:

Name: ..... Signature: .....

Capacity: ..... Date and Time: .....

Contractor	Witness 1	Witness 2	Employer	Witness 1	Witness 2

FORM 2.1.3 REGISTRATION CERTIFICATE/AGREEMENT/POWERS OF ATTORNEY/ID DOCUMENT (IF APPLICABLE)

Important note to Tenderer: Registration Certificates for Companies, Close Corporation and Partnerships, or Agreements and Powers of Attorney for Joint Ventures, or ID Document for Sole Proprietor, all as referred to in the foregoing forms and in T2.2.6 must be inserted here.

FORM 2.1.4 PROPOSED JOINT VENTURE AGREEMENT

The following legal business entities agree to deliver the services and/or goods as required under this Contract as a Joint Venture as follows:

Name and Addresses of Joint Venture: …….

…….

…….

Consisting of the following businesses (Joining Entities)

NAME JOINING ENTITY	TAX No	PROPORTIONAL PAYMENT THAT WILL BE RECEIVED UNDER THIS CONTRACT
.....	.....	..... %
.....	.....	..... %
.....	.....	..... %
.....	.....	..... %
.....	.....	..... %

The above-mentioned Joint venture will execute the Contract under the management of (full name)

..... who is an employee of (name of joining entity)
..... ; and in accordance with any further agreements as attached to this document, titled

..... and dated ……..(if applicable).

Contractor	Witness 1	Witness 2	Employer	Witness 1	Witness 2

Bank guarantees and retention money (where required) will be provided or paid by (name of joining entity)

.... who will be responsible for the fulfilment of the retention obligations (where required) asset out in the Contract Document.

Signed by the duly authorized representatives of the above-mentioned Joint Entities:

JOINING ENTITY AND POSITION	**FULL NAME (Position)**	**SIGNATURE**	**DATE**
.....			
.....			
.....			
.....			
.....			

WITNESSES: 1. .....

2. .....

FORM 2.1.5 CERTIFICATE OF AUTHORITY OF SIGNATURE

Indicate the status of the Tenderer by ticking the appropriate box hereunder. The Tenderer must complete the certificate set out below for the relevant category.

(I) COMPANY	(II) CLOSE CORPORATION	(III) PARTHERSHIP	(IV) JOINT VENTURE	(V) SOLE PROPRIETOR

All signatories**, including sole proprietors**, shall confirm their authority by **attaching to this page of this tender** a duly signed and ***dated original or certified copy*** of the relevant resolution of their members or their board of directors, as the case may be

(I) Certificate for Company

I, ……, chairperson of the Board of Directors of ……

....., hereby confirm that by resolution of the Board (copy attached) taken on ..... 20....., Mr/Ms ....., acting in the capacity of

....., was authorized to sign all documents in connection with the tender for **BW316/UPSHRMP/22** and any contract resulting from it on behalf of the company.

Chairman: .....

As Witnesses: 1.....

2.....

Date: .....

Contractor	Witness 1	Witness 2	Employer	Witness 1	Witness 2

(II) Certificate for Close Corporation

We, the undersigned, being the key members in the business trading as .....

..... hereby authorize Mr/Ms ..... , acting in the capacity of

....., to sign all documents in connection with the tender for Tender **CONTRACT BW316/UPSHRMP/22** and any contract resulting from it on our behalf.

NAME	ADDRESS	SIGNATURE	DATE

Note: This certificate is to be completed and signed by all key members upon whom rests the direction of the affairs of the Close Corporation as a whole.

(III) Certificate for Partnership

We, the undersigned, being the key partners in the business trading as, ...

....., hereby authorize Mr/Ms .....

, acting in the capacity of ..... , to sign all documents in connection

with the tender for Tender **CONTRACT BW316/UPSHRMP/22** and any contract resulting from it on our behalf.

NAME	ADDRESS	SIGNATURE	DATE

Note : This certificate is to be completed and signed by all key partners upon who rests the direction of the affairs of the partnership as a whole.

(IV) **Certificate of Authority for Joint Ventures**

This Returnable Schedule is to be completed by joint ventures.

We, the undersigned, are submitting this tender offer in Joint Venture and hereby 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.

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

Note : This certificate is to be completed and signed by all key partners upon who rests the direction of the affairs of the Joint Venture as a whole.

(V) Certificate for Sole Proprietor

I, ..., hereby confirm that I am the sole owner of the

Business trading as .....

Signature of sole owner: ..... Date: ..... As

Witnesses:

1..... Date: .....

2. ..... Date: .....

FORM 2.1.6 CERTIFIED TAX CLEARANCE CERTIFICATE

Tax Clearance Certificate obtained from SARS to be inserted here.

IMPORTANT NOTES:

1. The following is an abstract from the Preferential Procurement Regulations 2017 promulgated with the Preferential Policy Framework Act No 5 of 2000:

   Tax clearance certificate

   No contract may be awarded to a person who has failed to submit an **original** Tax Clearance Certificate from the South African Revenue Service ("SARS") certifying the taxes of that person to be in order or those suitable arrangements have been made with SARS."

2. The ST 5.1 form, Application for Tax Clearance Certificate (in respect of tenders), must be **completed by the tenderer in every detail and submitted to the Receiver of Revenue** where the tenderer is registered for income tax purposes. The Receiver of Revenue will then furnish the tenderer with a Tax Clearance Certificate that will be valid for 6 months from date of issue. **This Tax Clearance Certificate must be submitted in the original form with the tender that is before the closing time and date of the tender.**

Each party to a Consortium / Joint Venture / Subcontractors must complete a separate Tax Clearance Certificate.

Failure to submit an original and valid Tax Clearance Certificate will invalidate the tender.

FORM 2.1.7 CERTIFIED COPY OF LATEST UIF RETURN

The Tenderer must attach hereto a copy of the latest Unemployment Insurance Fund return.

Unemployment Insurance Contributions Act, No. 4 of 2002

CHAPTER 2

Duty to contribute and recovery of contributions

5. Duty to contribute to Fund

(1) Every employer and every employee to whom this Act applies must, on a monthly basis, contribute to the Unemployment Insurance Fund.

(2) The contributions must be paid by the employer either to the Commissioner in terms of section 8 or to the Unemployment Insurance Commissioner in terms of section 9, whichever is applicable to the particular employer.

FORM 2.1.8 CERTIFIED COPY LATEST MUNICIPAL RATES AND TAXES CLEARANCE CERTIFICATE OR COPY OF VALID LEASE AGREEMENT (IF RENTING)

The Tenderer must attach hereto a certified copy of their latest municipal rates and taxes clearance certificate or a copy of a valid lease agreement (if renting)

FORM 2.1.9 CERTIFIED PROOF OF EXPENDITURE FOR SKILLS DEVELOPMENT

The Tenderer must attach hereto proof of expenditure on skills development as required.

SKILLS DEVELOPMENT LEVIES ACT 1, 1999

3. Imposition of levy

(1) Every Employer must pay a skills development levy

FORM 2.1.10 CERTIFIED COPY OF LETTER OF GOOD STANDING WITH COMPENSATION COMMISSIONER OR WITH A LICENSED COMPENSATION INSURER

The Tenderer must attach hereto certified copy of Letter of good standing with Compensation Commissioner or with a licensed compensation insurer

FORM 2.1.11 CERTIFICATE OF TENDERER'S CERTIFIED B-BBEE STATUS LEVEL OF CONTRIBUTOR IN TERMS OF THE PREFERENTIAL PROCUREMENT REGULATIONS, 2022)

1) Bidders are required to submit original and valid B-BBEE Status Level Verification Certificates or certified copies thereof together with their bids, to substantiate their B-BBEE rating claims.
2)
3) Bidders who do not submit B-BBEE Status Level Verification Certificates or are non-compliant contributors to B-BBEE do not qualify for preference points for BBBEE but should not be disqualified from the bidding process. They will score points out of 90 or 80 for price only and zero (0) points out of 10 or 20 for BBBEE.
4) A trust, consortium or joint venture must submit a consolidated B-BBEE Status Level Verification Certificate for every separate bid.
5) Public entities and tertiary institutions must also submit B-BBEE Status Level Verification Certificates together with their bids.

FORM 2.1.13 CERTIFIED COPY OF FORM OF INTENT TO PROVIDE A PERFORMANCE GUARANTEE

The Tenderer must attach hereto a letter from the bank or institution with whom he has made the necessary arrangements, to the effect that the said bank or institution will be prepared to provide the required performance guarantee when asked to do so.

VAAL CENTRAL WATER

CONTRACT NO.

BW316/UPSHRMP/22

UPGRADING OF PUMP STATIONS ON THE HENKRIES RISING MAIN PIPELINE

SECTION T2.2

OTHER DOCUMENTS REQUIRED FOR BID EVALUATION PURPOSES

OTHER DOCUMENTS REQUIRED FOR BID EVALUATION PURPOSES

INDEX

ALTERATIONS BY TENDERER

Should the Tenderer desire to make any departures from or modifications to the General or Special Conditions of Contract, the Specifications, the Schedule of Quantities or the Drawings, or to qualify his tender in any way, he shall set out his proposals clearly hereunder or alternatively state them in a covering letter attached to his tender and referred to hereunder, failing which the tender will be deemed to be unqualified.

Page	Clause or Item

Signature of Tenderer: _____ Date: _____

WORKS PREVIOUSLY EXECUTED

The following is a statement of major works successfully executed by myself/ourselves in recent years:

Employer	Contractor *	Nature of Works	Value of Works	Duration and Completion Date

Failure to detail the required information, shall signify that the tender is submitted by an inexperienced tenderer.

Signature of Tenderer:_____ Date:_____

State firm, contact person and telephone number:

Contractor	Witness 1	Witness 2	Employer	Witness 1	Witness 2

PRESENT COMMITMENTS

Employer	Contractor *	Nature of Works	Value of Works	Duration and Completion Date

Signature of Tenderer:_____ Date:_____

State firm, contact person and telephone number:

Contractor	Witness 1	Witness 2	Employer	Witness 1	Witness 2

SUPERVISORY AND SAFETY PERSONNEL

PREVIOUS EXPERIENCE ON WORKS OF A SIMILAR NATURE DURING THE LAST FIVE YEARS

Name	% Time on Site	Position (Current)	Service (Years)	Name of Project And year executed	Value of Works	Position Occupied
Contracts Manager						
Contractor's Site Agent						
Contractor's Foremen						
Construction Health and Safety Officer						

Tenderers shall indicate the percentage of working time these persons will be engaged on site. Tenderers are required to provide copies of curriculum vitas of all supervisory and safety personnel.

Signature of Tenderer:_____ Date:_____

Contractor	Witness 1	Witness 2	Employer	Witness 1	Witness 2

LABOUR UTILISATION

Labour Categories - Definitions

NOTE: These definitions serve as a guideline to complete the following table and will in no respect alter the Project Specifications or Standardized Specifications:

1. General Foreman / Foreman

An employee who gives out work to and directly co-ordinates and supervises employees. His duties encompass any one or more of the following activities:

a) Supervision;

b) maintaining discipline;

c) ensuring safety on the workplace;

d) being responsible to the Contractor for efficiency and production for his portion of the works; and

e) performing skilled work, whether in an instructional capacity or otherwise.

2. Charge hand

An employee engaged in any one or more of the following activities:

a) Being primarily employed in a supervisory capacity, but who may also be doing the work of an artisan;

b) giving out work to other employees under his control and supervision;

c) ensuring safety on the workplace;

d) maintaining discipline; and

e) being directly responsible to a general foreman or foreman or the Contractor or the Contractor's representative for efficiency and production for his portion of the works.

3. Artisan

An employee who has successfully completed all prescribed courses at a practical institutional training centre for a particular trade and who has successfully completed the on-site period of training as prescribed and who has successfully passed the prescribed trade tests.

4. Team Leader

An employee engaged in any one or more of the following activities :

a) Being employed in a supervisory capacity, but who may also be doing the work of a skilled person;

b) giving out work to other employees under his control and supervision;

c) maintaining discipline;

d) being directly responsible to a Charge hand or a foreman or a general foreman or the employer's authorized representative for efficiency and production for his portion of the works.

5. Skilled Employee

An employee engaged in an ancillary trade or an assistant artisan.

6. Semi-Skilled Employee

An employee with any specified skills, an apprentice or a trainee-artisan.

7. Unskilled Employee

An employee engaged on any task or operation not specified above.

8. Imported Employee

Personnel permanently employed by Contractor.

9. Local Employee

Temporary workforce employed through Labour Desk.

MAN DAYS

Categories	No. of Man Days	
	Imported	Local
1. Contracts Manager		
2. Site Agent		
3. Foreman/Supervisors (specify type)		
3.1 _		
3.2 _		
3.3 _		
4. Safety Inspectors (specify type)		
4.1 _		
4.2 _		
5. Charge hands		
6. Artisans		
7. Operators/Drivers		
8. Clerks/Storeman		
9. Team Leader		
10. Skilled Labour		
11. Semi-skilled Labour		
12. Unskilled Labour		

Signature of Tenderer: _____ Date: _____

COMPLIANCE WITH OHSA (ACT 85 OF 1993)

Tenderers are required to satisfy the Employer and the Engineer as to their ability and available resources to comply with the above by answering the following questions and providing the relevant information required below.

1. Is the Contractor familiar with the OHSA (ACT 85 OF 1993) and its Regulations? YES / NO

2. Who will prepare the Contractors Health and Safety Plan? (Provide a copy of the person/s curriculum vitae/s or company profile).

_____

3. Does the Contractor have a health and safety policy? (If yes, provide a copy). YES / NO
How is this policy communicated to all employees?

_____

4. Does the Contractor keep records of safety aspects of each construction site? YES / NO
If yes, what records are kept?

_____

5. Does the Contractor conduct monthly safety meetings? If yes, who is the chairperson of the meeting, and who attends these meetings? YES / NO

_____

6. Does the Contractor have a safety officer in his employment, responsible for the overall safety of his company? YES / NO
If yes, please explain his duties and provide a copy of his CV.

_____

_____

7. Does the Contractor have trained first aid employees? If yes, indicate who. YES / NO

_____

8. Does the Contractor have a safety induction training programme in place? YES / NO
(If yes, provide a copy).

Signature of Tenderer: _____ Date: _____

Contractor	Witness 1	Witness 2	Employer	Witness 1	Witness 2

PLANT AND EQUIPMENT

1. Major Plant and Equipment available for this Contract:

Quantity	Size, Description, Capacity, etc.

2. Major Plant and Equipment that will be acquired for this contract if my/our tender is accepted:

Quantity	Size, Description, Capacity, etc.

Signature of Tenderer: _____ Date: _____

Contractor	Witness 1	Witness 2	Employer	Witness 1	Witness 2

SUB-CONTRACTORS

The tenderer shall list below any subcontractors he intends to employ to carry out part(s) of the Works.

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

Company	Portion of Contract	Approx. Value

Signature of Tenderer: _____ Date: _____

SITE INSPECTION CERTIFICATE

As required by Clause 2.7 of the Tender Data, I/we certify that I/we have visited the site of the Works and attended the compulsory site visit and clarification meeting on the date certified below.

I/we further certify that I am / we are satisfied with the description of the Work and the explanations given by the Engineer at the site visit and clarification meeting.

_____ _____

Signature of Tenderer Date

Site Visit

This will certify that _____

representing _____

attended a Site Inspection for this Contract on _____20_____

_____(signed)

For the Engineer

Contractor	Witness 1	Witness 2	Employer	Witness 1	Witness 2

AUTHORITY OF SIGNATORY

With reference to Clause 2.13.4 of the Tender Data, Part T1.1, I/we herewith certify that this tender is submitted by : *(Mark applicable block)*

a) a company, and attach hereto a certified copy of the required resolution of the Board of Directors ☐

b) a partnership, and attach hereto a certified copy of the required resolution by all partners ☐

c) a close corporation, and attach hereto a certified copy of the required resolution of the Board of Officials ☐

d) a one-man business, and attach hereto certified proof that I am the sole owner of the business submitting this tender ☐

e) a joint venture, and attach hereto ☐

- a notarially certified copy of the original document under which the joint venture was constituted; and
- certified authorisation by the participating members of the undersigned to submit tenders and conclude contracts on behalf of the joint venture

Signature of Tenderer: _____ Date: _____

Contractor	Witness 1	Witness 2	Employer	Witness 1	Witness 2
☐	☐	☐	☐	☐	☐

PROSPECTIVE TENDERER'S REGISTRATION FORM /CHANGE OF REGISTRATION FORM

The Main Tenderers, Subcontractors or Joining Entities listed in Table 1 of the Schedule No. 7 must complete this form despite the fact that they must register as a Registered Tenderer separately.

All Tenderers (Main Contractor, Subcontractors or Joining Entities) intending to tender, or a Registered Tenderer who's registration information has changed in the mean time, must complete this form and submit it to the client not later than 7 days before the closing of the relevant tender.

*** Complete in full (indicate N/A where not available or applicable) and indicate if the information is submitted for the first time (F), it is unchanged (U) or has changed (C) since the previous submission.**

- Name of Business (or person, in case of goods/services provided by a person:

  …… ( )*

- Official physical address of business, e-mail, telephone and fax numbers:

  - Address: …… ( )*
  - E-mail: ..... ( )*
  - Telephone: ..... ( )*
  - Fax: ..... ( )*

- Electricity account no. if a local business: ..... ( )*
- Type of business (Company, cc, etc): ..... ( )*
- Main business activity (Stationary Dealer, Building Contractor, etc):

  ..... ( )*

- Estimated annual turnover (to remain confidential): R ..... ( )*
- Full name of controlling shareholder if not a one-man business (to remain confidential):

  ..... ( )*

Contractor	Witness 1	Witness 2	Employer	Witness 1	Witness 2

- Equity held by HDI's in the above-mentioned business:

Full Name	**ID No**	**Race**	**Sex**	**Age**	**Disability Status**	**Personal Tax No**	**Equity Ownership %**

I, the owner/manager of the above-mentioned business declare that the above-mentioned information is complete and correct, and that I am fully aware of the penalty that will apply if the tenders are allocated to the above-mentioned business on its own or as a joining entity, based on wrong information submitted above.

Tender forms pertaining to Preferential Procurement

JOINT VENTURE
FORM

The following legal business entities agree to deliver the services and/or goods as required under this Contract as a Joint Venture as follows:

Name and Addresses of Joint Venture: …….

…….

…….

Consisting of the following businesses (Joining Entities)

NAME JOINING ENTITY	TAX NO.	PROPORTIONAL PAYMENT THAT WILL BE RECEIVED UNDER THIS CONTRACT
		..... %
		..... %
		..... %
		..... %
		..... %

The above-mentioned Joint venture will execute the Contract under the management of (Full Name) ……
….. Who is an employee of (Name of Joining Entity) ……..; And in accordance with any further agreements as attached to this document, titled
……..……
… and dated ……..(if applicable). Bank guarantees and retention money (where required) will be provided or paid by (Name of Joining Entity)
……..……
… who will be responsible for the fulfillment of the retention obligations (where required) asset out in the Contract Document.

Signed by the duly authorized representatives of the above-mentioned Joint Entities:

JOINING ENTITY AND POSITION	FULL NAME (Position)	SIGNATURE	DATE
----------	----------	----------	----------
----------	----------	----------	----------
----------	----------	----------	----------
----------	----------	----------	----------

WITNESSES **1.** ---------- ---------- ----------

2. ---------- ---------- ----------

Contractor	Witness 1	Witness 2	Employer	Witness 1	Witness 2

PREFERENTIAL PROCUREMENT

1. B-BBEE Status Level of Contribution

The following Preference points will be allocated

B-BBEE Status Level of Contribution	Number of points for tenders up to R1 000 000.00 (80/20)	Number of points for tenders above R1 000 000.00 (90/10)
1	20	10
2	18	9
3	16	8
4	12	5
5	8	4
6	6	3
7	4	2
8	2	1
Non-compliant contributor	0	0

Tenderer's B-BBEE Status Level of Contribution = ……

Thus, Preference points claimed according to above table = ……

Signature of Tenderer: _____ Date: _____

AFFIDAVIT

Affidavit to be completed by every member of a company, closed corporation, trust, partnership or other business entity, claiming preference points regarding their HDI-status:

1. I, the undersigned ……., hereby
(Full name and surname)

Certify that I am a ……. of the tenderer.
(Member, Director, Partner, Owner)

2. I furthermore certify that I personally hold ……..% (percent) equity shares in the above mentioned business venture and are actively involved in the management and control of the business.

Signed at …… on this ……..…….. day of ……..20……..

……
Signature

I certify that the deponent has acknowledge that he/she knows and understands the contents of this declaration.

This declaration has been sworn / affirmed before me at ……..

On this ……..…… day of ……..……..20……

……
COMMISSIONER OF OATHS

STAMP:

I, THE UNDERSIGNED ……., ACTING IN MY CAPACITY AS

THE COMPANY/CORPORATION/BUSINESS VENTURE: …….

……..
Hereby gives Mangaung Local Municipality and its delegates the right to inspect any documents in our possession pertaining to the verification of information reflecting the equity held in our company / corporation / business venture.

Signed at …… on this ……..…… day of ……..20……..

……
Signature

Contractor	Witness 1	Witness 2	Employer	Witness 1	Witness 2

DECLARATION OF INTEREST (FORM MBD 4)

1. No bid will be accepted from persons in the service of the state[1].

2. Any person, having a kinship with persons in the service of the state, including a blood relationship, may make an offer or offers in terms of this invitation to bid. In view of possible allegations of favouritism, should the resulting bid, or part thereof, be awarded to persons connected with or related to persons in service of the state, it is required that the bidder or their authorised representative declare their position in relation to the evaluating/adjudicating authority.

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, hareholder[2]):……..

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. ……

……..

[1]MSCM Regulations: "in the service of the state" means to be –
(a) a member of –
  (i) any municipal council;
  (ii) any provincial legislature; or
  (iii) the national Assembly or the national Council of provinces;

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

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

3.9 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……
……

.8

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

3.12.1 If yes, furnish particulars……
……

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

3.13.1 If yes, furnish particulars……
……

3.14 Do you or any of the directors, trustees, managers, principle shareholders, or stakeholders of this companyhave 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:……..
……

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

Full Name	**Identity Number**	**State Employee Number**

CERTIFICATION

I, THE UNDERSIGNED (NAME) .....
CERTIFY THAT THE INFORMATION FURNISHED ON THIS DECLARATION FORM IS CORRECT.

I ACCEPT THAT, IN ADDITION TO CANCELLATION OF A CONTRACT, ACTION MAY BE TAKEN AGAINST ME SHOULD THIS DECLARATION PROVE TO BE FALSE.

……..	……..
Signature	Date
……..	……..
Position	Name of Bidder

Contractor	Witness 1	Witness 2	Employer	Witness 1	Witness 2

DECLARATION CERTIFICATE FOR LOCAL PRODUCTION AND CONTENT FOR DESIGNATED SECTORS

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

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

1. General Conditions

1.1. Preferential Procurement Regulations, 2011 (Regulation 9) makes provision for the promotion of local production and content.

1.2. Regulation 9.(1) prescribes that in the case of designated sectors, where in the award of bids local production and content is of critical importance, such bids must be advertised with the specific bidding condition that only locally produced goods, services or works or locally manufactured goods, with a stipulated minimum threshold for local production and content will be considered.

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

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

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

LC = [1- x / y] *100

Where
x is the imported content in Rand
y is the bid price in Rand excluding value added tax (VAT)

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

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

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

2. Definitions

2.1. **"bid"** includes written price quotations, advertised competitive bids or proposals;

2.2. **"bid price"** price offered by the bidder, excluding value added tax (VAT);

2.3. **"contract"** means the agreement that results from the acceptance of a bid by an organ of state;

2.4. **"designated sector"** means a sector, sub-sector or industry that has been designated by the Department of Trade and Industry in line with national development and industrial policies for local production, where only locally produced services, works or goods or locally manufactured goods meet the stipulated minimum threshold for local production and content;

2.5. **"duly sign"**means a Declaration Certificate for Local Content that has been signed by the Chief Financial Officer or other legally responsible person nominated in writing by the Chief Executive, or senior member / person with management responsibility(close corporation, partnership or individual).

2.6. **"imported content"** means that portion of the bid price represented by the cost of components, parts or materials which have been or are still to be imported (whether by the supplier or its subcontractors) and which costs are inclusive of the costs abroad (this includes labour and intellectual property costs), plus freight and other direct importation costs, such as landing costs, dock duties, import duty, sales duty or other similar tax or duty at the South African port of entry;

2.7. **"local content"** means that portion of the bid price which is not included in the imported content, provided that local manufacture does take place;

2.8. **"stipulated minimum threshold"** means that portion of local production and content as determined by the Department of Trade and Industry; and

2.9. **"sub-contract"** means the primary contractor's assigning, leasing, making out work to, or employing another person to support such primary contractor in the execution of part of a project in terms of the contract.

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

Description of services, works or goods	Stipulated minimum threshold
Refer to T2.2.20 for a list of goods with minimum thresholds **on page T2.2-31** of this document.	
_____	_____%
_____	_____%
_____	_____%

4. Does any portion of the services, works or goods offered have any imported content?
(***Tick applicable box***)

YES		NO	

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

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

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

Currency	**Rates of exchange**
US Dollar	
Pound Sterling	
Euro	
Yen	
Other	

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

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

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

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

IN RESPECT OF BID NO. .....

ISSUED BY: (Procurement Authority / Name of Municipality / Municipal Entity):

.....
NB

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

I, the undersigned, ……..... (full names),

do hereby declare, in my capacity as …… ……..

of .....(name of bidder entity), the following:

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

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

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

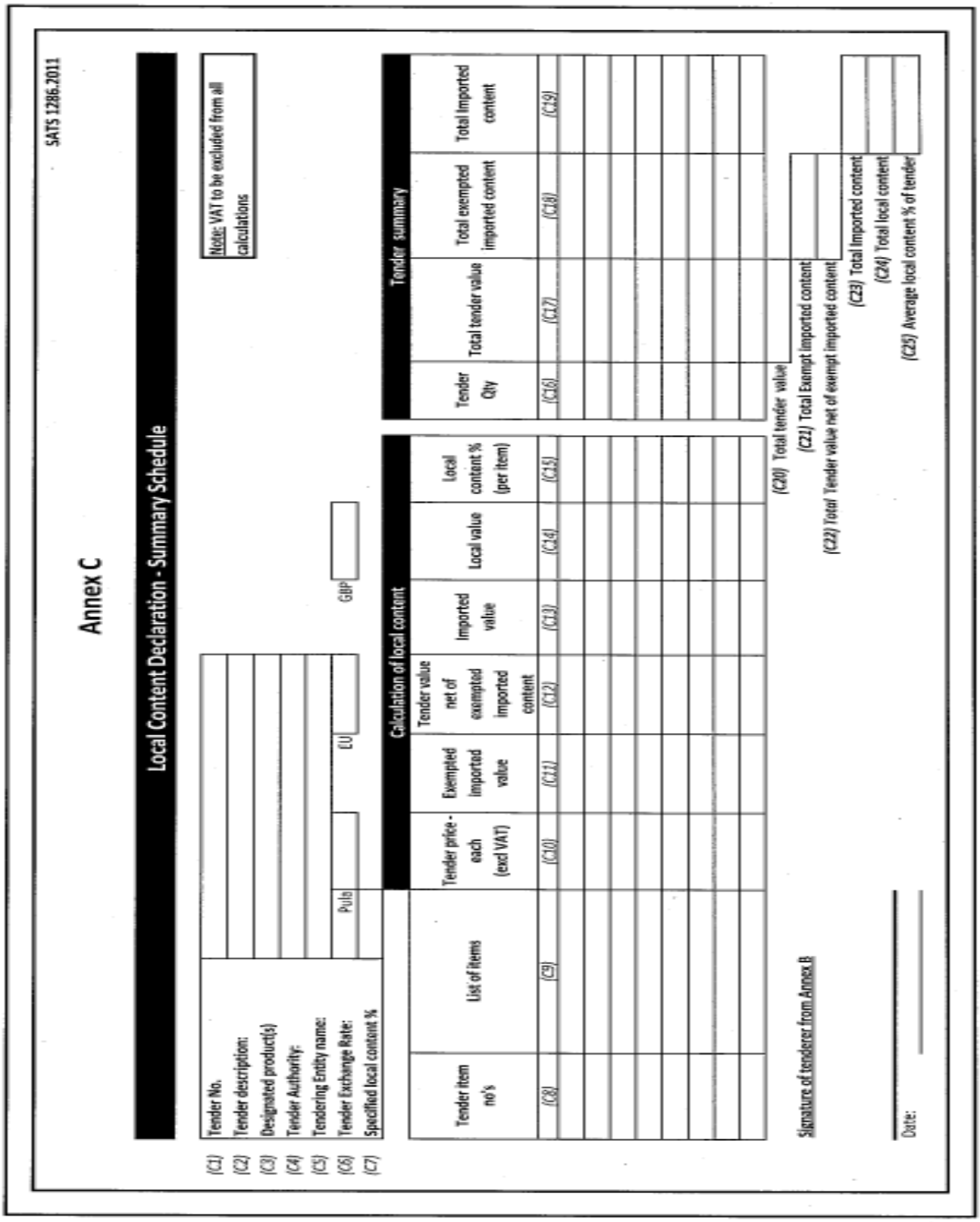
(d) I accept that the Procurement Authority / Municipality /Municipal Entity has the right to request that the local content be verified in terms of the requirements of SATS 1286:2011.
(e) I understand that the awarding of the bid is dependent on the accuracy of the information furnished in this application. I also understand that the submission of incorrect data, or data that are not verifiable as described in SATS 1286:2011, may result in the Procurement Authority / Municipal / Municipal Entity imposing any or all of the remedies as provided for in Regulation 13 of the Preferential Procurement Regulations, 2011 promulgated under the Preferential Policy Framework Act (PPPFA), 2000 (Act No. 5 of 2000).

SIGNATURE: _____ **DATE:** _____

WITNESS No. 1 _____ **DATE:** _____

WITNESS No. 2 _____ **DATE:** _____

ANNEXURE C: LOCAL CONTENT DECLARATION – SUMMARY SCHEDULES



SATS 1286.2011

Annex C

Local Content Declaration - Summary Schedule

Note: VAT to be excluded from all calculations

(C1) Tender No.
(C2) Tender description:
(C3) Designated product(s)
(C4) Tender Authority:
(C5) Tendering Entity name:
(C6) Tender Exchange Rate: Pula EU GBP
(C7) Specified local content %

Tender item no's	List of items	Calculation of local content							Tender summary			
		Tender price - each (excl VAT)	Exempted imported value	Tender value net of exempted imported content	Imported value	Local value	Local content % (per item)	Tender Qty	Total tender value	Total exempted imported content	Total Imported content
(C8)	(C9)	(C10)	(C11)	(C12)	(C13)	(C14)	(C15)	(C16)	(C17)	(C18)	(C19)

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

Signature of tenderer from Annex B

Date: _____

Contractor	Witness 1	Witness 2	Employer	Witness 1	Witness 2

ANNEXURE D: IMPORTED CONTENT DECLARATION

SATS 1286:2011

Annex D

Imported Content Declaration - Supporting Schedule to Annex C

(D1)	Tender No.	
(D2)	Tender description:	
(D3)	Designated Products:	
(D4)	Tender Authority:	
(D5)	Tendering Entity name:	
(D6)	Tender Exchange Rate:	Rate

Note: VAT to be excluded from all calculations

EU R 9.00 GBP R 12.00

A. Exempted imported content

Tender item no's	Description of imported content	Local supplier	Overseas Supplier	Calculation of imported content: Foreign currency value as per Commercial Invoice	Tender Exchange Rate	Local value of imports	Freight costs to port of entry	All locally incurred landing costs & duties	Total landed cost excl VAT	Summary: Tender Qty	Exempted imported value
(D7)	(D8)	(D9)	(D10)	(D11)	(D12)	(D13)	(D14)	(D15)	(D16)	(D17)	(D18)

(D19) Total exempt imported value

This total must correspond with Annex C - C.21

B. Imported directly by the Tenderer

Tender item no's	Description of imported content	Unit of measure	Overseas Supplier	Calculation of imported content: Foreign currency value as per Commercial Invoice	Tender Rate of Exchange	Local value of imports	Freight costs to port of entry	All locally incurred landing costs & duties	Total landed cost excl VAT	Summary: Tender Qty	Total imported value
(D20)	(D21)	(D22)	(D23)	(D24)	(D25)	(D26)	(D27)	(D28)	(D29)	(D30)	(D31)

(D32) Total imported value by tenderer

C. Imported by a 3rd party and supplied to the Tenderer

Description of imported content	Unit of measure	Local supplier	Overseas Supplier	Calculation of imported content: Foreign currency value as per Commercial Invoice	Tender Rate of Exchange	Local value of imports	Freight costs to port of entry	All locally incurred landing costs & duties	Total landed cost excl VAT	Summary: Quantity imported	Total imported value
(D33)	(D34)	(D35)	(D36)	(D37)	(D38)	(D39)	(D40)	(D41)	(D42)	(D43)	(D44)

(D45) Total imported value by 3rd party

D. Other foreign currency payments

Type of payment	Local supplier making the payment	Overseas beneficiary	Calculation of foreign currency payments: Foreign currency value paid	Tender Rate of Exchange	Summary of payments: Local value of payments
(D46)	(D47)	(D48)	(D49)	(D50)	(D51)

(D52) Total of foreign currency payments declared by tenderer and/or 3rd party

(D53) Total of imported content & foreign currency payments - (D32), (D45) & (D52) above

This total must correspond with Annex C - C.23

Signature of tenderer from Annex B

Date:

Contractor	Witness 1	Witness 2	Employer	Witness 1	Witness 2

ANNEXURE E: LOCAL CONTENT DECLARATION

SATS 1286.2011

Annex E

Local Content Declaration - Supporting Schedule to Annex C

(E1)	Tender No.	
(E2)	Tender description:	
(E3)	Designated products:	
(E4)	Tender Authority:	
(E5)	Tendering Entity name:	

Note: VAT to be excluded from all calculations

Local Products (Goods, Services and Works)	Description of items purchased	Local suppliers	Value
	(E6)	*(E7)*	*(E8)*
		(E9) Total local products (Goods, Services and Works)	

(E10) **Manpower costs** (Tenderer's manpower cost)

(E11) **Factory overheads** (Rental, depreciation & amortisation, utility costs, consumables etc.)

(E12) **Administration overheads and mark-up** (Marketing, insurance, financing, interest etc.)

(E13) **Total local content**

This total must correspond with Annex C - C24

Signature of tenderer from Annex B

Date:

LIST OF MATERIALS – LOCAL CONTENT

List of pipes, fittings and valves that require a minimum local content per unit			
No.	**Description of Material**	**Quantity**	**Percentage Local Content**
1	Steel pipes	As per BOQ	80%
2	Valves	As per BOQ	70%
3	Steel fittings	As per BOQ	80%
4	Electrical and Telecom Cables	As per BOQ	90%
5	Plastic Pipes & Fittings	As per BOQ	100%
6	Pumps, Medium Voltage (MV) Motor and Associated Accessoriews	As per BOQ	70%
7	Cement	As per BOQ	100%

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

VAAL CENTRAL WATER

CONTRACT NO.

BW316/UPSHRMP/22

UPGRADING OF PUMP STATIONS ON THE HENKRIES RISING MAIN PIPELINE

SECTION T2.3

CHECKLIST

CHECKLIST

The following information <u>MUST</u> be completed in full and/or attached to the tender document:

DESCRIPTION	SECTION	PLEASE TICK : COMPLETED/ ATTACHED	PLEASE TICK : NOT COMPLETED/ ATTACHED	OUTCOME IF NOT COMPLIED WITH
Original Valid Tax Clearance Certificate	Part T2 Section T2.1	❐	❐	No contract shall be awarded upon failure to submit an original Tax Clearance Certificate certifying that the taxes of that person to be in order or that suitable arrangements have been made with SARS
Certified copy of VAT registration Certificate (if VAT Registration number is not indicated on Tax Clearance Certificate)	Part T2 Section T2.1	❐	❐	No contract shall be awarded upon failure to submit a VAT registration Number
Certified copy of Certificate of Incorporation (if tenderer is a Company)	Part T2 Section T2.1	❐	❐	Non-responsive, tender eliminated
Certified copy of Founding Statement (if tenderer is a Closed Corporation)	Part T2 Section T2.1	❐	❐	Non-responsive, tender eliminated
Certified copy of Partnership Agreement (if tenderer is a Partnership)	Part T2 Section T2.1	❐	❐	Non-responsive, tender eliminated
Certified copy of Identity Document (if tenderer is a One-man concern)	Part T2 Section T2.1	❐	❐	Non-responsive, tender eliminated
Joint Venture Agreement (if the tenderer is a joint venture)	Part T2 Section T2.2.12	❐	❐	Non-responsive, tender eliminated
Certified copy of CIDB Registration Certificate	Part T2 Section T2.1	❐	❐	Non-responsive, tender eliminated
Form of Offer	Part C1.1	❐	❐	Non responsive, tender eliminated
Schedule of Quantities (ALL items in black ink)	Part C2.2	❐	❐	Refer to pricing Instructions
Summary of Schedules	Section C2.3	❐	❐	Refer to pricing Instructions

Contractor	Witness 1	Witness 2	Employer	Witness 1	Witness 2

Bank Details (completed in full)	Section C2.4	❒	❒	Information or bank history not available. (Evaluated as possible risk)
Alterations by Tenderer	Section T2.2.1	❒	❒	
Works Previously Executed	Section T2.2.2	❒	❒	Regarded as tender with no experience
Present Commitments	Section T2.2.3	❒	❒	Regarded as tender with no experience
Supervisory Personnel	Section T2.2.4	❒	❒	No designated personnel, possible experience risk
Labour Utilisation	Section T2.2.5	❒	❒	Regarded as tenderer with limited experience and understanding of contract scope
Compliance with OHSA (Act 85 of 1993)	Section T2.2.6	❒	❒	Regarded as a tenderer with limited ability and available resources to comply with the OHSA act
Plant and Equipment	Section T2.2.7	❒	❒	Regarded as tenderer with limited experience and understanding of contract scope
Sub-contractors	Section T2.2.8	❒	❒	All work to be carried out by main Contractor or joint entity
Site Inspection Certificate	Section T2.2.9	❒	❒	Non responsive, tender eliminated
Authority of Signatory & Certified Resolution	Section T2.2.10	❒	❒	Non responsive, tender eliminated
Business Registration Form / Change of Registration Form	Section T2.2.11	❒	❒	No contract shall be awarded upon failure to complete the registration form
Preferential Procurement (To be completed in full with values for EP & NEP)	Section T2.2.13	❒	❒	Tenderer not tendering for equity ownership points
Affidavit (3 Copies)	Section T2.2.14	❒	❒	Tenderer not tendering for equity ownership points
Declaration of Interest	Section T2.2.15	❒	❒	Non-responsive, tender eliminated
Property Rates Clearance : Copy of latest Municipal account / lease agreement	Part T1.2 Annex A, Part 2, 2.2.2	❒	❒	No contract shall be awarded upon failure to provide the required information

Contractor	Witness 1	Witness 2	Employer	Witness 1	Witness 2

Reasons for non compliance :

Contact Details

Office Phone No. _____

Office Fax No. _____

Cell phone No. _____

_____ _____

Name in CAPITAL (BLOCK) LETTERS **Signature**

Contractor	Witness 1	Witness 2	Employer	Witness 1	Witness 2

VAAL CENTRAL WATER

CONTRACT NO.

BW316/UPSHRMP/22

UPGRADING OF PUMP STATIONS ON THE HENKRIES RISING MAIN PIPELINE

PART C3

SCOPE OF WORK

VAAL CENTRAL WATER

CONTRACT NO.

BW316/UPSHRMP/22

UPGRADING OF PUMP STATIONS ON THE HENKRIES RISING MAIN PIPELINE

PART C3: SCOPE OF WORK

CONTENTS

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VAAL CENTRAL WATER

CONTRACT NO.

BW316/UPSHRMP/22

UPGRADING OF PUMP STATIONS ON THE HENKRIES RISING MAIN PIPELINE

SECTION C3.1

DESCRIPTION OF THE WORKS

GENERAL DESCRIPTION

The Namakwa pipeline supplies potable water to the town of Springbok and surrounding towns from the Orange River through a series of pump stations, reservoirs, water treatment works, rising mains and gravity mains. The scheme is managed by Vaal Central Water on behalf of the Namakwa Water Board. The replacing of the gravity mains, the first phase, from Eenriet reservoir to Vaalhoek Reservoir in Okiep would have been completed by the time phase two construction starts. Phase two includes the refurbishment rising mains and pump station from the Orange River up to Eenriet Reservoir. It also includes a new pipeline and pump station for pumping water from Okiep, Concordia and Carolusberg.

This is set out in 3 portions which are identified as follows:

Section A: Raw water booster pump station
Section B: Water treatment plant pump station
Section C: Clear water booster pump station

This is a single comprehensive contract and contractors should select specialist subcontractors to conduct works which they consider of a specialist nature.

Section A: Raw Water Booster Pump Station

Scope of Works, Phase One

Supply, delivery, installation, testing and commissioning as well as upholding during the Defects Liability Period of the following:

- **Refurbishment of the Henkriesmond raw water booster pump station, with a nominal capacity of 290 litres per second upgradeable to 435 litres per second in the future. The works for this section comprises the following subsections:**

Mechanical Works:

- Decommissioning of existing pumps
- Existing pump sets, pipework and instrumentation to be dismantled and removed
- Temporary installation of pump set in parallel with pump sets on duty
- Supply and install discharge manifold, ND 600mm, PN25
- Supply and install suction manifold, ND 600mm, PN10
- Supply and install suction piping, ND 400mm, PN10
- Supply and install 2 number multistage centrifugal pump sets
- Supply and install discharge piping, ND 400mm, PN25
- Supply and install flanged flow meters
- Testing and commissioning

Electrical Works:

- Supply and install MV Switch gear
- Supply and install VSD's and MV MCC
- Electrical supply to decommissioned systems to be shut off
- Supply and install instrumentation: level sensors and pressure gauges
- Miscellaneous electrical installations
- Telemetry
- Electrical supply to new system restored

Scope of Works, Phase Two

Mechanical Works:

- Decommissioning of existing pumps
- Existing pump sets pipework and instrumentation to be dismantled and removed
- Supply and install suction manifold, ND 600mm, PN10
- Supply and install suction piping, ND 400mm, PN10
- Supply and install 1 number multistage centrifugal pump set
- Testing and commissioning of systems

Electrical Works:

- Electrical supply to decommissioned systems to be shut off
- Older cables to be removed
- Miscellaneous electrical installations
- Supply and install instrumentation: pressure gauges, flow meters and level sensors
- Electrical supply to new systems restored

Section B: Water Treatment Plant Pump Station

Scope of Works, Phase One

- **Refurbishment of the water treatment works at Henkries, with a nominal capacity of 270 litres per second upgradeable to 405 litres per second in future. The works for this section comprises the following works:**

Mechanical Works:

- Decommissioning of existing pumps
- Existing pump set, pipework and instrumentation to be dismantled and removed
- Supply and install pipe gantry
- Supply and install single discharge manifold as per drawing,
- ND 600mm, PN40
- Supply and install suction manifold as per drawing, ND 500mm, PN10
- Supply and install suction pipework, ND 350mm, PN10
- Supply and install 2 number multistage centrifugal pump sets
- Supply and install discharge pipework, ND 350mm, PN40
- Supply and install flanged flow meters
- Testing and commissioning of systems

Electrical Works:

- Supply and install MV MCC's and VSD's
- Electrical supply to decommissioned systems to be shut off
- Removal of existing electrical equipment and cabling
- LV MCC panels to be moved to new positions
- Miscellaneous electrical installations
- Supply and install instrumentation: flow level sensors and pressure gauges
- Telemetry
- Electrical supply to new system restored

Scope of Works, Phase Two

Mechanical Works:

- Decommissioning of existing pumps
- Existing pump sets to be dismantled, removed and stored on site
- Existing pipework, valves and instrumentation to be dismantled and removed
- Backwash pumps to be moved and reassembled with pipework at new positions
- Backwash blowers to be moved and reassembled with pipework at new positions
- Supply and install suction manifold as per drawing per phase, ND 500mm, PN10
- Supply and install 1 number multistage centrifugal pump set
- Supply and install suction branch pipework, ND 350mm, PN10
- Supply and install discharge branch pipework, ND 350mm, PN40
- Testing and commissioning of systems

Electrical Works:

- Electrical supply to decommissioned systems to be shut off
- Removal of existing electrical equipment and cabling
- Miscellaneous electrical installations
- Supply and install flow meters, pressure gauges and level sensors
- Electrical supply to new system restored

Section C: Clear Water Booster Pump Station

Scope of Works, Phase One

- **Refurbishment of the Doringwater clear water booster pump station, with a nominal capacity of 270 litres per second upgradeable to 405 litres per second in future. The works for this section comprises the following works:**

Mechanical Works:

- Decommissioning of existing pumps
- Existing pump sets to be dismantled, removed and stored on site
- Existing pipework, valves and instrumentation to be dismantled and removed
- Steel stand forms: manufacture and install
- Supply and install suction manifold as per drawing, ND 600mm, PN10
- Supply and install discharge manifold as per drawing, ND 600mm, PN40
- Supply and install suction pipework, ND 400mm, PN10
- Supply and install discharge pipework ND 400mm, PN40
- Supply and install flanged flow meter
- Supply and install 2 number multistage centrifugal pump sets
- Commissioning and testing of systems

Electrical Works:

- LV-DB panels to be moved (existing)
- MV MCC and VSD to be installed
- Electrical supply to decommissioned systems to be shut off
- Removal of existing electrical equipment and cabling
- Miscellaneous electrical installations
- Supply and install instrumentation: pressure gauges, flow meters and level sensors
- Electrical supply to new system restored

Scope of Works, Phase Two

Mechanical Works:

- Existing pumps to be decommissioned
- Pump sets to be dismantled, removed and set aside
- Supply and install 1 number multistage centrifugal pump, complete with motors, couplings, bases plates and valves
- Supply and install suction pipework, ND 400mm, PN10
- Supply and install discharge branch pipework, ND 400mm, PN40
- Commissioning of systems

Electrical works

- Electrical supply to decommissioned systems to be shut off
- Removal of existing electrical equipment and cabling
- Miscellaneous electrical installations
- Supply and install flow meters, pressure gauges and level sensors
- Electrical supply to new system restored

Telemetry Options

Vaal Central Water currently has no means of monitoring certain data required to operate the scheme efficiently. The control of the total scheme is currently done on an ad hoc basis as there is no telemetry system in place. Operators do not have real-time information with regards to flows, pressure, reservoir levels and pump parameters. All communications and switching of pumps are coordinated by telephone subsequent time lags and wastage of energy takes place when pumps are operated against closed and partially opened valves.

A SCADA base station will be installed at the Henkries Water Treatment Works, with a second mirror remote station at Vaal Central Water's offices in Okiep. The base station and remote station are to have the same monitoring and control functions.

The SCADA communication will be through a fibre optic cable from the reservoir abstraction through every pump station and reservoir all the way to termination at Vaalhoek reservoir. The cable will be fully installed, spliced and tested with slack at for connection at the river Abstraction, Henkriesmond, Henkries WTW, Doringwater, Eenriet, Okiep and Vaalhoek and will be installed by others.

VAAL CENTRAL WATER

CONTRACT NO.

BW316/UPSHRMP/22

UPGRADING OF PUMP STATIONS ON THE HENKRIES RISING MAIN PIPELINE

SECTION C3.2

STANDARD SPECIFICATIONS

VAAL CENTRAL WATER

CONTRACT NO.

BW316/UPSHRMP/22

UPGRADING OF PUMP STATIONS ON THE HENKRIES RISING MAIN PIPELINE

SECTION C3.2

STANDARD SPECIFICATIONS

APPLICABLE STANDARDIZED SPECIFICATIONS

1. The General Conditions of Contract applicable to this contract are the "General Conditions of Contract for Construction Works, Second Edition (2010)", issued by the South African Institution of Civil Engineering and the necessary amendments to the Standard Specifications have been made and included in the Project Specifications contained in this document.

2. The terms "Schedule of Quantities", (used throughout the Standard Specifications) and "Bill of Quantities", (used in all other documents forming part of this contract), are synonymous.

VAAL CENTRAL WATER

CONTRACT NO.

BW316/UPSHRMP/22

UPGRADING OF PUMP STATIONS ON THE HENKRIES RISING MAIN PIPELINE

SECTION C3.2.1

STANDARD SPECIFICATIONS

- SANS 1200 A – 1986: General
- SANS 1200 L: Medium-Pressure Pipelines
- SANS 1200 G – 1982: Concrete (Structural)
- SANS 50545: Ductile Iron pipes, fittings, etc
- ISO 1940-1: Mechanical vibration – Balance quality requirements for rotors in a constant (Rigid) state: Specification and Verification of balance tolerance
- ISO 1940-2: Mechanical vibration – Balance quality requirements for rotors in a constant (Rigid) state: Balance Errors
- ISO 9906: Rotodynamic Pumps: Hydraulic performance acceptance test
- ISO 10816-1: Mechanical Vibration – Evaluation of machine vibration by measurements on non-rotating parts: General Guidelines
- ISO 10816-2: Mechanical Vibration – Evaluation of machine vibration by measurements on non-rotating parts: Industrial machines with nominal power above 15 kW and nominal speeds between 120 r/min and 15000 r/min when measures in situ
- ISO 10816-5: Mechanical Vibration – Evaluation of machine vibration by measurements on non-rotating parts: Machine sets in hydraulic power generating and pumping plants
- SANS 719-2011: Electric welded low carbon steel pipes for aqueous fluids (large bore)
- SANS 1123-2015: Pipe Flanges
- SANS 664-3-2011: Wedge Gate and Resilient Seal Valve for Water Works
- SANS 1551-2-2007: Check Valve (Flanged and Wafer Types)
- SANS 1849-2008: Butterfly Valve for General Purposes
- SANS 10142-1: 2017 Edition 2: The Wiring of Premises: Part 1: Low-Voltage Installations

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UPGRADING OF PUMP STATIONS ON THE HENKRIES RISING MAIN PIPELINE

SECTION C3.2.2

VARIATIONS AND ADDITIONS TO THE STANDARDISED SPECIFICATIONS

The following variations and additions to the SANS 1200 Standardized Specifications referred to in Portion 1 apply to this Contract. The prefix PS indicates an amendment to SANS 1200. The letters and numbers following these prefixed respectively indicate the relevant Standardized Specification and clause numbers in SANS 1200.

SANS 1200A: GENERAL

PSA 1 SCOPE

REPLACE THE CONTENTS OF SUBCLAUSE 1.1, INCLUDING THE NOTES, WITH THE FOLLOWING

"1.1 This specification covers requirements, principles and responsibilities of a general nature which are generally applicable to civil engineering construction and building works contracts, as well as the requirements for the Contractor's establishment on the Site."

PSA 2 INTERPRETATIONS

PSA 2.3 DEFINITIONS

IN THE OPENING PHRASE, INSERT THE WORDS: "the definitions given in the Conditions of Contract and" BETWEEN THE WORDS "specification" AND "the following".

a) General

ADD THE FOLLOWING DEFINITIONS

"General Conditions' and 'Conditions of Contract': The General Conditions of Contract specified for use with this Contract, together with the Special Conditions of Contract as applicable".

'Specified': As specified in the Standardized Specifications, the Drawings or the Project Specifications. 'Specifications' shall have the corresponding meaning'.

b) Measurement and Payment

REPLACE THE DEFINITIONS FOR "Fixed charge", "Time-related charge" AND "Value-related charge" WITH THE FOLLOWING:

'Fixed charge': A charge that is not subject to adjustment on account of variations in the value of the Contract Price or the time allowed in the Contract for the completion of the work.

'Time-related charge': A charge, the amount of which varies in accordance with the Time for Completion of the Works, adjusted in accordance with the provisions of the Contract.

'Value-related charge': A charge, the amount of which varies pro rata with the final value of the measured work executed and valued in accordance with the provisions of the Contract.

PSA 2.4 ABBREVIATIONS

a) Abbreviations relating to standard documents

ADD THE FOLLOWING ABBREVIATION:

"CKS: SABS Co-ordinating Specification."

PSA 3 MATERIALS

PSA 3.1 QUALITY OF MATERIALS

Add the following:

All materials are to be the best of their respective kinds, new, undamaged, sound and free from defects and shall comply with the relevant clauses of the Specification.

All references to Standard Specifications are to be the latest amendment to such specifications.

Materials bearing the SANS or BS mark will not be subjected to tests to determine whether they comply with the relevant specifications. The Engineer may in his discretion require any material not bearing such mark to be tested in accordance with the relevant specifications; should he do so the Contractor shall arrange for such tests to be carried out to the Contractor's cost by the South African Bureau of Standards or other approved body.

Whether or not the material bears the mark or is tested, any material found not to be in accordance with the specification shall be rejected and replaced by the Contractor at his own cost.

Tenderers may be required, at their own expense to submit samples of the material offered to the Engineer for his approval and the material supplied under his contract shall be of a standard equal to that of the samples so submitted and approved. Samples will remain the property of the Tenderers, who shall remove them when called upon to do so by the Engineer.

PSA 2.3 DEFINITIONS

IN THE OPENING PHRASE, INSERT THE WORDS: "the definitions given in the Conditions of Contract and" BETWEEN THE WORDS "specification" AND "the following".

a) <u>General</u>

ADD THE FOLLOWING DEFINITIONS:

'General Conditions' and 'Conditions of Contract': The General Conditions of Contract specified for use with this Contract, together with the Special Conditions of Contract as applicable.

'Specified': As specified in the Standardized Specifications, the Drawings or the Project Specifications. 'Specifications' shall have the corresponding meaning.

b) <u>Measurement and payment</u>

REPLACE THE DEFINITIONS FOR "Fixed charge", "Time-related charge" AND "Value-related charge" WITH THE FOLLOWING:

'Fixed charge': A charge that is not subject to adjustment on account of variations in the value of the Contract Price or the time allowed in the Contract for the completion of the work.

'Time-related charge': A charge, the amount of which varies in accordance with the Time for Completion of the Works, adjusted in accordance with the provisions of the Contract.

'Value-related charge': A charge, the amount of which varies pro rata with the final value of the measured work executed and valued in accordance with the provisions of the Contract.

Add the following new sub-clause.

PSA 2.3.1 DELAY DUE TO SUPPLY OF MATERIALS AND ORDERING

The Contractor shall ensure that the work is not delayed, due to the lack of materials on the site of the works, by placing orders with suppliers for the materials required under his contract as soon as possible after the acceptance of this tender.

The Contractor shall, by producing copies of written orders or written enquiries for supplies, prove to the satisfaction of the Engineer that any delay occasioned by non- availability of materials has been caused by the ability of suppliers to supply and not by his own lack of timely ordering or lack of exhaustive enquiry for supplies, before any extensions of the contract time will be allowed due to such delays.

The quantities set out in the Schedule of Quantities have been clearly determined calculations based on data available at the time and should therefore be considered to be approximate quantities only. Before ordering materials of any kind the Contractor shall check with the Engineer whether or not the scope of the work for which the materials are required is likely to change substantially. No liability or responsibility whatsoever shall be attached to the Employer for materials ordered by the Contractor except when ordered in accordance with written confirmation issued by the Engineer.

PSA 2.4 ABBREVIATIONS

a) Abbreviations relating to standard documents

ADD THE FOLLOWING ABBREVIATION:

"CKS : SABS Co-ordinating Specification."

PSA 3 MATERIALS

PSA 3.1 QUALITY

ADD THE FOLLOWING AT THE END OF SUBCLAUSE 3.1:

All manufactured materials supplied shall be new materials unless the contrary is specified. All materials specified to be in accordance with SANS Specifications shall bear the SANS mark."

ADD THE FOLLOWING SUB-CLAUSES TO SUBCLAUSE 3:

PSA 3.3 ORDERING OF MATERIALS

The quantities set out in the Schedule of Quantities have been carefully determined from calculations based on data available at the time of its compilation but are to be considered as approximate quantities only. Before ordering materials of any kind, the Contractor shall be solely responsible for determining, from the drawings issued or approved by the Engineer for construction purposes, the actual quantities of materials required for the execution of the Works. No liability or responsibility whatsoever shall be attached to the Employer or the Engineer in respect of materials ordered by the Contractor except when ordered in accordance with the drawings issued or approved by the Engineer for construction purposes.

PSA 4 PLANT

PSA 4.1 SILENCING OF PLANT

REPLACE THE CONTENTS OF SUBCLAUSE 4.1 WITH THE FOLLOWING:

"The Contractor's attention is drawn to the applicable regulations pertaining to noise and hearing conservation, framed under the Occupational Health and Safety Act (Act No. 85 of 1993) as amended."

The Contractor shall at all times and at its own cost, be responsible for implementing all necessary steps to ensure full compliance with such regulations, including but not restricted to the provision and use of suitable and effective silencing devices for pneumatic tools and other Plant which would otherwise cause a noise level in excess of that specified in the said regulations.

"Where appropriate, the Contractor shall further, by means of temporary barriers, effectively isolate the source of such noise in order to comply with the said regulations."

PSA 4.2 CONTRACTOR'S OFFICES, STORES AND SERVICES

ADD THE FOLLOWING PARAGRAPH BEFORE THE EXISTING FIRST PARAGRAPH IN SUBCLAUSE 4.2:

"The Contractor's buildings, sheds and other facilities erected or utilized on the Site for the purposes of the Contract shall be fenced off and shall contain all offices, stores, workshops, testing laboratories, toilet facilities, etc. as may be required by the Contractor. The facilities shall always be kept in a neat and orderly condition.

"A night-watchman may be on the Site after hours."

DELETE "and first-aid services" IN THE SECOND PARAGRAPH OF SUBCLAUSE 4.2 AND ADD THE FOLLOWING:

"The Contractor shall provide on the Site and in close proximity to the actual locations where the work is being executed, one toilet per 10 workmen, which toilets shall be effectively screened from public view and their use enforced. Such toilets shall be relocated from time to time as the location of the work being executed changes, so as to ensure that easy access to the toilets is maintained."

"The Contractor shall, where applicable, make all necessary arrangements and pay for the removal of night soil."

Add the following new sub-clause:

PSA 4.3 CONSTRUCTION PLANT

Construction plant, where the use thereof is permitted, shall be of a suitable type for carrying out the work for which it is required. Its capacity shall be sufficient to meet the requirements of the work within the contract time. It shall be kept at all times in full working order and repair.

PSA 5 CONSTRUCTION

PSA 5.1 SURVEY

PSA 5.1.2 Preservation and Replacement of Survey Beacons and Pegs Subject to the Land Survey Act

DELETE THE WORDS: "in the vicinity of boundaries" IN THE SECOND SENTENCE OF SUBCLAUSE 5.1.2 AND REPLACE THE WORDS: "under the direction of" IN THE SAME SENTENCE WITH: "in consultation and liaison with".

ADD THE FOLLOWING AFTER THE SECOND SENTENCE OF SUBCLAUSE 5.1.2:

"The Contractor and the Engineer shall record on the said list, their concurrence or disagreement (as the case may be) regarding the completeness and accuracy of the details recorded therein."

REPLACE THE THIRD SENTENCE OF SUBCLAUSE 5.1.2 WITH THE FOLLOWING:

"At the completion of the Contract, the Contractor shall expose all pegs that were listed at the commencement of the construction as being in order and the Contractor shall arrange with a registered Land Surveyor for the checking of the positions of all such pegs and the replacement of any thereof which the Land Surveyor's check reveals have become disturbed or damaged. The Contractor shall, as a precedent to the issue of the Certificate of Completion, provide to the Engineer, a certificate from the Registered Land Surveyor, certifying that all the pegs listed at the commencement of construction in accordance with the provisions of this clause, have been checked and that those found to have been disturbed, damaged or destroyed have been replaced in their correct positions, all in accordance with the provisions of the said Act.

The cost of all checking, replacement and certification as aforesaid shall be entirely for the Contractor's account; provided always that the Contractor shall not be held liable for the cost of replacement of pegs which:

a) cannot reasonably be re-established in their original positions by reason of the finished dimensions of the Permanent Works; and

b) the Contractor can prove beyond reasonable doubt to the satisfaction of the Engineer, were disturbed, damaged or destroyed by others beyond its control."

PSA 5.3 PROTECTION OF EXISTING STRUCTURES

REPLACE: "Machinery and Occupational Safety Act, 1983, (Act No. 6 of 1983)" WITH: "Occupational Health and Safety Act, 1993 (Act No. 85 of 1993), as amended," AND INSERT THE FOLLOWING AFTER "(Act No. 27 of 1956)": "as amended".

PSA 5.4 PROTECTION OF OVERHEAD AND UNDERGROUND SERVICES

Replace the heading and the contents of this sub-clause with the following:

PSA 5.4 LOCATION AND PROTECTION OF EXISTING SERVICES

PSA 5.4.1 Location of existing services

Before commencing with any work in an area, the Contractor shall ascertain the presence and actual position of all services which can reasonably be expected by an experienced and competent Contractor to be present on, under, over or within the Site.

Without in any way limiting its liability in terms of the Conditions of Contract in relation to damage to property and interference with services, the Contractor shall, in collaboration with the Engineer, obtain the most up-to-date plans as are available, showing the positions of services existing in the area where it intends to work. Neither the Employer nor the Engineer offer any warranty as to the accuracy or completeness of such plans and because services can often not be reliably located from plans, the Contractor shall ascertain the actual location of services depicted on such plans by means of careful inspection of Site and the provision and utilization of suitable detecting and testing equipment.

Thereafter, the Contractor shall, by the use of appropriate methodologies carefully expose the services at such positions as are agreed to by the Engineer, for the purposes of verifying the exact location and position of the services. Where the exposure of existing services involves excavation to expose underground services, the further requirements of Sub-clauses 4.4 and 5.1.2.2 of SANS 1200D (as amended) shall apply.

The aforesaid procedure shall also be followed in respect of services not shown on the plans but which may reasonably be anticipated by an experienced Contractor to be present or potentially present on the site.

All services, the positions of which have been determined as aforesaid at the critical points, shall henceforth be designated as 'Known Services' and their positions shall be indicated by the Contractor on a separate set of Drawings, a copy of which shall be furnished to the Engineer without delay.

As soon as any service which has not been identified and located as described above is encountered on, under, over or within the Site, it shall henceforth be deemed to be a Known Service and the aforesaid provisions pertaining to locating, verifying and recording its position on the balance of the Site shall apply. The Contractor shall notify the Engineer immediately any such service is encountered or discovered on the Site.

Whilst it is in possession of the Site, the Contractor shall be liable for all loss of or damage as may occur to:

a) Known Services, anywhere along the entire lengths of their routes, as may reasonably be deduced from the actual locations at which their positions were verified as aforesaid, due cognizance being taken of such deviations in line and level which may reasonably be anticipated; and

a) any other service which ought reasonably to have been a Known Service in accordance with the provisions of this clause;

as well as for consequential damage, whether caused directly by the Contractor's operators or by the lack of proper protection;

Provided always that the Contractor will not be held liable in respect of damages occurring to services not being Known Services.

No separate payment will be made to the Contractor in respect of its costs of providing, holding available on the Site and utilizing the said detecting and testing equipment, nor for any costs incurred in preparing and submitting to the Engineer, the Drawings as aforesaid and these costs shall be deemed included in the Contractor's other tendered rates and prices included in the Contract.

Payment to the Contractor's in respect of exposing services at the positions agreed by the Engineer and as described above will be made under the payment items (if any) as may be provided therefore in the respective sections of the Specifications pertaining to the type of work involved.

PSA 5.4.2 Protection during construction

The Contractor shall take all reasonable precautions and arrange its operations in such a manner as to prevent damage occurring to all Known Services during the period which the Contractor has occupation and/or possession of the Site.

Services left exposed shall be suitably protected from damage and in such a manner as will eliminate any danger arising there from for the public and/or workmen, all in accordance with the requirements of the prevailing legislation and related regulations.

PSA 5.4.3 Alterations and repairs to existing services

Unless the contrary is clearly specified or ordered, the Contractor shall not carry out alterations to existing services. When this is necessary, the Contractor shall inform the Engineer, who will either make arrangements for such work to be executed by the owner of the service, or instruct the Contractor to make such arrangements himself.

When the Contractor damages existing services, he shall immediately inform the Engineer or the relevant authority and obtain instructions as to who should carry out repairs. In urgent cases the Contractor shall take the necessary steps to minimize damage to and interruption of the service. No repairs of telecommunication cables or electric power lines and cables shall be attempted.

The Employer will accept no liability for damages due to a delay in having such alterations or repairs affected. The Contractor shall provide all reasonable opportunity, access and assistance to persons carrying out alterations or repairs of existing services.

PSA 5.7 SAFETY

REPLACE THE CONTENTS OF SUBCLAUSE 5.7 WITH THE FOLLOWING:

"Pursuant to the provisions of the Conditions of Contract, and without in any way limiting the Contractor's obligations there under, the Contractor shall at its own expense (except only where specific provision (if any) is made in the Contract for the reimbursement to the Contractor in respect of particular items)":

a) Provide to its Employees on the Site of the Works, all safety materials, clothing and equipment necessary to ensure full compliance with the provisions of the Occupational Health and Safety Act (Act No 85 of 1993) as amended (hereinafter referred to as the Act) at all times, and shall institute appropriate and effective measures to ensure the proper usage of such safety materials, clothing and equipment at all times; and

b) Provide, install and maintain on all barricades, safety signage and other measures to ensure the safety of workmen and all persons in, on and around the Site, as well as the general public; and

c) Implement on the Site of the Works, such procedures and systems and keep all records as may be required to ensure compliance with the requirements of the Act at all times; and

d) Implement all necessary measures as to ensure compliance of the Act by all subcontractors engaged by the Contractor and their employees engaged on the Works; and

e) Comply fully with all other requirements pertaining to safety as may be specified in the Contract.

The Employer and the Engineer shall be entitled, although not obliged, to make such inspections on the Site as they shall deem appropriate, for the purpose of verifying the Contractor's compliance with the requirements of the Act. For this purpose, the Contractor shall grant full access to the Site of all parts of the Site and shall co-operate fully in such inspections and shall make available for inspection, all such documents and records as the Employer's and/or Engineer's representative may reasonably require.

Where any such investigations reveal, or where it comes to the Engineer's attention that the Contractor is in any way in breach of the requirements of the Act or is failing to comply with the provisions of this clause, the Engineer shall, in accordance with the provisions of Clause 42 of the Conditions of Contract, be entitled to suspend progress on the Works or any part thereof until such time as the Contractor has demonstrated to the satisfaction of the Engineer, that such breach has been rectified.

The Contractor shall have no grounds for a claim against the Employer for extension of time and/or additional costs if the progress on the Works or any part thereof is suspended by the Engineer in terms of this clause and the Contractor shall remain fully liable in respect of the payment of penalties for late completion in accordance with the provisions of Clause 46(1) of the Conditions of Contract should the Contractor fail to complete the Works on or before the specified Due Date for Completion in consequence of the suspension.

Persistent and repeated breach by the Contractor of the requirements of the Act and/or this clause shall constitute grounds for the Engineer to act in terms of Sub-Clause 58(1)(b)(vi) of the Conditions of Contract and for the Employer to cancel the Contract in accordance with the further provisions of the said Clause 58."

Add the following new sub-clause:

All work and particularly work carried out in the proximity of buildings, bridges, tanks or other structures shall be carried out in conformance with the regulations framed under the Occupational Health and Safety Act, 1993 and the Minerals Act, (Act 50 of 1991) (including shoring where necessary) to ensure the safety of structures that are risk.

The Contractor shall make available for the duration of the contract safety helmets, gumboots and any other necessary safety equipment for sole use by the Engineer and his representative(s).

Add the following new sub-clause:

PSA 5.9 SECURITY

PSA 5.9.1 Security of Contractor's Plant and Personnel

The Contractor shall note that, notwithstanding any insurances which may be by the Employer, the Contractor shall be responsible for the effecting of safety and security of plant and personnel on and around the site of the works, and that no claims in this regard will be entertained by the Employer.

The sum entered by the Contractor in the Schedule of Quantities for effecting of safety and security of plant and personnel on and around the site of the works shall be deemed to include full compensation for all the necessary to effect the safety and security including, where necessary, the employment of the services of a security organization.

ADD THE FOLLOWING SUBCLAUSES TO CLAUSE 5:

PSA 5.10 SITE MEETINGS

The Contractor or its authorized agent will be required to attend regular site meetings, which shall normally be held twice a month on dates and at times determined by the Engineer, but in any case, whenever reasonably required by the Engineer. Unless otherwise indicated in the Contract or instructed by the Engineer, such meetings shall be held at the Contractor's offices on the Site. At such monthly meetings, matters such as general progress on the Works, quality of work, problems, claims, payments, and safety etc., shall be discussed, but not matters concerning the day-to-day running of the Contract.

PSA 6 TOLERANCES

ADD THE FOLLOWING SUBCLAUSE TO CLAUSE 6:

PSA 6.4 USE OF TOLERANCES

No guarantee is given that the full specified tolerances will be available independently of each other, and the Contractor is cautioned that the liberal of full use of any one or more of the tolerances may deprive him of the full or any use of tolerances relating to other aspects of work.

Except where the contrary is specified, or when clearly not applicable, all quantities for measurement and payment shall be determined from the 'authorized' dimensions. These are specified dimensions or those shown on the Drawings or, if changed, as finally prescribed by the Engineer, without any allowance for the specified tolerances. Except if otherwise specified, all measurements for determining quantities for payment will be based on the 'authorised' dimensions.

PSA 7 TESTING

PSA 7.1 PRINCIPLES

PSA 7.1.2 Standard of Finished Work Not to Specification

INSERT THE WORDS "or checks by an approved laboratory ..." AFTER THE WORDS "Where the Engineer's checks ..." IN THE FIRST LINE OF SUBCLAUSE 7.1.2.

PSA 7.2 APPROVED LABRORATORIES

REPLACE THE CONTENTS OF SUB-CLAUSE 7.2 WITH THE FOLLOWING:

"Unless otherwise specified in the relevant specification or elsewhere in the Project Specification, the following shall be deemed to be approved laboratories in which design work, or testing required in terms of a specification for the purposes of acceptance by the Engineer of the quality of materials used and/or workmanship achieved, may be carried out:

a) any testing laboratory certified by the South African National Accreditation Systems (SANAS) in respect of the nature and type of testing to be undertaken for the purposes of the Contract;

b) any testing laboratory owned, managed or operated by the Employer or the Engineer;

c) any testing laboratory established and operated on the Site by or on behalf of the Employer or the Engineer.

PSA 8 MEASUREMENT AND PAYMENT

PSA 8.1.1 Method of Measurement, All Sections of the Schedule

DELETE THE WORDS: "and South West Africa".

PSA 8.1.2 Preliminary and General Item or Section

PSA 8.1.2.1 Contents

"Separate items will be scheduled to cover the Fixed, Value-related and Time-related components of the Contractor's Preliminary and General Costs."

AND REPLACE THE WORDS "substantial completion" IN SUBCLAUSE 8.1.2.1(c) WITH "Certificate of Completion".

PSA 8.1.2.2 Tendered sums

REPLACE THE CONTENTS OF THIS SUBCLAUSE WITH THE FOLLOWING:

"Except only where specific provision is made in the Specifications and/or the Schedule of Quantities for separate compensation for any of these items, the Contractor's tendered sums under items PSA 8.3 and PSA 8.4 shall collectively cover all charges for:

- risks, costs and obligations in terms of the Conditions of Contract and of this standardized specification; and
- head-office and site overheads and supervision; and
- profit and financing costs; and
- expenses of a general nature not specifically related to any item or items of the permanent or temporary work; and

- providing such facilities on Site as may be required by the Contractor for the proper performance of the Contract and for its personnel, including, but without limitation, providing offices, storage facilities, workshops, ablutions, for providing services such as water, electricity, sewage and rubbish disposal, for access roads and all other facilities required, as well as for the maintenance and removal on completion of the Works of these facilities and for the cleaning-up of the site of the Contractor's establishment and reinstatement to not less than its original condition.
- providing the facilities for the Engineer and his staff as specified in the Contract and their removal from the Site on completion of the Contract."
- providing security for Contractor's Plant and Personnel
- compliance with Occupational Health and Safety

PSA 8.2 PAYMENT

PSA 8.2.1 Fixed-Charge and Value-Related Items

REPLACE THE CONTENTS OF SUBCLAUSE 8.2.1 WITH THE FOLLOWING:

PSA 8.2.1.1 Fixed Charge Items

"Payment of fixed charges in respect of item 8.3.1 will be made as follows:

a) EIGHTY PERCENT (80%) of the sum tendered will be paid when the facilities have been provided and approved; and

b) The remaining TWENTY PERCENT (20%) will be paid when the Works have been completed, the facilities have been removed and the site of the Contractor's establishment has been cleared and cleaned to the satisfaction of the Engineer.

c) No adjustment will be made to the sum tendered in respect of item 8.3.1 should the value of the Works finally executed or the Time for Completion vary in any way from that specified in the Tender.

PSA 8.2.2 Time-related items

REPLACE THE CONTENTS OF SUBCLAUSE 8.2.2 WITH THE FOLLOWING:

"Subject to the provisions of Subclauses 8.2.3 and 8.2.4, payment under item 8.4.1 (time-related item) will be made monthly in equal amounts, calculated by dividing the sum tendered for the item by the tendered contract period in months;

Provided always that the total of the monthly amounts so paid for the item is not out of proportion with the value of the progress of the Works as a whole.

ADDITIONAL CLAUSES: Add the following:

PSA 9 Foreign exchange risks

the provision of forward cover against foreign exchange fluctuations on any imported goods or equipment required under this Contract is compulsory. Refer to the Special Conditions of Contract.

PSA 10 Measurement and Payment

Provision is made in the Schedule of Quantities for the insertion of Provisional Sums and Lump Sums to cover the following:

(i) Variations in exchange rates prior to obtaining forward cover;
(ii) The cost of paying forward cover.

The sums actually paid by the Client will be determined in accordance with the Special Conditions of Contract.

PSD SANS 1200D: EARTHWORKS
PSD.3 MATERIALS
PSD.3.1 CLASSIFICATION FOR EXCAVATION PURPOSES
PSD.3.1.1 Method of Classifying
REPLACE THE CONTENTS OF SUBCLAUSE 3.1.1 WITH THE FOLLOWING:

"The Contractor may use any method he chooses to excavate any class of material but his chosen method of excavation shall not determine the classification of the excavation. The Engineer will decide on the classification of the materials. Said classification will be based on the criteria as stated in PSD 3.1.2 as described below. All equipment described in PSD 3.1.2 to be in a good mechanical condition and be operated efficiently by an experienced operator. "**Efficiently**" meaning "in a manner that can reasonably be expected of a contractor, having regard for the production achieved". In the event of a disagreement between the Engineer and the Contractor, it shall be the responsibility of the Contractor, if so required and subject to the provisions of 4.1, to make available at his own expense such equipment as is specified in PSD 3.1.2 in order to assess the reasonable removability or otherwise of the material. The Engineers decision shall then, subject to the provisions of the contract, be final and binding."

PSD 3.1.2 Classes of Excavation
REPLACE THE CONTENTS OF SUBCLAUSE 3.1.2(a), (b) and (c) WITH THE FOLLOWING:

"The excavation of material will be classified as follows for purposes of measurement and payment:

(a) <u>Soft excavation</u>

1. Soft excavation shall be excavation in material that can be efficiently removed or loaded, without prior ripping, by the following plant:

i. a track type back-acting excavator unit of total mass of approximately 30t and flywheel power approximately 150kW.

(b) Hard rock excavation

1. Material shall be deemed to be hard rock when a track type back-acting excavator unit with a total mass of approximately 30t and a flywheel power of approximately 150kW fails to achieve a trenching production rate of 10m per hour.
2. Hard rock excavation shall be excavation in material that cannot be efficiently removed without blasting or without wedging and splitting.
3. Small quantities of hard material which can be removed by means of pneumatic equipment such as an excavator mounted hydraulic hammer or pneumatic hand tools will also be classified as hard rock.

(c) Intermediate excavation

1. There will be no intermediate classification of material for this contract. Material will be either soft excavation or hard excavation and will be classified as described in (a) and (b) above.

(d) Approval for Blasting

1. Permission for the use of explosives will only be given once the engineer has been notified that the hard excavation conditions have been encountered and when he has verified that excavation by conventional means is not possible.
2. All blasting will take place in accordance within the safety and security regulations applicable to such activities.

PSD.5 CONSTRUCTION
PSD.5.1. PRECAUTIONS
PSD 5.1.1. SAFETY

D.5.1.1.1.3 Explosives

Add the following:

"Blasting sites should be properly covered to the satisfaction of the Engineer and the Contractor will be held responsible for any damages which occur due to blasting." Certificates of Competency and Permits must be available and should be produced for inspection at the request of the Engineer.

PSD.5.2 METHODS AND PROCEDURES
PSD.5.2.2 EXCAVATION
PSD.5.2.2.3 Disposal

Add the following:

"Surplus material will be disposed and finished off on site or at an approved site in compliance with the Engineers requirements"

Contractor	Witness 1	Witness 2	Employer	Witness 1	Witness 2

PSD.5.2.5.1 Freehaul

REPLACE THE CONTENTS OF SUBCLAUSE 5.2.5.1(a) and (b) WITH THE FOLLOWING:

"The freehaul distance within which the Contractor will be required to move material without separate compensation shall be 5km."

PSD.7 TESTING

PSD.7.2 TAKING AND TESTING OF SAMPLES

The Contractor shall include in his rate for the cost of density testing. These tests will be carried out on each layer of material utilized for filling.

PSDA SANS 1200 DA: EARTHWORKS (SMALLWORKS)

DA.3 MATERIALS

PSDA.3.1 CLASSIFICATION FOR EXCAVATION PURPOSES

PSDA 3.1.1 METHOD OF CLASSIFYING

Add the following:

In case of excavation by hand, the following method of classification will be used:

3.1.2(a) **Soft excavation** will be classified as material which can be excavated with a pick and shovel. Should this material be measured with a DCP testing apparatus, the density of the material will be such that a penetration of not less than 10mm per blow will occur for every layer of 150mm.

3.1.2(b) **Intermediate excavation** will be classified as material which can be excavated with a pick and shovel and the penetration of a DCP testing apparatus is less than 10mm per blow

3.1.2(c) **Hard Rock excavation** will be classified as material which can only be removed with compressed air equipment, wedging and blasting.

PSDA 3.1.2 Classes of Excavation

REPLACE THE CONTENTS OF SUBCLAUSE 3.1.2(a), (b), and (c) WITH THE FOLLOWING:

"The excavation of material will be classified as follows for purposes of measurement and payment:

(a) Soft excavation

1. Soft excavation shall be excavation in material that can be efficiently removed or loaded, without prior ripping, by the following plant:

i. a track type back-acting excavator unit of total mass of approximately 30t and flywheel power approximately 150kW.

(b) Hard rock excavation

1. Material shall be deemed to be hard rock when a track type back-acting excavator unit with a total mass of approximately 30t and a flywheel power of approximately 150kW ***fails to achieve a trenching production rate of 10m per hour.***
2. Hard rock excavation shall be excavation in material that cannot be efficiently removed without blasting or without wedging and splitting.
3. Small quantities of hard material which can be removed by means of pneumatic equipment such as an excavator mounted hydraulic hammer or pneumatic hand tools will also be classified as hard rock.

(c) Intermediate excavation

1. There will be **no intermediate classification** of material for this contract. Material will be either soft excavation or hard excavation and will be classified as described in (a) and (b) above.

(d) Approval for Blasting

1. Permission for the use of explosives will only be given once the Engineer has been notified that hard excavation conditions have been encountered and when he has verified that excavation by conventional means is not possible.
2. All blasting will take place in accordance within the safety and security regulations applicable to such activities. Certificates of Competency and Permits must be available and should be produced for inspection at the request of the Engineer.

PSDB SANS 1200DB: EARTHWORKS (PIPE TRENCHES)
PSDB.3 MATERIALS
PSDB 3.7 SELECTION
Add the following:

"Where suitable backfilling material is available in layers of 150mm or more, it will be separated during excavation and utilized for backfilling. Should this material not be utilized, an estimation of the available quantity will be made and deducted from the material which was imported."

PSDB.5.6 BACKFILLING
PSDB 5.6.2 Material for Backfilling
Add the following:

"Rocks and rubble removed from the trench exceeding 250mm in diameter will be deemed unsuitable for backfilling above the bedding (cradle and blanket) and should be separated and removed to spoil."

PSDB 5.6.4 Disposal of Hard Rock and Intermediate Material
Add the following:

"It is the Contractors responsibility to level the disposed spoil heaps and tip the following loads on the levelled material. The Contractor will not be permitted to dispose of unsuitable material by just dumping it onto the horizontal surface. Excess material which cannot be flattened sufficiently will be removed from site to an approved spoil site. All excavated rock material exceeding 250mm in diameter is to be removed to an approved spoil site."

SANS 1200 L: MEDIUM PRESSURE PIPES
PSL 3 MATERIAL
PSL 3.10 Valves
PSL 3.10.1 Gate Valves

"All gate valves are to comply with SANS 1200 LK, must be of the "waterworks" type and be suitable for a working pressure of 16 bar. All valves to be clockwise (right hand) closing and the direction of opening and closing should be permanently displayed on the valve casing. Valves should be of the non-rising spindle type and be equipped with a square cap- top suitable for use with a valve spanner. Isolating valves should have a resilient seal rubber coated gate without a gate recess. All valves will be tested for watertightness. One valve spanner is to be provided for every 10 valves or less."

PSL 5.1.4 Depth and Cover
ADD THE FOLLOWING:

PSL 5.1.4.6 COVER

"A minimum cover of 800mm is required over the top of pipes inside the road reserve, in street reserves, underneath roads or as specified by levels on long sections and plans. Where instructed, pipes are to be encased in concrete."

PSL 7 TEST
PSL 7.3 Standard Hydraulic Pipe Test
PSL 7.3.1 Test Pressure and Time of Test
PSL 7.3.1.2 Test Pressure
ADD THE FOLLOWING:

"Before any connections are made, pipes are to be tested to 1.5 times the working pressure of the specific class of pipe. After connections have been done, the complete network is to be tested at the maximum static pressure as specified by the Engineer."

PSL 8 MEASUREMENT AND PAYMENT
PSL 8.2.6 Specials
ADD THE FOLLOWING:

"Where the new works are to be connected to existing pipelines or fittings, all costs associated with the excavation, removal of fittings, cutting in, joining, labour and complete finishing are deemed to be included in the tendered price."

SANS 1200 LB: BEDDING PIPES
PSLB 3 MATERIAL
PSLB 3.3 Bedding
ADD THE FOLLOWING:

"Class C bedding as applicable to rigid pipes is required. Material for the Class C bedding will only be imported where insufficient suitable material is obtainable from the excavated material. The selected blanket materiaal must cover the pipe by at least 200mm and not 300mm as specified in the applicable General Specification.

Where large diameter uPVC pipes (> 300mm diameter) are utilized, compaction on either side of the pipe should be carefully done in layers not exceeding 100mm in thickness to ensure that the bedding and pipe act as a "pipe-soil system" to prevent ovality of the pipes occuring during backfilling"

PSLB 3.4 Selection
PSLB 3.4.2 Suitable Material not available from the trench excavation
ADD THE FOLLOWING:

"Should there during selective excavation methods (including screening) with the correct tools still be insufficient suitable material available for the bedding, material must be imported. The Contractor will find a suitable source of bedding material and submit it to the Engineer for approval.

The finding of a suitable source/quarry/borrow pit, loading, transport, placement and compaction of the imported material is deemed to be included in the rate tendered by the Contractor."

PSLB 5 CONSTRUCTION
PSLB 5.1.4 Compaction
ADD THE FOLLOWING:

"After excavation of the trench, the trench bottom will be levelled by means of a rake and compacted. Compaction may be conducted by hand tools. The required compaction to be achieved must exceed or equal 90% Mod ASHTO density.

After installation of the pipes, similar compaction must be applied to the blanket material. Now the final backfilling to 50mm above the adjacent soil levels may be carried out. The total working area shall then be finished off. Only when specified by the Engineer will sidewalks be finished to specific standards and levels.

Where streets and roads are crossed, compaction of the bedding and backfill must be conducted by mechanical means to achieve a density of 98% Mod AASHTO."

PSG CONCRETE (STRUCTURAL) (SANS 1200 G)

PSG2 **Interpretations**

PSG2.1 **Definitions (Subclause 2.3)**

Under (a) add:

A Constructional joint: a joint required on account of constraints or convenience in the method of construction and that is not a movement, contraction or expansion joint.

PSG2.2 **Exposure Condition (Subclause 2.4.1)**

All Concrete on the Works shall be as specified for severe exposure condition.

PSG2.3 **Strength Concrete (Subclause 2.4.2)**

Grade 30MPa/19mm means strength concrete grade 30 MPa with 19 mm stone.

PSG2.4 **Joints**

Notwithstanding Subclause 2.4.3, designed joints will only be joints that are shown on the drawings. Any other joints that are required by the contractor as a result of his construction constraints or for any other reason, whether approved by the Engineer or not, will not be considered to be designated joints as defined in Subclause 2.4.3, i.e. they will be considered to be non-designated joints.

PSG3 **MATERIALS**

PSG3.1 **Cement (Subclause 3.2)**

All cement used in the works shall be ordinary Portland cement complying with SANS 471.

PSG3.2 **Storage (Subclause 3.2.3)**

Cement shall be used in the order in which it is received. Unless approved by the Engineer, cement kept in storage for longer than 8 weeks shall not be used in the Works. Any cement that contains lumps that cannot easily be crumbled to powder between the fingers may not be used.

PSG3.3 **Water (Subclause 3.3)**

Only potable water from an approved source may be used for mixing concrete.

PSG3.4 **Aggregate (Subclause 3.4)**

The nominal stone size specified in the concrete grade (e.g. 30 MPa/40 mm) shall mean stone conforming to the grading specified in SANS 1083 for the nearest equivalent size, i.e. 40 mm means stone that complies with SANS 1083 for 37, 5 mm size. Aggregates with a shrinkage higher that 130% will not be allowed.

PSG 3.4.1 Coarse Aggregate

PSG 3.4.1.1 Coarse Aggregate must comply with the 10% FACT requirements set for durability.

PSG 3.4.1.2 The nominal aggregate size is the smallest of the 37.5 millimetre maximum particle size and 25% of the slab thickness.

PSG 3.4.1.3 If the nominal aggregate size is larger than 26.5 millimetres, the coarse aggregate must consist of a mixture of aggregates larger than 26.5 millimetres and aggregates smaller than 26.5 millimetres.

PSG 3.4.2 Fine aggregate

PSG 3.4.2.1 Fine aggregate may not contain more than 40% Silicon particles.

PSG 3.4.2.2 Adjustments must be made to the mixture design if the Fineness Modulus of the fine aggregates varies more than ± 0, 2 during construction.

PSG 3.4.3 Mixture Design

A complete concrete mixture design must be submitted to the Engineer for approval before the commencement of the works.

The Contractor must have sufficient cube moulds to make test cubes on a daily base on request of the Engineer.

Care must be taken with the design of the mixture, to limit bleeding to a minimum. Special attention must be given to the fine aggregate if bleeding occurs.

PSG3.5 **Samples (Subclause 3.4)**

At least one month before commencement of concrete work the contractor shall supply, at his own cost, representative samples to the engineer of the aggregates he intends using, together with certificates from an approved laboratory indicating that the aggregates comply with the specifications. Approximately 50 kg of each sample of aggregate shall be supplied.

After approval, these samples shall be taken as standard for the agreed aggregates to be used in the Works. If at any time during the course of the Contract the Engineer considers that there has been any deviation from the approved standard the contractor shall submit further tested samples of material to the Engineer for approval.

PSG3.7 **Admixtures (Subclause 3.5.1)**

The use of admixtures will be subject to the approval of the Engineer.
The information listed in Subclause 3.5.1 shall be provided.

PSG 3.9 **Water stops**

PSG 3.9.1 **Expansion Joints in the floor**

The expansion joints will be of the type, shape and size as shown on the drawings. Examples of materials used must be submitted to the engineer for approval

PSG 3.9.2 **Vertical and Horizontal Water stops in the Reservoir Wall.**

"Galvanized steel plates, 2, 0 millimetre thick en 300 millimetres in width, will be used in all construction joints in the reservoir wall. Alternative materials can be used if it will have the same water tightening effect.

PSG4 ***PLANT***

PSG4.1 **Mixing plant and vibrators (Subclauses 4.3 and 4.4)**

Standby mixers and vibrators of adequate capacity and with an independent power unit. Unit shall be maintained on site for immediate use in the event of breakdown of the regular mixers or vibrators or failure of the power supply.

PSG4.2 **Formwork Ties (Subclause 4.5.3)**

The use of sleeves for formwork ties through the walls of water-retaining structures will not be permitted. Ties, when cast in, shall have some form of positive anchorage to prevent any rotation when loosening formwork.

PSG4.3 **Formwork: Chamfers and Fillets**

Air exposed external angles in concrete work shall have 20 mm x 20 mm chamfers unless otherwise specified or ordered, but the top edge of a slab that is to receive and applied finish shall not be chamfered.

Internal corners in concrete work need not have fillets unless such fillets have been specified on the drawings or ordered by the Engineer.

PSG4.4 **Water-bath**

A temperature-controlled water-bath shall be provided on site. The water-bath shall be located under cover.

PSG5 **CONSTRUCTION**

PSG5.1 **REINFORCEMENT**

PSG5.1.1 **Fixing (Subclause 5.1.2)**

Fixing of reinforcing bars by welding and heating of bars will not be permitted.

PSG5.1.2 **Spacers**

Spacers of approved design include approved plastic or other proprietary spacers, or purpose made precast mortar blocks.

Where mortar blocks are being used they shall be properly shaped so as to slip out of position and shall be made of the same mix as the mortar of the concrete in which they are to be placed. The mortar shall be well compacted by approved means into the moulds to result in blocks with a density of at least 2 300 kg/m; and which are free from honeycombing. The mortar blocks shall be cured in water for at least 7 days. Blocks which have not been manufactured and cured strictly in accordance with these requirements or which are in any other way considered unsatisfactory by the Engineer, will be rejected and shall be removed from the site.

PSG5.1.3 **Cover (Subclause 5.1.3)**

In Subclause 5.1.3(a) amend the words bar or stirrup to read: bar, secondary reinforcement, tie stirrup, tying-wire knots or wire ends.
Add to Subclause 5.1.3: (a) Tying wire may not encroach on the specified minimum cover by more than a single strand thickness. The cover to steel reinforcement shall not be less than 50 mm.

PSG5.2 **FORMWORK**

PSG5.2.1 **Classification of finishes (Subclause 5.2.1)**

Formwork for formed concrete surfaces against which backfill will be placed shall be rough. Formwork for formed concrete surfaces shall be smooth, except where otherwise specified.

PSG5.2.2 **Special Smooth Finish**

All concrete surfaces that will be exposed above the final ground levels shall have a special smooth finish to a Degree of Accuracy. The formwork used shall be high-grade, unblemished and regular in size. Formwork ties shall be placed in a regular pattern. The special smooth finish shall be an off-shutter finish to the concrete such that no after treatment is required other than at the positions of formwork ties.

PSG5.3 **CONCRETE**

PSG5.3.1 **General (Subclause 5.5.1.1)**

The concrete mix design for strength concrete must be prepared in an approved laboratory and the results of actual test mixes must be submitted for approval together with 7-day and 28-day strength test results. Special attention is drawn to the fact that the concrete mix used for water retaining structures must provide a very dense and impervious concrete.

No concrete shall be cast until the mix designs have been approved by the Engineer. The Engineer may call for revised mix designs at any stage during the Contract.

PSG5.3.2 **Slump (Subclause 5.5.1.2)**

The slump for vibrated concrete shall be a minimum of 30 millimetres en maximum of 70 millimetres and for hand-placed concrete a minimum of 70 millimetres and a maximum of 120 millimetres.

PSG5.3.3 **Workability (Subclause 5.5.1.3)**

If the necessary compaction of the concrete can not be obtained, a better quality aggregate must be used. The use of more water or any addition of admixtures may not be considered without the written permission of the engineer.

PSG5.3.4 **Chloride Content (Subclause 5.5.1.4)**

With reference to Table 4, efflorescence will not be acceptable on any exposed concrete surface.

PSG5.3.5 **Durability (Subclause 5.5.1.5)**

Add the following
*"*The water/cement ratio of all concrete mixes will not be more then 0,53."

PSG5.3.6 **Strength Concrete (Subclause 5.5.1.7)**

With the exception of mixes weaker than 15MPa, all concrete for structural units/the Works shall be considered to be strength concrete in terms of Subclause 5.5.1.7. All structural concrete shall be according to the prescribed strengths.

PSG5.3.7 **Strength Concrete (Subclause 5.5.3.1)**

Add the following

" If concrete is mixed by hand, the limit of the quantity of one single mix will be 0,25 cubic meters. Mixing will take place on a waterproof surface. The Cement and Sand will be mixed thoroughly before the addition of stone particles, whereafter the water will be added last.

PSG5.3.8 **Prevention and repair of plastic shrinkage cracks**

The contractor shall take whatever measures are necessary to prevent plastic shrinkage cracking in the concrete. Particularly on dry windy days or hot sunny days the contractor shall make provision for fine spraying of the concrete with black plastic sheeting. It may be necessary to change the aggregates or the concrete mix proportions.

If plastic shrinkage cracking occurs, the cracks shall be closed up by revibrating the concrete with a poker vibrator, within about three hours of casting. Once the cracks have been closed, the concrete shall be kept thoroughly wet, or covered with plastic sheeting for at least a further three hours.

PSG5.4 **CONSTRUCTION JOINTS (SUBCLAUSE 5.5.7)**

PSG5.4.1 **General**

The edge of joints, exposed to view in the finished structure, shall be formed with suitable beads to provide a straight edge true to line and level. As soon as practical, but not before 15 hours after placing, the construction joint surface shall be prepared to receive fresh concrete. This preparation, as specified in 5.5.7.3(a) to (d), shall be such as to improve all laitance or inert and strength less material which may have formed and the specified chipping or sand blasting, shall be such as to produce a roughened surface all over.

When concerting is interrupted, concrete surfaces shall be protected from the sun as specified in Subclause 5.5.8(d) of by means of hessian kept damp until concerting is resumed.

PSG5.4.2 **Formed Joints (Generally vertical or near vertical)**

Formed joints will be considered to be designated joints as defined in Subclause 2.4.3.
(The forming of a straight edge to a joint as specified in PSG5-4,1 does not constitute a formed joint).

Each joint shall be formed as shown on the drawings, complete with shear keys rebates, waffle formwork, V-feature, waterstops, Flexcell or similar joint filler, dowel bars and their PVC tubes, etc. as indicated.

PSG5.4.3 **Joints between Floors, Walls and Pillars**

Construction joints between foundations or footings and walls, or piers standing on them, shall not be made flush with the supporting surface, but shall be made at a distance above the floor or footing shown on the drawings or approved by the Engineer. The kicker (starter stub) shall be cast as an integral part of the bottom, floor or footing.

PSG5.5 **CURING AND PROTECTION (SUBCLAUSE 5.5.8)**

PSG5.5.2 **Formed Surfaces**

In order to improve the effectiveness of the curing treatment, the specified minimum time for the removal of the formwork shall be four days.

PSG5.5.3 **Curing Compound**

The use of membrane curing compounds will be allowed on vertical faces or steeply inclined faces (i.e. steeper than 45° to the horizontal) of cast in-situ members of the structures subject to the contractor producing sufficient, satisfactory cube crushing strength test results where the crushing strength of cubes which have been cured with the proposed curing membrane and left exposed to the elements are compared with those of an equal number of water cured cubes. The crushing strength of the cubes cured with the proposed membrane shall be at least 85% of the crushing strength of the water cured cubes.

The timing of power-floating is critical to its success. Power-floating steel shall not commence until the concrete can support the weight of a man without indentation and until the moisture sheen has disappeared. Thus several hours will have to elapse after concreting has been completed before this operation can commence. Night work may therefore be required.

This main objective of power floating the mortar skim on the no-fines under drainage layer is to achieve a plane, smooth surface. This need not be dense.

PSG5.6 **CONCRETE SURFACES (SUBCLAUSE 5.5.10)**

PSG5.6.1 **Screeded finish**

After placing and compacting, the concrete on a top (unformed) surface shall be struck off with a template to the designated grades and tampted with a tamping board to compact the surface thoroughly and to bring mortar to the surface, leaving the surface slightly ridged but generally at the required elevation. No mortar shall be added, and noticeable surface irregularities caused by the displacement of coarse aggregate shall be made good by re-screeding after the interfering aggregate has been removed or tampted.

PSG5.6.2 **Wood-floated finish (Subclause 5.5.10.1)**

Where wood-floating is ordered or scheduled, the surface shall first be given a finish as specified in PSG5.6.1 and, after the concrete has hardened sufficiently, it shall be wood-floated, either by hand or machine, only sufficiently to produce a uniform surface free from screeding marks.

PSG5.6.3 **Steel-floated finish**

Where steel-floating is specified or scheduled, the surface shall be treated as specified in PSG5.6.1 except that, when the moisture film has disappeared and the concrete has hardened sufficiently to prevent laitance from being worked to the surface, the screeded surface shall be steel-trowelled under firm pressure to produce a dense, smooth uniform surface free from trowel marks.

PSG5.6.4 **Power float finish**

Where power floating is specified or scheduled the surface shall be treated as specified in PSG5.6.2 except that when the moisture film has disappeared, and the concrete has hardened sufficiently to prevent laitance form being worked in the surface, the screeded surface shall be power floated to produce dense, smooth and uniform surface free of all trowel marks. In corners and areas of restricted access the concrete surface shall be finished by steel floating in accordance in PSG5.6.1. The timing of power-floating is critical to its success. Power-floating steel shall not commence until the concrete can support the weight of a man without indentation and until the moisture sheen has disappeared. Thus several hours will have to elapse after concreting has been completed before this operation can commence. Night work may therefore be required.

The main object of power floating the mortar skim on the no-fines underdrainage layer is to achieve a plane, smooth surface. This needs to be done.

PSG5.6.5 **Broom-swept finish**

Where broom-swept finish is specified, the surface shall be treated as specified in PSG5.6.2 and hereafter swept transversely (to the direction of the roadway paving) with a stiff bristle broom to produce an approved no-skid finish.

PSG5.6.6 **GRANOLITHIC SCREEDS**

PSG5.6.61 **General**

Before placing any granolithic screeds the base concrete shall be chipped to expose the aggregate over 100% of the area to be screeded and soaked with water for at least 24 hours.

The base concrete shall be thoroughly cleaned by scrubbing and all standing water removed after soaking. A 1:2 cement/sand grout shall then be brushed into the prepared surface followed by the granolithic screed before the grout sets. The granolithic screed shall be of the driest feasible consistency with a slump not exceeding 50mm and shall be formed true to profile and shape as required and shown on drawings. Before placing granolithic screed against and adjacent band of granolithic screed the edge of the latter shall be prepared by chipping back to firm material, wire brushing and brushing with grout as for the base concrete.

Granolithic screed shall be compacted to remove all air and shall be screeded and finished with a steel trowel to Degree of Accuracy 1.

The trowelling shall be carried out in the following stages:-

a) First – as soon as the granolithic screed has been compacted and screeded.
b) Second – after 2 hours to close the surface and remove laitance.
c) Third – after a further 24 hours.

The time intervals are estimated as appropriate to normal temperature conditions and shall be varied by the Contractor to ensure a smooth dense finish.

Granolithic screed shall be cured as specified in Subclause 5.5.8(b) but shall additionally be protected from direct sunlight and drying winds as it is being placed.

All screeding necessary to accommodate mechanical equipment shall be done under the equipment supplier's supervision and in strict accordance with his instructions. It shall be commenced as soon as the equipment supplier give notice on completion of erection and shall be finished expeditiously.

The Contractor shall make good any damage to the mechanical equipment resulting from his personnel not following the supplier's instructions. Any spillage on the equipment shall be cleaned off immediately.

PSG8 MEASUREMENT AND PAYMENT

PSG8.1 Reinforcement (Subclause 8.1.2.2 and 8.1.2.3)

Notwithstanding the method of measuring and paying for reinforcement specified in Subclause 8.1.2.2 and 8.1.2.3, reinforcement will be measured and paid for as scheduled.

PSG8.2 Concrete (Subclause 8.1.3.3)

The rates for concrete shall also cover:

1. The cost of the preparation of design mixes by an approved laboratory and submission for approval by the Engineer (PSG5-3.1)
2. The cost of non-designated joints (PSG2-2, 4)
3. Screeded finish of unformed surface as specified in PSG5-6,1 and
4. Wood-floated finish to exposed surfaces as specified in PSG5-6,2

PSG8.3 Joints (Subclause 8.5)

Only designated joints as shown on the drawings will be measured for payment according to the length of each type of joint constructed (PSG2-4). The rate shall cost of all materials, labour and plant required to construct each type of joint specified on the drawings, including the cost of all shuttering, treatment of the joint as specified in Subclause 5.5.7.3, the provision of chamfers as specified where concrete is exposed, as well as testing the repairing where necessary.

Non-designated joints will not be measured for payment.

PSG8.4 **Formed joints**

Formed joints will be measured by the plan area of the joint.

The rates shall cover the cost of all operations and materials specified in Subclause 5.5.7 and PSG5-4,2, and detailed on the drawings such as joint filler, dowel bars and tubes, bitumen coats, etc, but excluding water stops or water bars. Water stops and water bars will be measured by length separately for each type.

PSG8.5 **Formwork**

PSG8.5.1 **Edges of Blinding Layer**

No separate payment will be made for formwork to the edge of the blinding layer. The rates tendered for concrete to be blinding layer shall cover the cost of such formwork.

PSG8.5.2 **Kickers**

Formwork to the edges of kickers will be measured as plain vertical or plain circular as applicable (not as narrow widths).

PSG8.6 **Unformed Surface Finishes (Subclause 8.4.4)**

The rates for unformed surface finishes shall cover the cost of providing the respective surface finish as specified in PSG5-6.

PSG8.7 **Holding Down Bolts**

Fixing of holding down bolts will be measured by number. The rate shall cover the cost of all things necessary to ensure that the bolts are effectively and rigidly held in position during casting, complete with sleeved pockets, all as detailed on the drawings.

PSG8.8 **Grouting**

Grouting of base plates and equipment bases will be measured by the volume of grout used.

The rate shall cover the cost of the supply and floating in the grout under the plates to ensure solid and complete filling of the gap.

PSG8.9 **Items cast in concrete**

Items cast in concrete will be measured by number separately for each type of item.

Notwithstanding Sub clause 8.2.6, the rate shall cover the cost of fixing in position and casting in the item as construction proceeds, irrespective of whether the Contractor chooses to fix the item in the formwork and cast it in directly or to box out a hole and group the item in subsequently.

The item will be measured and paid separately.

VAAL CENTRAL WATER

CONTRACT NO.

BW316/UPSHRMP/22

UPGRADING OF PUMP STATIONS ON THE HENKRIES RISING MAIN PIPELINE

SECTION C3.3

PROJECT SPECIFICATIONS

VAAL CENTRAL WATER

CONTRACT NO.

BW316/UPSHRMP/22

UPGRADING OF PUMP STATIONS ON THE HENKRIES RISING MAIN PIPELINE

PORTION 2: CONTRACT PART

C3.3.1

General Project Specifications

In the event of any discrepancy between the Project Specifications and a part or parts of SANS 1200 Standardized Specifications, the Schedule of Quantities or the Drawings, the Project Specifications shall take precedence. Where discrepancies arise with regard to the units of the payment items only, the units stated in the Schedule of Quantities shall prevail.

PS 1 CONSTRUCTION PROGRAMME
PS 2 SITE FACILITIES AVAILABLE
PS 3 SITE FACILITIES REQUIRED
PS 4 FEATURES REQUIRING SPECIAL ATTENTION
PS 5 INFORMATION SUPPLIED BY EMPLOYER
PS 6 EXTENSION OF TIME ARISING FROM ABNORMAL RAINFALL
PS 7 CERTIFICATES OF PAYMENT
PS 8 CONSTRUCTION IN LIMITED AREAS
PS 9 NON-WORKING DAYS
PS 10 SPOIL MATERIAL
PS 11 DRAWINGS
PS 12 LENGTH OF TRENCHES
PS 13 SAMPLES
PS 14 MANUFACTURER'S INSTRUCTIONS
PS 15 MATERIALS AND PLANT
PS 16 NOTICES, SIGNS, BARRICADES AND ADVERTISEMENTS
PS 17 SETTING OUT OF WORK
PS 18 WORKMANSHIP AND QUALITY CONTROL
PS 19 TRANSPORT OF MATERIAL
PS 20 LIAISON WITH LOCAL AUTHORITIES
PS 21 LOCAL LABOUR AND LOCAL SUBCONTRACTORS
PS 22 TRAINING SCHEMES
PS 23 PRESCRIPTIONS IN RESPECT OF EXISTING SERVICES

PS 1 : CONSTRUCTION PROGRAMME

It is a prerequisite of this contract that minimal disruption of the public is ensured during construction. Construction methods must be of such a nature that no property or life is endangered. The Municipality accepts no responsibility for any work done outside the site boundaries without the Engineer's approval. The Contractor himself is responsible for liaison and arrangements with the Engineer in connection with the finalization and approval of the construction programme.

The Contractor is responsible for liaison with residents and house owners via the Project Steering Committee in respect of the programming of construction through private erven and the crossing of driveways to erven. No additional payment will be made in this regard and it shall be deemed to be covered by the relevant items.

Sufficient digital photographs of all existing structures and obstructions in the pipe line routes must be taken by the Contractor, compiled electronically, indexed and handed over to the Engineer before construction commences. A special payment item is included for a digital photo record in the Schedule of Quantities under other fixed-charge obligations.

The Contractor shall submit a programme of work to the Engineer not later than 14 (fourteen) days after the Contractor has been notified of the acceptance of his tender. This programme must take into account, and allow for phased completion of the work. The Engineer may instruct the Contractor to stop construction work at any stage and time, as may be dictated by financial constraints highlighted by the Clients Cost Control Programme.

If necessary, the Engineer may instruct the Contractor to adjust his programme to suit other activities.

The programme shall not be in the form of a bar chart only, but shall clearly show the anticipated quantities, the production rates and value of work to be performed each month.

A network-based programme according to the precedence method shall also be provided showing the various activities and critical path in such detail as may be required by the Engineer. The programme shall be updated monthly in accordance with the progress made by the Contractor.

Failure to comply with these requirements will entitle the Engineer to use a programme based on his own assumptions for the purpose of evaluating claims for extension of time or additional payments.

If the programme submitted by the Contractor in terms of Clause 15 of the General Conditions of Contract, has to be revised because the Contractor is falling behind in his programme, he shall submit a revised programme of how he intends to regain lost time to ensure completion of the Works within the period defined in Clause 45 of the General Conditions of Contract or within a granted extension of time. A proposal to increase the tempo of work must incorporate positive steps to increase production either by more labour and plant on the site, or by using the available labour and plant in a more efficient manner.

Failure on the part of the Contractor to submit or to work according to the programme or revised programmes shall be sufficient reason for the Engineer to take steps as set out in Clause 58 of the General Conditions of Contract.

The approval by the Engineer of a programme shall have no contractual significance other than the Engineer will be satisfied if the work is carried out according to the programme. The said approval shall not limit the right of the Engineer to instruct the Contractor to vary the programme if necessary. The Contractor shall allow for the effect of normal rainfall and special non-working days in his programme.

(CRITICAL PATH MUST BE INDICATED ON PROGRAMME)

PS 2 : SITE FACILITIES AVAILABLE

PS 2.1 : Camp site

The Contractor shall negotiate with property owners and make his own arrangements to obtain sites for the erection of offices, laboratories, yards, etc. Written approval must be obtained from the owners on whose property the camp is to be situated. The choice of all sites for the establishment of camps is subject to the approval of the Engineer. Campsites within the road reserve will not be permitted.

PS 2.2 : Water, electricity and sewage

The Contractor shall make his own arrangements concerning the supply of electrical power, water, telephone and all other services, both for use at the site establishment area as well as for the use in the construction of the Works. No direct payment shall be made for the provision of any service and the cost thereof shall be deemed to be included in the rates tendered for the various items of work for which these services are required.

PS 2.3 : Rain gauge

The contractor must set up his own rainfall gauge. This item is included in the Schedule of Quantities under other fixed-charge obligations.

PS 3 : SITE FACILITIES REQUIRED

PS 3.1 : Facilities for the Engineer

No separate office is required for the Engineer's representative but the Contractor must provide a table, a chair and a plan cupboard in one of his offices for the exclusive use of the Engineer's representative. The Engineer's representative shall be allowed free use of the Contractor's facilities. The Engineer's representative shall be allowed free use of survey equipment and survey assistants to carry out control work as and when required.

PS 3.2 : Equipment for Engineering staff

The Contractor shall allow for providing the following protective clothing for the engineering staff:

2 high visibility vests
2 hard hats (white)
2 Sets of safety boots

The contractor shall supply the Engineer with a Business cell phone and be responsible for the monthly running cost, and other cost relating to the use of the cell phone.

PS 3.3 : Water, electricity and sewage

The Contractor shall, at his own expense, be responsible for obtaining and distributing the water and electricity required for construction and domestic use. The distribution of water and electricity shall be carried out in accordance with the applicable laws and regulations.

No separate payment will be made for obtaining and distributing water and electricity, the cost of which will be deemed to be included in the tendered rates.

PS 3.5 : Site instruction book

A triplicate book shall be provided by the Engineer to be used for site instructions. It shall at all times be kept on the site.

PS 4 : FEATURES REQUIRING SPECIAL ATTENTION

PS 4.1 : Access to properties

The Contractor shall organize the work in such a manner as to cause the least possible inconvenience to the public and to the property owners adjacent to or affected by the work included in this contract.

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

The Contractor may, with the approval of the Engineer, make arrangements with the occupiers of the affected erven and properties to close off a portion of a street, road, footpath or entrance temporarily, provided the Contractor duly notifies the occupiers of the intended closure and its probable duration and shall, as punctually as possible, re-open the route at the prescribed time. Where possible, the road shall be made safe and re-opened to traffic overnight. Any such closure shall be made by arrangement between the Contractor and the occupiers and shall not absolve the Contractor from his obligations under the contract to provide access at all times. Barricades, traffic signs and drums shall be provided by the Contractor to suit the specific conditions. The Contractor shall also comply with all the requirements of the Local Authority with regard to safety, signage and notices to the public.

PS 4.2 : Existing residential areas

Access to the adjacent residential areas shall be maintained at all times, as shall access to individual houses.

Electricity and water supply interruptions to existing residential areas shall be kept to a minimum. Whenever it is necessary to interrupt these supplies, the Engineer's approval shall first be obtained. The affected residents shall then be notified in writing at least 3 days, but not more than 5 days in advance. Supplies shall be normalized by 16:00 on the same day.

Cognisance shall be taken by the Contractor of the possibility of residents from the adjacent residential areas having access, whether authorized or not, to the works. It is strongly emphasized that under no circumstances shall any claims be considered for delays or disruptions as a result of the presence of residents from the adjacent occupied areas.

PS 4.3 : Facilities to other Contractors

In addition to the requirements of clause 21 of the general conditions of contract, the Contractor must make allowance for the presence of other Contractors engaged on other contracts on the site, which may involve, inter alia, the adoption of his programme to fit in with work to be done by the other Contractors, as well as assuring other Contractors access to their sites along prescribed routes which may fall within the site of this contract.

PS 4.4 : Contractor's vehicles

All equipment and vehicles used by the Contractor shall be roadworthy at all times and all drivers and operators shall be in possession of valid drivers' licenses.

PS 4.5 : Site maintenance

During the progress of the work and upon its completion, the site of the works shall be kept and left in a clean and orderly condition. The Contractor shall at all times store materials and equipment for which he is responsible in an orderly manner, and shall keep the site free from debris and obstruction. Workers shall lunch or have tea breaks only in a designated area with approved refuse and toilet facilities.

No open fires shall be permitted on the site.

Vehicles and workers must adhere to property demarcated access routes and not take or make short cuts.

PS 4.6 : Testing and quality control

The Contractor shall engage the services of an approved independent testing laboratory for the testing of materials and the quality testing of layer works, to ensure that his work conforms to the specifications.

No separate payment will be made for such testing by an approved independent laboratory, the costs of which will be deemed to be included in the Contractor's tenderered rates for the various items of work requiring testing in accordance with the specifications.

Certificates shall be submitted to the Engineer for all materials and equipment included in the works, where applicable.

PS 4.7 : Subcontractors

The Contractor is responsible for work carried out on his behalf by subcontractors. The Engineer will not liaise directly with such subcontractors, and all problems relating to payments, programming, workmanship, etc, shall be the concern of the Contractor and the subcontractor, and the Engineer will not be involved.

PS 4.8 : Existing Services

Before the Contractor commences operations, he must discuss with and have the approval of the Employer, authority or owner concerned regarding the method he proposes to use for relocating or safe-guarding any services and existing works he may encounter during construction.

The positions of existing services shown on the Drawings are given in good faith and no guarantee can be given that:

(a) these services actually are in the approximate positions indicated.
(b) that these are the only services in the vicinity, and
(c) that the nature and description of these services are correct.

The Contractor shall be responsible to locate and safeguard any existing service or works he may encounter during construction and shall obtain clearance from the Employer, authority and the Engineer before commencing work in the proximity of existing services or works.

The Contractor shall be responsible for any damage to such existing services and works in the execution of this contract and shall reimburse the Employer, authority or the owner concerned for any repairs required and for damages.

The Contractor shall be responsible for immediately notifying the Engineer and the authorities concerned regarding any damage caused to public services and existing works.

Any alteration to public services shall be carried out by the Authority concerned unless the Contractor is instructed otherwise.

The Contractor shall provide the necessary assistance during any operations necessary in connection with the removal, alteration or safe-guarding of any public service.

PS 4.9 Safety

The Contractor shall apply suitable proven methods for construction so that his activities will not constitute a hazard to the public or any adjacent property. All excavations shall be suitably safeguarded and barricaded especially during night time, weekends or holidays and any other day of inactivity by the Contractor.

PS 5 : INFORMATION SUPPLIED BY EMPLOYER

Certain information contained in these contract documents, or provided separately, is being offered in good faith. However, in the circumstances pertaining to the type of information supplied, no guarantee can be given that all the information is necessarily correct or representative. More specifically this applies to all material surveys and reports and similar information, the accuracy of which is necessarily subject to the limitation of testing, sampling, the natural variation of material or formations being investigated and the measure of confidence with which conclusions can be drawn from any investigations carried out. It also applies to the positions of existing services as indicated on the drawings.

The Employer accepts no liability for the correctness or otherwise of the information supplied or for any resulting damages, whether direct or consequential, should it prove during the course of the contract that the information supplied is either incorrect or not representative. Any reliance placed by the tenderer on this information shall be at his own risk.

PS 6 : EXTENSION OF TIME ARISING FROM ABNORMAL RAINFALL

If abnormal rainfall or wet conditions occur during the course of the Contract, the Employer may grant an extension of time in accordance with Clause 45 of the General Conditions of Contract, calculated in accordance with the formula given below for each calendar month or part thereof:

$$V = (Nw - Nn) + (Rw - Rn)/X$$

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

The symbols shall have the following meanings:

V = Extension of time in calendar days for the calendar month under consideration. When the value of V for any month exceeds the number of days in the particular month, V will be the number of days in the month.

Nw = Actual number of days in the calendar month on which a rainfall of Y mm or more were recorded.

Nn = Average number of days, derived from existing rainfall records, on which a rainfall of Y mm or more were recorded for the calendar month.

Rw = Actual rainfall in mm recorded on the Site in an approved rain gauge for the calendar month under consideration.

Rn = Average rainfall in mm for the calendar month, derived from existing rainfall records.

The total extension of time is the algebraic sum of all the monthly totals for the period under consideration, but if the total is negative, the time for completion will not be reduced on account of subnormal rainfall. Extensions of time for part of a month will be calculated by using pro rata values for Nn and Rn.

The factor (Nw - Nn) is considered a fair allowance for variations from the average number of days during which the rainfall exceeds Y mm.

The factor (Rw - Rn)/X is considered a fair allowance for variations from the average number of days during which the rainfall did not exceed Y mm but wet conditions prevented or disrupted work.

The average rainfall record for the past 10 years at the nearest rainfall station shall be for the purposes of this Contract are taken as normal rainfall refer to table below. Rn and Nn for this period shall be used and the values of X and Y are 20 and 10 respectively.
The rainfall records for Thaba Nchu (14 km away from Botshabelo) for the period 1923 to 1993 were used to determine the monthly averages (Rn and Na) for this period and shall for the purposes of this Contract be taken as normal.

Month	Nn (days)
January	0
February	1
March	1
April	1
May	2
June	3
July	2
August	1
September	0
October	0
November	0
December	0
Total	**11**

PS 7 : CERTIFICATES OF PAYMENT

It was agreed that the master copy of the payment certificates would be drawn up and processed by the Contractor. All costs to this effect, as well as reproduction costs shall be to the account of the Contractor. It was agreed that the first month's certificate will be evaluated and if in order, the same format will be used throughout the contract.

PS 8 : CONSTRUCTION IN LIMITED AREAS

In certain cases working space may be limited. The method of construction in these restricted areas will depend largely on the Contractor's plant. However, the Contractor must note that measurement and payment will be according to the specified cross-sections and dimensions irrespective of the method used to achieve these cross-sections and dimensions, and that the rates and prices tendered shall be deemed to include full compensation for any difficulty encountered while working in limited areas and narrow widths, and that no extra payment will be made, nor will any claim for payment due to these difficulties be considered.

PS 9 : NON-WORKING DAYS

The Contractor shall not work on Sundays or on the following statutory Public Holidays: New Years Day, Human Rights Day, Good Friday, Family Day, Freedom Day, Workers Day, Youth Day, National Women's Day, Heritage Day, Day of Reconciliation, Christmas Day and Day of Goodwill. Whenever any of the above statutory Public Holidays fall on a Sunday, the following Monday shall be a Public Holiday.

Contractor	Witness 1	Witness 2	Employer	Witness 1	Witness 2

PS 10 : SPOIL MATERIAL

No indiscriminate spoiling of material will be allowed. All surplus or unsuitable material shall be spoiled in designated areas as directed by the Engineer. Spoiling shall comply with the applicable statutory and municipal regulations.

PS 11 : DRAWINGS

All "as built" information, as listed below, must be submitted to the Engineer's Representative before a certificate of completion will be issued. No separate payment will be made for the "as built" drawings

List of "as built" information required

(a) Exact coordinates or chainage on the centre line of the pipeline including the information regarding parallel or crossing of electrical, Telkom, Sewer and irrigation services..

(b) Exact coordinates and invert levels of all construction work

A Registered Land Surveyor shall be required to provide the above information.

Only figured dimensions shall be used and drawings shall not be scaled unless so instructed by the Engineer.

The Engineer will supply any figured dimensions which may have been omitted from the drawings.

PS 12 : LENGTH OF TRENCHES

Where no limitations are imposed by construction stages and unless otherwise permitted in writing by the Engineer, not more than 200 m of trench in any one place shall be opened in advance of pipe laying operations.

No trench may be left open over the builders' holidays.

PS 13 : SAMPLES

The Contractor shall at his own cost, supply all samples or tests that may be required. Material or work not conforming to the approved tests shall be rejected. The Engineer reserves to himself the right to submit samples to any tests to ensure that the material represented by the sample conforms to the requirements of the specifications. The cost of all tests failed shall be for the Contractor's account.

PS 14 : MANUFACTURER'S INSTRUCTIONS

The recommendations of the manufacturers of patented materials must be strictly adhered to regarding the use, mixing, application, fastening, etc. thereof except when otherwise instructed in writing by the Engineer.

PS 15 : MATERIALS AND PLANT

The contractor, when using materials that are required to comply with any standard specification, shall, if so ordered, furnish the engineer with certificates of compliance.

Where so specified, materials shall bear the official mark of the appropriate authority. Samples ordered or specified shall be delivered to the engineer's office on the site free of charge.

Where proprietary products have been specified, similar products may be used subject to the prior written approval of the engineer.

Unless otherwise specified, all proprietary materials shall be used and placed in strict accordance with the relevant manufacturer's current published instructions.

Unless anything to the contrary is specified, all manufactured articles or materials supplied by the contractor for the permanent works shall be unused.

Existing structures on the site shall remain the property of the employer and except as and to the extent required elsewhere in the contract, shall not be interfered with by the contractor in any way.

Materials to be included in the works shall not be damaged in any way and, should they be damaged on delivery or by the contractor during handling, transportation, storage, installation or testing they shall be replaced by the contractor at his own expense.

All places where materials are being manufactured or obtained for use in the works, and all the processes in their entirety connected therewith shall be open to inspection by the engineer (or other persons authorised by the engineer) at all reasonable times, and the engineer shall be at liberty to suspend any portion of work which is not being executed in conformity with these specifications.

The contractor shall satisfy himself that any quarry selected for use provides the necessary mined material in accordance with the specification.

PS 16 : NOTICES, SIGNS, BARRICADES AND ADVERTISEMENTS

The Contractor shall erect the necessary signs, notices and barricades for the duration of the contract in order to safeguard both the works and the public.

Notices, signs and barricades as well as advertisements may be used only upon approval by the Engineer, and the Contractor shall be responsible for their supply, erection, maintenance and ultimate removal and shall make provision for this in his tendered rates.

The Engineer shall have the right to have any sign, notice or advertisement moved to another position or to have it removed from the site of the works, should it in any way prove to be unsatisfactory, inconvenient or dangerous to the general public.

Such notices, signs and barricades shall be provided and erected at the Contractor's own expense.

The standard name board of the South African Association of Consulting Engineers is specified. The cost of which shall be included in the rates tendered for items 1300 (Colto) of the Schedule of Quantities.

PS 17 : SETTING OUT OF WORK

Reference and level beacons will be shown to the Contractor by the Engineer at the commencement of the Contract and the Contractor will be responsible for transferring the data to the Site of Works.

The Contractor shall check the condition and accuracy of all reference and level beacons and satisfy himself that they have not been disturbed and are true with regard to position and level. A beacon that has been disturbed shall not be used until its true position and level have been re-established and the new values have been certified by the Engineer. The Contractor shall thereafter be held entirely responsible for the protection of all reference and level beacons.

The Contractor shall employ a capable surveyor to set out the Works to the required lines and levels. The Engineer shall be informed immediately should any discrepancy be discovered between the levels or dimensions obtained by the Contractor and those shown on the drawings.

Where a beacon is likely to be disturbed during construction operations, the Contractor shall establish suitable reference beacons at locations where they will not be disturbed during construction. No beacons shall be covered over, disturbed or destroyed before accurate reference beacons have been established and details of the positions and levels of such beacons have been submitted to the Engineer. The Contractor's reference beacons shall be of at least the same accuracy and sturdiness of construction as the existing beacons.

The Contractor shall submit the method of setting out he proposes to employ to the Engineer. Accurate control of line and level shall be provided by the Contractor at all stages of construction.

Work set out by the Contractor may be checked by the Engineer and any errors found shall be rectified by the Contractor at his own expense. The Contractor shall supply any instrument, equipment, material and labour required by the Engineer for this survey work. Any assistance, including checking given to the Contractor by the Engineer or any setting out done by the Engineer for Contractor shall not be held as relieving the Contractor of his responsibility for the accurate construction of the Works.

The Contractor's survey instruments and survey equipment shall be suitable for the accurate setting out of the Works and shall be subject to the approval of the Engineer. They shall furthermore be checked and correctly adjusted by the authorized agents before the commencement of the contract and subsequently when required by the Engineer and when otherwise necessary.
When required the Contractor shall, at his own expense, provide two labourers to assist the Engineer. The Engineer shall have the sole right of approving of such a labourer.

Survey work shall not be measured and paid for directly and compensation for the work involved in setting out shall be deemed to be covered by the rates tendered and paid for the various items of work included under the contract.

PS 18 : WORKMANSHIP AND QUALITY CONTROL

The onus to produce work which conforms in quality and accuracy of detail to the requirements of the Specifications and Drawings rests with the Contractor, and the Contractor shall, at his own expense, institute a quality-control system and provide experienced Engineers, foremen, surveyors, materials technicians, other technicians and technical staff, together with all transport, instruments and equipment, to ensure adequate supervision and positive control of the works at all times.

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

The Contractor's attention is drawn to the provisions of the various standardized specifications regarding the minimum frequency of testing that will be required for process control. The Contractor shall, at his own discretion, increase this frequency where necessary to ensure adequate control.

On completion of every part of the work and submission thereof to the Engineer for examination, the Contractor shall furnish the Engineer with the results of all relevant tests, measurements and levels to indicate compliance with the specifications.

PS 19 : TRANSPORT OF MATERIAL

All costs of transporting material shall be included in the applicable tendered rates.

PS 20 : LIAISON WITH LOCAL AUTHORITIES

The Contractor will have to liaise with local authorities regarding the following matters:

(a) Dealing with traffic.
(b) Locating of existing underground services.
(c) Protection of existing services during construction.

All the relevant authorities were notified of above operations. It is then the Contractor's onus to immediately contact all these authorities and to accommodate their involvement in his programme of work. The Contractor should also warn the authorities at least 48 hours before the actual work commences. Compensation for delays, losses or accidents will not be considered should the Contractor at any time have failed to keep the local authorities informed.

The Engineer or Employer must immediately be notified, should the Contractor experience any problem regarding work which involve a local authority.

PS 21 LOCAL LABOUR AND LOCAL SUBCONTRACTORS

PS 21.1 Introduction

It is envisaged that the works will be constructed by one Contractor employing local labour to construct the work applying the principles of the Expanded Public Works Programme (EPWP).

PS 21.2 Workload

The Contractor is required to execute certain components of this contract with labour-based construction methods as described in paragraph PS 10.6.

PS 21.3 Assisting ABE's

The Contractor is required to assist ABE's in accordance with the Contractors proposal included in his/her tender.

PS 21.4 Local Labour

It is the intention that this Contract should make maximum use of the local labour force that is presently under-employed. To this end the Contractor is expected to limit non-local employees to key personnel only and to employ and train local labour on this Contract.
The Contractor shall complete the form: Annexure F and state how many non-local key personnel he intends to employ in the various categories. The numbers stated on the above-mentioned form will be strictly controlled during the Contract period and any increase in numbers is subject to the approval of the Employer.

A Project Steering Committee (PSC) has been formed and consists of representatives of the affected community, Mangaung Local Municipality and the Engineer. The PSC is up to date with the details of the project and appointment of all local labour must be through the PSC.

The Contractor will be required to arrange his own documentation regarding a contract for locally employed labour and must include provisions for the Occupational Health and Safety Act (1993) and the Compensation for Occupational Injuries and Diseases Act. The minimum daily wage to be paid in accordance with the Wage Bill for the geographical area shall be as stated in the Government Gazette in terms of Wage Determination for the Civil Engineering Industry.

PS 21.5 Contractors Obligations

The Contractor is to supply the Engineer with copies of the agreements between himself/herself and his/her subcontractors within twenty-one (21) days of the contract being awarded.

Should the Contractor be unable to or unwilling to:

i) Subcontract the required Works as detailed in his/her tender document;
ii) Submit the necessary documentation to prove that he/she is subcontracting the work as specified in paragraph PS 10.6.
iii) Implement his/her proposed training scheme or any other scheme agreed to by the relevant parties;

the Municipality reserves the right to:

a) nullify the said contract and re-issue it to tender;
b) nominate available local subcontractors for the required Works;
c) deduct payment from the monthly certificates, the value of which will be calculated as follows:

X = Y – Z

X = Amount of deduction from the monthly certificate
Y = Value of the work that should have been undertaken by the subcontractor during the month
Z = Value of the work actually undertaken by the Subcontractor during the month;
(d) = Nominate agents to undertake the proposed training at the expense of the Contractor.

PS 21.6 Work Considered to be Labour Based

It is a condition of this contract that the following components of work must be executed using labour based construction methods.

1) Excavation of soft/ intermediate / hard material in trenches not deeper than 1,5 m.
2) Shaping of open drains.
3) Preparation of pipe bedding.
4) Laying and jointing of all pipes.
5) Backfilling of all trenches with compaction excluded.
6) Location of existing services.

Note:

The abovementioned work must either be done by local labourers employed by the Contractor or by local subcontractors. In the Schedule of Quantities, as an alternative to machine excavation, the cost of a compulsory labour based construction activity is covered by using the standard Colto payment item (where applicable). Site conditions and material present will dictate the application of labour-based trench excavation or machine excavation. A prerequisite for payment of these labour-based excavation items is that the Contractor keeps daily written records with names of labourers, tasks completed, man-hours spent and payments made.

Items excluded from labour based items:

1) Excavation in Boulders and rock material - Mechanical excavators and blasting allowed.
2) Compaction of bedding and backfilling - Rollers and plate compactors allowed.
3) Transport of materials LDV, dumpers and other transport equipment allowed.
4) Mixing of concrete - Mechanical mixers allowed.
5) Vibration of concrete - Vibrators compulsory.
6) Precast concrete manholes.

PS 22 TRAINING SCHEMES

Certain members of the Contractors staff will be selected from the locally recruited employees, to be subjected to training in tasks related to the execution of the contract. An item with a provisional sum to cover the cost of training is included in the Schedule of Quantities.

The PSC will select the trainees and decide upon the specific training for each of them. The Contractor must guide PSC in this regard and make all the necessary arrangements with the training institution and the trainees, to ensure that the process runs smoothly. This training must be completed before the Contractor will receive any payments. The provisional sum in the Schedule of Quantities is to cover the fees of the training institution and a R30 per day allowance for each trainee during training. All other costs, including transport of trainees, will be borne by the Contractor and should be included in the percentage handling fee of the Contractor.

PS 23 PRESCRIPTIONS IN RESPECT OF EXISTING SERVICES

The scope of works for this contract could be affected by existing services. Where necessary the contractor must familiarize himself with the position and extent of existing services and to carry out the works in such a manner as not to cause damage to existing services.

PS 23.1 Water and Storm Water Services

Any cost of repairs, replacement and/or installation of services and equipment resulting from the contractor's negligence or unauthorized action shall be to the contractor's account.

PS 23.2 Electrical Services

The following procedures will apply:

1. The Contractor will in all instances submit construction drawings to the Electricity Supply Authority (ESA) for comments and for ESA to indicate known electrical services. These drawings will in all instances be available on site during the construction period or in the possession of the supervisor of the construction workers.

2. The cable's precise position on the terrain, with reference to the approximate position as indicated on the drawing, must be confirmed on terrain by means of cable tracing equipment to be supplied or arranged by the Contractor for this purpose. In the case of primary cables (11 kV and 33kV) as indicated on the drawings, it is essential that cable tracing be conducted by ESA. The Contractor will provide sufficient white lime to mark the cable on the ground. The contact persons and telephone numbers for cable tracing personnel shall be obtained from ESA by the Contractor.

3. The Contractor must thereafter, very carefully, open up the cable by hand on at least two places, of which the in between distances will not exceed 50 meters.

4. At any position, between any two points of the exposed cable as described in 1.3 above, that cable shall be identified as a known service if it lays within 0,5 meters of a straight line drawn between these two points
5. If the cable lays further than 0,5 meters away from a straight line drawn between the two exposed points, it shall be identified as an unknown service.

6. With reference to the approximate position of cables on the drawing, the Contractor will be responsible for confirming the location of such cables on terrain by means of the equipment referred to in 1.2 above, and by careful digging by hand. If the exact position of the cables cannot be determined without doubt, ESA can be approached for help.

7. When existing electrical cables fall within the excavation area of the new service, the Contractor will be responsible for protecting and supporting such cable. During backfilling of the trench, the Contractor will ensure that the cable is not damaged and repositioned at the original position and depth with the necessary bedding and marker tape.

8. Before any exposed cables are backfilled, such cables shall be inspected for possible damage by the terrain agent, in the presence of the Engineer or his/her representative. A complete record of all positions where cables were exposed must be indicated on the drawing.

9. The Contractor is responsible for keeping a complete record of incidents where electrical cables (known or unknown) were damaged that includes the following:
   - Date when damaged and the reason
   - Date when repaired
   - The extent of repairs, for instance cable size, number of joints necessary, the length of cable replaced etc
   - The exact cable position and depth indicated on the plan

10. The Engineer's representative must check these records. The above-mentioned record will be an annexure to the minutes of the monthly site meetings. All repairs of damaged cables (known or unknown) will be conducted by ESA. The account for repairs done on known services (cables) will be delivered to the Contractor via the Engineer. On the basis of accounts delivered monthly by ESA, the repair cost of a known service (electrical cable) that was damaged, will be recovered from the Contractor's certificate.

11. 33 kV Cables
In no instances will any Contractor be allowed to expose cover 33kV cables or excavate closer to 500mm (by hand) and 2000 mm (mechanical excavation) from the centre of a 33 kV cable. ESA will do the required excavation for the Contractor's account.

12. Overhead Services
Excavation and backfill shall be such that no foundation of overhead structures (power lines, streetlights, high mast lights, stays etc.,) will be disturbed. If disturbed, the Contractor will inform ESA in writing and will reinstate the foundation to its original state.

13. Maintenance Period
During the maintenance period the Contractor's responsibility shall include:
All electrical cables that were exposed or handled by him
Excavations in the vicinity of poles and stays, at the time of the construction activities

This makes provision for instances where damaged cables were covered up without informing ESA that may cause many problems later on. The Contractor is responsible to repair all disturbed pole and stay foundations and to reinstate it to its original condition (electrical and structural), as they are disturbed.

VAAL CENTRAL WATER

CONTRACT NO.

BW316/UPSHRMP/22

UPGRADING OF PUMP STATIONS ON THE HENKRIES RISING MAIN PIPELINE

SECTION C3.4

PARTICULAR SPECIFICATIONS

PARTICULAR SPECIFICATIONS – MECHANICAL

This portion of the Project Specifications relates to particular items in the Scope of Works.

Scope of Works

This specification relates to specific works and equipment required to supply, install and commission the following Pump Stations:

- Henkriesmond Pump Station
- Henkries Water Treatment Works Pump Station
- Doringwater Pump Station

Requirements

a. Manufacturer's Certificate

On appointment the final selection and configuration of the pump sets must be submitted to the engineer together with detailed and complete installation requirements from the supplier of the pump set together with a method statement for the off-loading, storing, installation, alignment and dry- and wet commissioning. These must be approved by the pump supplier.

After installation and preceding the commissioning of the pump set on site, the pump supplier must visit the site and approve the installation and alignment of the pump in a document to the engineer. The engineer needs to be invited to this inspection together with the alignment of the pump and motor and the pump to the suction- and discharge pipework

Following wet commission of pump sets, the pump manufacturer or his approved supplier shall check the installation and when satisfied shall issue to the Engineer a certificate approving installation in compliance with manufacturer's specification.

b. Pump Requirements

The pumps shall have stable, non-overloading characteristics. The tenderer shall submit with this this tender for each pump offered the following data:

- Pump selection calculations and methodology
- Pump characteristic curves, with respect to flow (l/s)
  - Total head; in meters (0% to 120% of duty flow)
  - Power absorbed; in kilowatts (50% to 120% of duty flow)
  - Net positive suction head (NPSH) requirements: recommended, 0% head drop, and 3% head drop relative to pump shaft centre line, in the case of horizontal spindle pumps,
  - Best efficiency point
- Pump characteristic curves with respect to speed
  - The torque requirements rated in absolute units
  - Data of supplier
  - Pump model
  - Speed at duty point
  - Minimum save operational flow (l/s).
  - Run off and shut off points

c. Pumping Equipment required

- Three (3) number pumps [two (2) duty + one (1) standby] for **Henkriesmond raw water pump station** with each having a duty of **145 litres per second at a total head of 233 meters** are required.
- Three (3) number pumps [two (2) duty + one (1) standby] for **Henkries Water Treatment Works pump station** with each having a duty of **135 litres per second at a total head of 362 meters** are required.
- Three (3) number pumps [two (2) duty + one (1) standby] for **Doringwater booster pump station** with each having a duty of **135 litres per second at a total head of 388 meters** are required.

Pump Type

The pump types required will be the horizontal multistage centrifugal pumps of the ring section design mounted on steel base plates. The pumps are to have a radial suction nozzle located at 90 degrees to the vertical as well as radial discharge nozzle located at 90 degrees to the vertical. The suction connection is to be at the drive end. The dimension and drillings of the suction and discharge flanges integral with the pump casings shall be to SANS 1123 to design pressure specified. Both nozzles to have mating flanges.

Pump Casing

Pump casings shall be of cast iron (CI) of at least grade 220 to BS 1452 or stronger cast steel. The grade of material proposed should be selected appropriate to the quality of water to be pumped. The inspection and testing of castings and test bars shall be in accordance with BS 3100. Test results shall be supplied with pump as well as volute casing specification.

Impellers

Impellers shall be capable of handling silt and solids found in the pumped liquid. The impeller shall be double shrouded and non-clogging. Impellers shall be manufactured from either phosphor bronze (PBI according to BS 1400 or 1E according to SANS 200) or chrome steel (AB1 according to BS 3100, DIN1.4313). Bronze components shall be zinc free. The impellers shall be statically, dynamically and hydraulically balanced. No holes may be drilled in the impeller to balance it with regard to mass distribution. All impellers shall be fitted with wear rings of the same material as the impellers. These rings shall be secured to the impeller with non-corroding screws and be mechanically locked.

Pump Shafts

The pump shaft shall be of EN 26 or 19 to BS 970 or similar and of sufficient dimensions to transmit the power to which they will be subjected without undue torsional or bending stresses and deflection. Pump shaft is to run on rolling element bearings or plain white metal bearings on both drive and suction sides. All bearings are to be either oil or grease lubricated. The bearings shall have a B-10 life rating of 100 000 hours. Shaft sealing to be by means of a single self-aligning balanced mechanical seal manufactured in 316 stainless steel and fitted with at least matched solid tungsten carbide (or any other approved) rotating and stationery faces shall be supplied.

Shaft Coupling

Pump and motors shall be direct coupled with a suitable coupling that will take up minor misalignment or off-setting of the minor misalignment or off-setting of the motor and pump shaft satisfactorily. Couplings shall be statically and dynamically balanced. Couplings to be robust and shall be readily dismantled and reassembled and shall have a service factor of at least 1.5. Contractor to supply a strong removable all-metal coupling guard over the coupling and drive shafts as protection against accidents in case of bodily contact.

Designation and Information Plates

Each pump shall be clearly labelled. The label shall be a 0.5mm thick stainless-steel plate of dimensions 100mm x 50mm. The label shall be fixed to pump exterior with an approved adhesive or other method after the completion of corrosion protection on the pump.

The label shall include the following information:

- Pump rates
- Pump Head
- Power required
- NPSH (req)
- Design speed
- Impeller detail.

Base Frame

Pumps and motor shall be mounted on base frame of rigid design, manufactured from structural steel members, equipped with anchor bolt holes, anchor bolts, drain connections and unobstructed grout holes.

Base frames shall be machined at the points of contact with pump and motor supports so that the set may be mounted on the base frame in correct alignment without the use of shims where possible or within acceptable tolerances with minimal use of levelling shims.

Every motor shall be provided with two jacking bolts at right angles with a lock nut at every corner.

At least two 100mm diameter openings for grouting without the removal of the pump or motor shall be cut into the baseplate.

Factory Acceptance Testing

All material and equipment are to be inspected, checked and tested at the OEM factory before delivery to site as part of the overall project Quality Assurance plans. A variety of factory acceptance tests (FAT), at different stages of manufacturing process, shall be required to ensure that equipment and material delivered to site conform to specification. The Contractor shall submit a list of all FAT tests to be performed and all cost associated with the FAT's shall be borne by the Contract and the Contractor shall duly allow and include in the Contract Sum.

The Contractor shall notify the Engineer or his Representative in writing two weeks in advance, of the place and dates at which the equipment may be inspected and tested.

The Engineer or his Representative will inform the Contractor of his intention to attend the test or the inspection and propose a date, which suits him. If the date preferred by the Engineer is later than ten days after the first possible date, the Contractor shall be entitled to perform the test or inspection without the presence of the Engineer.

If on any agreed date the equipment to be inspected or tested is not ready and the test or inspection has to be postponed the Contractor shall be held responsible for the travelling and/ or living expenses of the Engineer and/ or his Representative.

The test shall be witnessed by the Engineer or his Representative and details of the tests and the results obtained, duly signed by the appointed Witness, shall be submitted to the Engineer before dispatch of the pumping units from the Manufacturer's workshop.

The Contractor shall provide inspection and test certificates for:

- Each rotating assembly confirming static and dynamic balancing
- Copies of all Quality Assurance (QCP's) documentation related to manufacture, machining and assembly of the pumps
- Approved and signed QCO's pertaining to all surface preparation and coating systems
- Valve Leakage Acceptance testing

Alignment

The Contractor shall align and level accurately the pump unit, using metal blocks and shims under the base at the anchor studs and, in the case of heavy equipment, midway between studs. The anchor nuts shall then be flogged tight against the base. The pump and motor shall then be checked for alignment.

If alignment needs improvement, metal shims or wedges shall be added at appropriate positions under the base. The Contractor shall align the units using laser beam alignment, and shall ensure that the measured deviations nowhere exceed the smallest values recommended by the manufactures of the motors and pump respectively. The final alignment by an approved third-party inspector and engineer to witness the procedure. The readings shall be recorded and made available to the Engineer

d. Drive Motors

Electric motors shall comply with the requirements of SANS 1804. All drive motors to be of the TEFC (Totally Enclosed, Fan-Cooled) type with cast iron frames and an IP55 protection rating. All motors to be 3 phase MV 3.3 kV four pole, class EI3 Premium efficiency motors. Motor to have as a minimum Class F insulation and a Continuous duty rating of S1.

Motors shall have dynamically balanced rotors supported by maintenance-free, sealed-for-life ball bearings. Cable terminals to have metric threaded entities. All motors shall be standard catalogue models and shall be readily available. All motors where possible, be from the same interchangeable frames. Variations in type and size shall, where possible, be limited to make stocking a variety of special spares unnecessary. Motors shall be suitably coated to ensure the satisfactory operation of the motor under the specified class of service. Terminal boxes shall be waterproof.

e. Suction End

Henkriesmond Pump Station:

Each pump suction is to be equipped with a triple eccentric isolating butterfly valve, follow by DN 400mm magnetic flowmeter. A pressure transducer and suitable pressure gauge and stop cock is to be fitted. These pumps abstract raw water from settling ponds adjacent to the pump station and will operate under a Net Positive Suction Head of 6 meters.

Henkries WTW Pump Station:

Each pump suction is to be equipped with a triple eccentric isolating butterfly valve, follow by DN 350mm magnetic flowmeter. A pressure transducer and suitable pressure gauge and stop cock is to be fitted. These pumps abstract potable water from clear water reservoirs adjacent to the pump station and will operate under a Net Positive Suction Head of 9 meters.

Doringwater Booster Pump Station:

Each pump suction is to be equipped with a triple eccentric isolating butterfly valve, follow by DN 400mm magnetic flowmeter. A pressure transducer and suitable pressure gauge and stop cock is to be fitted. These pumps abstract raw water either directly from the rising mains or from newly constructed 3 ML Reservoir.

f. Delivery End

Each pump is to be equipped with a nozzle type check valve followed by a wedge gate valve to allow the pump to be isolated. Each pump installed will be fitted with a pressure transducer and suitable pressure gauge and stop cock on the delivery side.

g. Fittings

The pump sets should be supplied complete with base frame, motor, coupling, coupling guard and any other accessories which are specified in this or other related specifications. All items not specifically mentioned but required in a specification should be included in the rate.

Pipework and ancillaries

a. Pipe Fittings and Specials

The Contractor will be responsible for the design of pipe specials and fittings, with regard to pipe wall thickness and compensation flanges, as per drawings and pressure rating indicated.

b. Suction Piping

Henkriesmond Pump Station:

Contractors will manufacture, supply and install the suction piping in epoxy coated low carbon steel. The main suction header will be 600mm nominal bore whilst the branch off-takes will be 400mm nominal bore.

The suction piping will start at the newly constructed settling pond with a bell mouth at the pipe inlet to reduce flow separation and head loss caused by sharp inlets. The suction manifold will split into branches. One branch enters the pump station on the left-hand side and the other on the right-hand side. From the branch on the left-hand side there is two (2) number forty-five-degree (45º) off-takes for two (2) duty pumps operating in parallel. From the branch on the right-hand side there is two (2) number forty-five degree (45º) off-takes for one standby unit and for one future pump set.

The piping is to be installed on concrete plinths at a level suited to suction nozzle. Supports and fixtures are to be of sufficient strength to accommodate any thrust generated.

Henkries WTW Pump Station:

Contractors will manufacture, supply and install a suction manifold in epoxy coated low carbon steel. The main suction header will be 500mm nominal bore and the branch take-offs will be 350mm nominal bore.

There will be two separate suction manifolds on either side of the pump room, both suction manifolds will be joint together with a pipe running across the pump room. The suction piping is be installed on concrete plinths at a level suited to the pump suction nozzle. Supports and fixtures are to be of sufficient strength to accommodate any thrust generated.

From the manifold on the right-hand side there are two (2) number forty-five-degree (45º) branch take-offs for two (2) duty pumps operating in parallel. From the branch on the left-hand side there is two (2) number forty-five degree (45º) off-takes for one standby unit and for one future pump set.

Doringwater Booster Pump Station:
Contractors will manufacture, supply and install a suction manifold in epoxy coated low carbon steel. The main suction header will be 600mm nominal bore and the branch take-offs will be 400mm nominal bore.

There will be main suction manifold on one side of the pump room. The suction piping is be installed on concrete plinths at a level suited to the pump suction nozzle. Supports and fixtures are to be of sufficient strength to accommodate any thrust generated.

From the manifold there are three (4) number forty-five degree (45º) branch take-offs for two (2) duty pumps operating in parallel and for one standby unit and one future pump set.

Said epoxy coated suction pipe will terminate two (2) meter outside of the pump station building in a flanged connection. The contractor will supply a suitable S-bend with flanged connections to allow connection to the underground piping from the clear water reservoir.

c. Delivery Piping

Henkriesmond Pump Station:
Each of the three multistage pumps will be fitted with a flanged epoxy coated low carbon steel concentric reducer after the delivery nozzle. Following the valves stated elsewhere in this specification, the delivery piping will comprise a 400mm nominal bore epoxy coated low carbon steel pipe feeding into a single discharge header of 600mm nominal bore.

The piping starts off with horizontal distance piece followed by a non-return valve as specified elsewhere in this specification. The non-return valve is then followed by a horizontal distance piece followed by an isolation valve as specified elsewhere in this specification. The isolation valve is then followed by a horizontal pipe section ending at a 90-degree bend to align the pipe with take-offs from the single discharge header.

The epoxy coated low carbon steel discharge header will pass through an existing door opening and will terminate 15m outside the pump station building. The main discharge header will connect to the Rising Mains between Henkriesmond pump station and Henkries Water Treatment Plant.

All pipe work and flanges to be rated to operate at a working pressure of **25 Bar**.

Henkries WTW Pump Station:
Each of the three multistage pumps will be fitted with a flanged epoxy coated low carbon steel concentric reducer after the delivery nozzle. Following the valves stated elsewhere in this specification, the delivery piping will comprise a 350mm nominal bore epoxy coated low carbon steel pipe feeding into a single discharge header of 600mm nominal bore.

The piping starts off with horizontal distance piece followed by a non-return valve as specified elsewhere in this specification. The non-return valve is then followed by an isolation valve as specified elsewhere in this specification. The isolation valve is then followed by a horizontal pipe section aligning the pipe with take-offs from the single discharge header.

All pipe work and flanges to be rated to operate at a working pressure of **40 Bar**.

Doringwater Booster Pump Station:
Each of the three multistage pumps will be fitted with a flanged epoxy coated low carbon steel concentric reducer after the delivery nozzle. Following the valves stated elsewhere in this specification, the delivery piping will comprise a 400mm nominal bore epoxy coated low carbon steel pipe feeding into a single discharge header of 600mm nominal bore.

The piping starts off with horizontal distance piece followed by a non-return valve as specified elsewhere in this specification. The non-return valve is then followed by an isolation valve as specified elsewhere in this specification. The isolation valve is then followed by a horizontal pipe section aligning the suction piping with take-offs from the single discharge header.

The delivery manifold pipe is to be fitted with a 150mm BSPT socket on a 150mm Vent-o-mat RBX air valve is to be fitted complete with isolating stopcock.

All pipe work and flanges to be rated to operate at a working pressure of **40 Bar**.

Valve and Pipework

a. Gate Valves

All valves must be manufactured from cast iron. Gate valve on delivery side 600mm nominal bore and under shall conform to the requirements of SANS 664. Unless otherwise specified the contractor shall supply wedge gate valve PN25 (min) or as dictated by the service duty.

b. Butterfly Valves

Butterfly valves shall conform to BS 3952 for “cast iron butterfly valves for general purposes”. The class and size of the valve shall be that dictated by the service duty. Test certificates shall be supplied with each valve. The body ends shall be flanged and drilled of centreline in accordance with SANS 1123:2015 Table 3 as per pressure rating specified in bill of quantities. The gearbox shall not be an integral part of the main body, however the gearbox shall be a separate unit bolted to the main body in such a manner as to prevent any water leaking past the main shaft seal from entering the gearbox.

Valves shall be provided with hand wheels unless otherwise specified and all valves shall close by turning in a clockwise direction. Handwheels shall be clearly marked open and shut with arrow indicating direction of rotation.

c. Check Valves

Check valves shall be nozzle type check valves. The valves shall be suitable for horizontal or vertical mounting, of robust construction and shall close drop tight at the required operating head. The discs shall be either stainless steel or carbon steel with resilient seats and stainless-steel trim.

d. Air Valves

All air valves shall be Vent-O-Mat RBX with flanged connections. The air release and vacuum break valve shall be of the compact single chamber design with solid cylindrical HDPE control floats housed in a tubular stainless-steel body with epoxy powder coated mild steel or stainless-steel ends secured by means of stainless tie rods. The valve shall have an integral ‘Anti-Shock’ Orifice mechanism which shall operate automatically to limit transient pressure rise or shock induced by closure to 1.5 x valve rated working pressure. The intake orifice area shall be equal to the nominal size of the valve. The valve design shall incorporate an over pressure safety feature that will fail without an explosive effect, such as is normally the case when high compressed air released suddenly.
Air valves shall be supplied with a flanged isolation wedge gate valve, and with handwheel.

a. Flanges

The drilling of steel and CI flanges shall conform to the requirements of SANS 1123:2015 appropriate to the class of the pipe specified. Reaming of bolt holes to oversize dimension in order to make a particular piece fit will not be permitted. Flanged faces shall be machined overall with gramophone finish in accordance with SANS 1123:2015.

Loose flanges for welding onto steel pipes on site shall be manufactured from the same material specified for the pipes and shall be in accordance with SANS 1123:2015. All loose flanges shall be suitable for field welding to pipes and specials and shall conform to API 1104 in respect of attachment.

All flanged connections on the suction side are to be in accordance with SANS 1123:2015 T1000/3. Flange connections on delivery side are to be in accordance with SANS 1123:2015 T2500/3.

b. Gasketing

Each flanged pipe and fitting shall be supplied complete with one insertion piece of the appropriate diameter, and made of a material that is suitable for maximum working pressure, such as rubber for small diameter, low pressure lines or compressed fibres or other approved material for medium to large diameter and medium to high pressure lines.

c. Bolts and Nuts

One set of bolts and nuts to be supplied with each pipe fitting and pipe special. Bolts and nuts shall comply with relevant requirements of SANS 1700. All bolts, nuts and washers shall be hot dip galvanized and be of Grade 8.8.

Corrosion Protection

Scope

This specification covers the requirements for corrosion protection and painting of metal surfaces in pump stations, water treatment works and metal works in general.

Supporting Specifications

SABS 1200 HC: Corrosion protection of Structural Steelwork

Where this specification is required for a project, the above supporting specification shall also form a part of the Contract document.

Interpretations

Grit blast cleaning: The directing of particles of abrasive steel shot or other grit against the surface to be coated. The grade of cleanliness shall be according to the Swedish Standard SIS 05 59 00.

Holiday: A defect in the coating where the coating has been damaged or is too thin

Holiday detector: An electrical device which electrically charges the item to be coated and senses and signals defects in the coating by means of an audible signal when passed over the coating.

Organic coatings:

i) Coal tar and asphaltic bitumen coatings
ii) Paint inclusive of epoxies, polyurethane, nylon and fusion bonded epoxy.
iii) Thermoplastic coatings such as polyethylene, nylon and fusion bonded epoxy.
iv) Tape wrap coatings
v) Film type coatings
vi) Miscellaneous coatings such as foams, etc.

FBE:	Fusion bonded epoxy
GRC:	Glass reinforced cement
HDPE:	High density polyethylene
MS:	Mild Steel
PVC:	Polyvinyl chloride
Sa:	Followed by a number refers to the Swedish Standard SIS 05 59 00
UV:	Ultra-violet radiation

Design, Materials and Manufacture

Blast Cleaning

Grit for blast cleaning shall be in accordance with SABS 064 and/or BS 2451. Air used for blast cleaning will be free of oil and water.

Paints

General

Paints used for a coating system shall be mutually compatible. All paints supplied shall be in accordance with the SANS specification for their respective types and shall be of the best quality available.

Organic Coatings

The following basic requirements shall apply:

Durability: Supplied coatings to be chemically inert. This means it shall have constituents that are free from further oxidation, polymerization or saponification and maintain its properties for an indefinite period of time. All coatings to be resistant to biological degradation.

Moisture permeability: The coating is to be impermeable to the ingress of water and aggressive ions.

Mechanical damage: The coating should resist mechanical damage when an impact of at least 4 Joules at 20ºC is applied as per ASTM G 14.

Conformability: All coatings to conform with the metal surface profile without causing voids, gaps, laminations and pinholes.

Application: The coating should be able to be applied easily under normal site conditions as known or as described in the Project Specification.

Repairs: Damage to coatings shall be easily repaired on site and conform to the specification after repair has been affected.

Adhesion: Coatings to have a high resistance to peeling. Adhesion shall not be less than 6N per square millimeter of steel. Suitable priming and surface preparation shall in all cases be carried out to improve adhesion.

Flexibility: The coating shall be flexible allowing elongation of 3% strain at 20ºC and 1% strain at -18ºC

Solvent free: Where practical, solvent free paints shall be applied.

Non-toxic and taste free: All internal linings/coatings for potable water shall be non-toxic, non-tasting and non-tainting.

Degreasing agent: Only water-soluble degreasing agents to be used.

Primers: The most suitable primer for the surface to be coated shall be selected in accordance with the manufacturer's recommendation.

Plant

Handling

Plant and equipment used during the painting operation shall be such that no pipe, valve or pump casing are overstressed during any operations.

Surface preparation

The Contractor is to provide all equipment necessary for grit blasting and preparation of surfaces prior to painting.

Painting

The Contractor is to provide all necessary equipment for airless spray-painting, the application of epoxy coatings, sintered epoxy powder paints or other methods as specified. All paints to be applied in the contractor's workshop are to be applied by airless spray equipment, as FBE or approved. All site paintwork shall be to the Engineer's approval. The Contractor shall provide all required equipment and facilities required for inspection and testing purposes.

Colour

The final paint coat shall be of the colour as specified in the colour schedule attached to this specification.

Finishing and Painting

Finishing, painting and cleaning up the site are regarded as a part of the installation. After installation, all paintwork will be washed down with brushes and a suitable detergent to remove all grime and grease.

Corrosion Protection System

Fusion Bonded Epoxy (FBE) System

All corrosion protection of piping for this contract UNLESS SPECIFIED OTHERWIZE shall have an inner and outer FBE coating in accordance with SANS 1217:201 Type 2A. The surface preparation shall be in accordance with SANS 12944-4.

- Degreasing and abrasive blast cleaning to Sa 3

Nuts, Bolts, Washers, etc

All carbon steel pipes, flanges, bolts, nuts, washers and other fasteners are to be galvanized according to SABS 763. All nuts to be tapped after galvanizing. Washers are to be fitted to both bolt head and nut. After installation, nuts, bolts and washers are to be treated with a self-etching primer and then painted together with the relevant items on which they are installed.

Tolerances

Film thickness tolerances

Individual coats:

A minimum of 90% of thicknesses measured shall comply with the system specification thickness.

Total DFT

No more than 10% of readings shall be less than the specified minimum thickness and no readings less than 90% of the specified minimum will be allowed.

Testing and Inspection

The Contractor remains fully responsible for the quality of the work done irrespective of any quality control testing done.

All datasheets, specifications and codes of practice for the materials used are to be made available by the Contractor.

Quality Control:

The Contractor shall carry out quality control testing and record the results of such testing to ensure compliance with the specification.

These records shall be made available for inspection by the Engineer or any other Third-Party Specialist Inspector appointed. Incomplete or inaccurate records shall be regarded as non-compliance with this specification.

Independent Quality Control:

The Engineer will be free to employ an independent inspector to monitor the quality of the Contractors work on his behalf. In the event of a dispute, the Engineer's ruling will be final.

Sampling:

The Engineer may at any time remove a reasonable number of samples of materials to be used in the coating application. In the case that analysis of a sample leads to rejection, all work using the same batch will be placed on hold. Rejection of a batch of work may lead to the reworking of all components coated with said batch.

Destructive Testing:

The Engineer may carry out destructive testing to ensure compliance. Damaged areas are to be repaired by the contractor at no extra cost to the satisfaction of the Engineer.

Test Methods to be Employed

Determination of cleanliness: SABS 767 and ISO 8501-1
Determination of surface profile: SABS 772
Free of dust and debris:SABS 769
Dry Film Thickness: SABS 141
Soluble salts test: Weber Reilly reagent

Measurement and Payment

Corrosion protection and painting

Payment for corrosion protection and painting will be included in the rate for the items to be protected or painted.

The tendered amount shall include the cost of surface preparation, supply and application of corrosion protection systems/paint and the costs associated with the quality control. No separate payment will be made for site repairs to paintwork.

Main manifold

Henkriesmond Pump Station:

The manifold consists of a horizontal 600mm nominal bore epoxy coated low carbon steel pipe with one end closed and other open. The manifold is to be provided with four (4) number flanged 400mm nominal bore take-offs aligned with the delivery piping of the pumps.

The manifold is to be provided with two (2) number 50mm diameter high pressure steam sockets weld onto pipe for fitment of a pressure transducer that is to be connected with the telemetry system, as well as a suitable delivery pressure gauge.

The manifold is to be fitted with a 150mm nominal bore flanged off-take to which a 150mm Vent-O-mat-RBX air valve is to be fitted complete with isolating stopcock.

Henkries WTW Pump Station:

The manifold consists of a horizontal 600mm nominal bore epoxy coated low carbon steel pipe with one end closed and other open. The manifold is to be provided with four (4) number flanged 350mm nominal bore take-offs aligned with the delivery piping of the pumps.

The manifold is to be provided with two (2) number 50mm diameter high pressure steam sockets weld onto pipe for fitment of a pressure transducer that is to be connected with the telemetry system, as well as a suitable delivery pressure gauge.

The manifold is to be fitted with a 150mm nominal bore flanged off-take to with a 150mm Vent-O-mat-RBX air valve is to be fitted complete with isolating wedged gate valve.

Doringwater Booster Pump Station:

The manifold consists of a horizontal 600mm nominal bore epoxy coated low carbon steel pipe with one end closed and other open. The manifold is to be provided with four (4) number flanged 400mm nominal bore take-offs aligned with the delivery piping of the pumps.

The manifold is to be provided with two (2) number 50mm diameter high pressure steam sockets weld onto pipe for fitment of a pressure transducer that is to be connected with the telemetry system, as well as a suitable delivery pressure gauge.

The manifold is to be fitted with a 150mm nominal bore flanged off-take with a 150mm Vent-O-mat-RBX air valve is to be fitted complete with isolating wedge gate valve.

Training Requirement

The contractor shall provide supplier specific training to the employer/ operational staff on all critical equipment supplied under this contract. Detail of the proposed training and OEM training shall be provided. Training shall include:

- Stripping and assembly
- Training on the operation of the over system, and
- Training on maintenance manuals, maintenance procedures and all routine maintenance tasks,

A training program shall be submitted with this tender for the engineer's approval

Documentation Requirements

A comprehensive documentation pack in original Hardcopy and Electronic soft copy shall be provided for each mechanical system and major sub-components.

Documentation pack shall include GA drawings, technical manuals. Manufacturing / fabrication detail testing and validation Reports, QCP's, service procedures and repair manuals and full operating instructions

Spare Part Requirements

The Contractor shall identify a list of critical spare parts required for the continued operation of all mechanical equipment not only based on a reliability analysis of the equipment, but also on the reliability and availability of suppliers of spare parts in the region. All critical spares identified as part of the reliability analysis shall be identified, listed and priced by the Contractor

On the basis of the analysis the Contractor shall provide a priced list of spares which he recommends the employer should hold.

PARTICULAR SPECIFICATIONS – ELECTRICAL CONTROL AND INSTRUMENTATION

SECTION 1: GENERAL OVERVIEW AND SYSTEM DESCRIPTION

1. INTRODUCTION

This section provides a summarized overview of the intended systems to be installed as part of the works. Some items (as indicated) will not be implemented at present, but should form part of the overall system planning.

2. SYSTEM ELEMENTS

The following distinct elements/locations can be recognized as forming integral parts of the system

- MV Switchgear
- MV Variable Speed Drives
- PLC and SCADA System
- Communication Backbone
- Henkriesmond Pump Station
- Henkries Water Treatment Works Pump Station
- Doringwater Pump Station

The control system will integrate the above elements to provide a coherent system for the water supply system.

3. MV SWITCHGEAR

3.1 MV Switchgear at Henkriesmond Pump Station, Henkries WTW Pump Station and Doringwater Pump Station will be replaced.
3.2 The switchgear will be Schneider Premset series fixed-pattern switchgear
3.3 Switchgear protection should be suitable for supply to motors via variable speed drives.

4. MV VARIABLE SPEED DRIVES

4.1 All pumps will be fitted with 3.3 KV WEG series MVW01 variable speed drives, rated to the motor sizes for the applicable pump stations.
4.2 The drives will be standalone units, but will be locally integrated to each other via a local PLC system.
4.3 Costing must include commissioning by WEG Certified and approved personnel.
4.4 Costing must make provision for attendance of a FAT of at least one unit at the manufacturer's premises.

5. PLC AND SCADA SYSTEM

5.1 Siemens Simatic S7 Controllers will form the backbone of the control system.
5.2 PLC Systems and SCADA will be linked via fiber-optic backbone.
5.3 SCADA system will be the Adroit Smart Scada package.
5.4 PLC's will interface to VSD's at plant level via Profinet
5.5 Control Level Communication (Between PLC's and SCADA) will be Ethernet based.
5.6 Main SCADA installation will be at Okiep.
5.7 Remote SCADA station at Henkriesmond Water Treatment Works
5.8 A local Local HMI will be installed on the PLC panel at each Pump Station, with a further remote HMI installed in a location easily accessible to operational personnel.

6. COMMUNICATION BACKBONE

The communication backbone will be fibre-optic based, with an 8-core single-mode fibre installed from Okiep to Eenriet Reservoir, and from there to the three pump stations and terminating at the River Abstraction Station. The Vaalhoek reservoir will also be included in the fibre-optic system. The levels of the Nababeep, Concordia and Carolusberg Reservoirs will be incorporated into the system via a GSM system (future). The five reservoir sites will be solar-powered installations.

The system makes provision for the PLC communication system, as well as for the installation of a VOIP telephone system and CCTV system to monitor the remote locations.

7. HENKRIESMOND PUMP STATION

The water from the River Abstraction Pump Station gravitates into two settling ponds at this pump station. The pump suction is fed from the settling dams via a valve system used to select a specific pond. The stopping/starting of the pumps are controlled by the level of the raw water sump at the Henkries WTW Pump Station. The following forms part of the project:

7.1 Construction of a new MV room in parallel behind the existing MV room.
7.2 A new set of 3.3 KV Schneider Premset switchgear will be installed.
7.3 Three new WEG Variable Speed Drives will be installed in the new MV Room.
7.4 The existing MV room to be utilized for the LV and Control Room.
7.5 A PLC Control system, interfaced to the VSD's to be installed in the LV room.
7.6 The PLC panel will include a 10" HMI for local control and monitoring of the system.
7.7 A new LV Distribution Board to be installed in the LV Room.
7.8 Pump Instrumentation, via Pump Instrumentation Junction Boxes, to include the following:
a. Delivery Pressure Transmitters
b. Pump no-flow switch (delivery side of each pump)
c. Vibration Transducers (2 x pump, 1 x motor)
d. Bearing Temperature (2 x pumps, 2 x motors)
e. Motor Winding Temperatures
f. Monitoring and control of inlet/delivery actuators of each pump
7.9 Open Channel Flow meter on inlet flow from River Abstraction Pump Station

7.10 2 x Level Sensors (for each settling pond)
7.11 Monitoring of pond delivery valve selections via limit switches on valves.
7.12 Monitoring of existing station flow meter
7.13 Monitoring of station delivery pressure on outgoing line
7.14 A remote HMI will be installed in the pump room for local control/monitoring.
7.15 Linked to overall system via fibre-optic.
7.16 A VOIP telephone to be installed.
7.17 CCTV Cameras to be installed for monitoring of the station.
7.18 Servicing of two local services 3.3 KV/400V 160 KVA transformer.

8. HENKRIES WTW PUMP STATION

The water from the Henkriesmond Pump Station is delivered into the WTW raw water reservoir. The pump suction is fed from the WTW clear water reservoir. The stopping/starting of the pumps are controlled by the level of the Doringwater Pump Station reservoir. The following forms part of the project:

8.1 A new MV room will be constructed in the location as indicated on the included drawings.
8.2 A new set of 3.3 KV Schneider Premset switchgear will be installed in the new MV Room.
8.3 Three WEG Variable Speed Drives will be installed in the new MV Room.
8.4 The existing MV room will be utilized as a control room.
8.5 A PLC Control system, interfaced to the VSD's, will to be installed in the MV room.
8.6 The PLC panel will include a 10" HMI for local control and monitoring of the system.
8.7 A new LV Distribution Board will be installed in the LV Room.
8.8 Pump Instrumentation, via Pump Instrumentation Junction Boxes, to include the following:
a. Delivery Pressure Transmitter
b. Delivery no-flow switch
c. Vibration Transducers (2 x pump, 1 x motor)
d. Bearing Temperature (2 x pumps, 2 x motors)
e. Motor Winding Temperatures
f. Monitoring and control of inlet/delivery actuators of each pump
8.9 2 x Level Sensors (Raw Water and Clearwater Reservoirs)
8.10 Monitoring of station delivery pressure and existing station flow meter on outgoing pipeline
8.11 Linked to overall system via fibre-optic.
8.12 SCADA system installed in the Control Room
8.13 A VOIP telephone to be installed.
8.14 CCTV Cameras to be installed for monitoring of the station.
8.15 Servicing of two local services 3.3 KV/400V 400 KVA transformers.
8.16 A remote HMI will be installed in the pump room for local control/monitoring.

9. DORINGWATER PUMP STATION

The water from the Doringwater Pump Station is delivered into the Eenriet reservoir. The pump suction is fed from the Doringwater Pump Station reservoir. The stopping/starting of the pumps are controlled by the level of the Eenriet reservoir. The following forms part of the project:

9.1 The existing MV room will be modified to accept the new MV Switchgear and VSD's. A section of this room will also be utilized for the LV control and distribution system.
9.2 A new set of 3.3 KV Schneider Premset switchgear will be installed in the MV Room.
9.3 Three new WEG Variable Speed Drives will be installed in the MV Room.
9.4 The existing MV room will partly be utilized for the LV and control board.
9.5 A PLC Control system, interfaced to the VSD's to be part of the LV and control board.
9.6 The PLC panel will include a 10" HMI for local control and monitoring of the system.
9.7 Pump Instrumentation, via Pump Instrumentation Junction Boxes, to include the following:
a. Delivery Pressure Transmitter
b. Delivery no-flow switch
c. Vibration Transducers (2 x pump, 1 x motor)
d. Bearing Temperature (2 x pumps, 2 x motors)
e. Motor Winding Temperatures
f. Monitoring and control of inlet/delivery actuators of each pump
9.8 Level sensor on the Doringwater Reservoir.
9.9 Monitoring of station delivery pressure and existing station flow meter on outgoing pipeline
9.10 Linked to overall system via fibre-optic.
9.11 HMI for control and monitoring to be installed in the control cubicle in the pump room.
9.12 A VOIP telephone to be installed.
9.13 CCTV Cameras to be installed for monitoring of the station.

SECTION 2: GENERAL SPECIFICATION

1. INTRODUCTION

As described in Section 1, the project involves the upgrading of pump stations and infrastructure of the Vaal Central Water Namakwa Pumping system. The upgraded system will provide a modern, integrated system, offering comprehensive monitoring and control of the system. The electrical works required is described in detail within this document, the associated electrical diagrams and Bill of Quantities.

This Project Specification is not intended to specify the exact and final details of design and construction of the medium voltage switchgear, 400V equipment, cables and control equipment. The drawings depicting power- and controls are issued for tender purposes only and do not necessarily indicate the final design or the functioning of the equipment required by the Employer. The specification and drawings do, however, depict the basic requirements and the layout and positions of all the required equipment.
The Schedule of Quantities contain the proposed materials measured at tender design stage of the Contract and cannot be regarded as the full and final quantities of material for this Contract. The main offer of a tenderer must comply with the specification requirements of this Contract. No alternative equipment will be accepted unless specifically approved by the Employer or Employer's representative. A list of specific equipment requirements is included in this document. The correct functioning of the system, using equipment supplied and installed under this contract, will remain the responsibility of the Supplier of the equipment and/or the Contractor for this Contract.

All Technical Data Schedules and the Schedules of Quantities shall be completed in full. The Contractor shall submit shop drawings, details, general arrangement and equipment layouts, complete with overall dimensions, weights and finishes of the equipment offered by him within a period as agreed with the Employer, but prior to placing any orders or commencing with work or installations. The Contractor's manufacturing drawings and data must be approved in principal and/or in detail by the Employer or his appointed Representative before manufacture of any equipment may proceed.

The scope of work includes the design, selection, manufacture, supply, testing in factories, care and storage in the factories, delivery to site, off-loading on site, assembly and installation on site, connections, testing on site, "dry" commissioning and "wet" commissioning of the electrical works and equipment and handing over in working order of the complete electrical works as specified herein.

The scope of works also includes maintenance for twelve (12) months and insurance against lightning and other damage of the total installation for twelve (12) months from first handover.

The works can be summarized as follows:

1. The design, manufacture, supply, works testing, delivery, off-loading, site erection, connections, site testing, commissioning and handing over of indoor mounted 3.3 KV switchgear as indicated.
2. The design, manufacture, supply, works testing, delivery, off-loading, site erection, connections, site testing, commissioning and handing over of all equipment as indicated on the single line diagrams.
3. The design, manufacture, supply, works testing, delivery, off-loading, site erection, connections, site testing, commissioning and handing over 3.3 KV Variable Speed Drives as indicated.
4. The supply, installation and testing of all MV cable work, joints and terminations related to the installation. The work shall include megger testing and pressure testing of MV cables, as applicable.
5. The supply, installation and testing of 400V cable work and cable ends for sub-main feeders and other connections including megger testing as applicable.

6. The design, manufacture, supply, works testing, delivery, off-loading, site erection, connections, site testing, commissioning and handing over of all distribution and instrumentation cubicles as required.
7. The design, manufacture, supply, works testing, delivery, off-loading, site erection, connections, site testing, commissioning and handing over of all the 400V / 230V motor control centers, distribution boards and control device panels.
8. The supply and installation of earthing and lightning protection systems and additional earthing as may be required by the Employer's representative.
9. The manufacture, supply, delivery, off-loading, site erection, and handing over as a completed installation of cable ladders and ladder supports, ducting, junction boxes, fixing brackets, cable ties, etc.
10. The supply, delivery, off-loading, site erection, and handing over as a completed installation of all instrumentation as specified.
11. Assistance to other Contractors during the commissioning period of the pump sets and works.
12. Danger signs and notices in terms of OHS Act and Mine Regulations at all substation- and LV rooms.
13. The design, supply and installation of all equipment applicable to the already installed fiber-optic backbone to ensure the establishment of a secure, dependable communication backbone between all locations as indicated.
14. The design, supply and installation of a security camera system and telephone backbone as indicated.
15. The planning, design, supply and installation of comprehensive integrated control system for the project, including the supply, installation and configuration of a SCADA system at the Henkriesmond Water Treatment Works and Okiep Control Room.

The contractor shall be deemed to have carefully examined all the constituent parts of this document and all other documentation issued to him/her before the Tender or quotation was submitted. Any doubts as to the meaning of any terms, phrases or clauses of the document or any other document, or any missing pages, shall be submitted to the Employer's representative in writing before a Tender is submitted. No claims traceable to non-compliance with this requirement will be considered after the closing date of Tenders. If it is found at any stage of a Contract that the Contractor has deviated from the requirements of this document without the written consent of the Employer's representative, then the Employer's representative shall have the right to order the Contractor to carry out the actions required by this document without any adjustment in the Contract price.

2. SPECIFIC REQUIREMENTS OF THIS CONTRACT

Certain general and specific requirements are applicable to all the sections of the Contract specified hereinafter and Tenderer's must ensure that the price submitted for each portion of the Contract (i.e. MV switchgear, LV switchgear, Variable Speed Drives, MV cables, LV cables, transformers, 400V / 230V lighting and power point installation and cables) allow for all the materials and requirements of each portion as well as for the following general requirements:

1. All MV cable ends be made off by an accredited MV cable jointer.
2. All control- and protection equipment settings on the MV and LV switchgear be done by the suppliers of such equipment, in the presence of the Employer's Representative.
3. Contractors or suppliers of the MV switchgear shall obtain the upstream overload and trip settings from ESKOM and shall calculate and set the protection relays on MV switchgear to ensure downstream grading of protection to inhibit random tripping.
4. Tenderers shall fill in the Schedule of Technical Data bound into this document to indicate the type, manufacture and quality of equipment offered by them in their main offer for the project. Non-completion of the schedules will be seen as non-responsive and may cause invalidation and subsequent rejection of the Tender.
5. The Contractor shall confirm the lengths of cables and cable ladders on site and shall discuss this with the Employer's representative before ordering as only measured installed lengths will be paid for. Any allowance for off-cuts shall be made in the unit rates. The final measurements shall be based on the net route length of cables and racks concerned.

6. The quantities set out in the Schedules of Quantities for small items of equipment or cable (where applicable) are approximate only and do not necessarily represent the actual amount of work to be done. Items will be re-measured based on site-installation.
7. The design and manufacture of equipment and the complete installation shall be carried out and tested in accordance with the latest issue or amendments of the following Regulations, as applicable:
   • SANS 10142 – The Code of Practice for wiring of premises as amended;
   • The Occupational, Health and Safety Act, (Act 85 of 1993);
   • The local Municipal by-laws and Regulations and Regulations of the local supply authority;
   • The Fire Brigade Services Act, 2000 (Act 14 of 2000);
   • The Regulations of Telkom (S.A.) Ltd;
   • The National Building Regulations and Building Standards Act, (Act 29 of 1996); and
   • The Electricity Act, (Act 88 of 1996);
   • The Standard Specification for LV Work up to 1KV.
8. The Contractor shall issue the necessary completion certificates and Certificate of Compliancy to the Employer's Representative and the applicable Authorities as contained in SANS 10142 :Part 1: Low Voltage Installations, or as required in terms of the Occupational Health and Safety Act, Act 85 of 1993, upon completion and after commissioning of all electrical work. The Contractor shall issue the necessary "cold Commissioning" Certificate of Compliancy to ESKOM if ESKOM requires this document for switching on their supply.
9. The Contractor shall be fully responsible for the security of his own equipment and the insurance of all the equipment specified herein until the handing-over of the completed operating works to the Employer.
10. Cranage will not be provided by the Employer. Contractors must allow for all crane requirements and must include this cost in their overall cost structure, as a separate pricing item is not available in the Schedule of Quantities for such items.
11. The Tender Drawings issued with this Tender Documentation are detailed and sufficient for the purpose of tendering, construction and ordering of materials. The work forming this Contract is shown on the Tender drawings. Equipment- and small power layout drawings will be issued to the successful Contractor. Such Drawings will be issued with due consideration of the program of manufacture and construction and after due consultation with the Contractor. The Contractor shall indicate the lead times for critical Drawings after due consultation with the Employer's Representative.

3. GENERAL SYSTEM OPERATION

The overall control philosophy is to establish a plant system that will be able to run unmanned after completion and commissioning and will be controlled and monitored from the Plant Control Scada Desks. It is therefore essential to install instrumentation and controls to provide dependable and continuous operation of the switchgear and controls. The following modes of operation can be accepted for tender purposes:

1. Manual Mode: In manual mode the station control equipment shall be suitable to operate the station from the PLC HMI's at the pump control consoles and/or from the SCADA computers in the control rooms. The manual control equipment shall also have the facilities to test the pump sets by using the local manual control of the control valves on the pump lines in conjunction with the Local Control Modes on the HMI's, SCADA and equipment.
2. Automatic Mode: In this mode, operation of pumps will be based on the levels of the various reservoirs and sumps, with pumps stopping and starting to maintain levels as set from the SCADA system.

The automatic duty-cycling of pumps and starting of standby-pumps, as required, forms part of this mode of operation.

To enable the above modes, the suction- and delivery valve actuators must have local facilities to OPEN or CLOSE these valves for testing or maintenance purposes, but must have the ability to be remote controlled by the SCADA control system.

4. PLC CONTROL EQUIPMENT AND COMMUNICATION BACKBONE

The PLC's, PLC HMI's and SCADA computers and the software thereof as well as the fibre-optic equipment forms part of this Contract. The communication backbone will be an Ethernet system based on the use of a 8-fibre single-mode fibre-optic cable already installed under a separate contract. All ancillary equipment required to establish the communication network form part of this contract.

All PLC and Remote I/O equipment will be installed in cabinets and MCC's as per the attached electrical diagrams and will be placed in the locations as indicated. All the field- and instrumentation control cables must be terminated in the control consoles and specified junction boxes as indicated on the diagrams. The control equipment to be used is as indicated on the detailed electrical diagrams. Deviations from this will only be allowed with the express, written approval of the employer or his representative.

5. MEDIUM VOLTAGE CABLES AND CABLE-ENDS

All MV cables supplied and installed under this contract will be cross-linked polyethylene (XLPE)-insulated cable with stranded copper conductors complying with the requirements of SANS 1339 and NRS013: 1991, The following standards must also be taking into account:

Electric cables - Cross-linked polyethylene (XLPE)-insulated electric cables for rated voltages 3,8kV / 6,6kV to 19kV / 33kV (excluding pressure assisted cables): SANS 1339 (2001)
Materials of insulated electric cables and flexible cords: Part 4: Cross-linked polyethylene (XLPE): SANS 1411-4 (2001)
Materials of insulated electric cables and flexible cords: Part: Polyethylene (PE): SANS 1411-7 (2003) Test methods for cross-linked polyethylene (XLPE) insulated electric cables: Parts 1-4: Tests on XLPE insulation: SANS 6284-4 (1999)

All medium voltage XLPE cable ends shall be of heat shrinkable type materials and shall comply with SANS 1411-4 and SANS 1141-7. Sufficient slack shall be left on cable ends so as not to exert any strain on cable tails, cable ladders, gland plates, switchgear connections, bushings, etc. Ends shall be properly made off and steps shall be taken to avoid corona damage over a long period of time. The ends of cables which are cut and not made off within sixty (60) minutes shall immediately be sealed by means of heat shrink caps. Where cable ends have been left open for twenty-four (24) hours or more, the cable ends shall be tested for moisture ingress. Please note that the person responsible for making off the cable ends shall be an accredited cable jointer. Accreditation certificates in support of this must be submitted to the Employer's Representative for approval prior to any work commencing. All connections to the points of supply by ESKOM must be made in cooperation with ESKOM. Type test certificates of the joints and terminations must be available if requested.

6. 3.3 KV MV SWITCHGEAR

As a result of space and other related constraints, the switchgear to be supplied under this contract will be the Schneider Premset series of equipment. The pricing must include for the design, manufacture, supply, works testing, delivery, off-loading, site erection, connections, site testing, commissioning and handing over of the switchgear. These switchgear panels are suitable for indoor use with all power, control and communication cable entries from the front or bottom. The contractor may, as a separate offer, submit alternative switchgear with similar form-factor and rating as the Schneider Premset series.

Switchgear shall comply with the general requirements set-out in this document, as well as with the requirements of the following standards:

Graphical symbols for electrical diagrams: NRS 002 (2000).
Semi-conducting screens: SANS 6284-4 (1999)
International electro-technical vocabulary Chapter 441: Switchgear, control gear and fuses: SANS 60050 (441) (1984).
Standard voltages, currents and insulation levels for electricity supply: SANS 1019 (2001).
Metal-clad switchgear for rated AC voltages above 1kV and up to and including 36kV- General requirements and methods of test: SANS 1885 (2001), IEC 17025.
High-voltage switches Part 1: Switches for rated voltages above 1kV and less than 52kV: SANS 60265-1 (1998).
High-voltage switchgear and control gear Part 100: High-voltage alternating-current circuit-breakers: SANS 62271-100 and SANS 62271-200.
Metal-clad switchgear - For rated AC voltages above 1kV and up to and including 24kV - Preferred requirements for indoor applications in the electricity supply industry Part 2: Standardized panels: NRS 003-2 (1993).
Electrical power, switchgear and associated equipment- operating conditions: IEC 60694 Specification and acceptance on Sulphur Hexa Fluoride (SF6): IEC 60376
Isolators and earthing switches: NRS031, IEC 60129, IEC60271-102
Current Transformers: IEC 60044-2

Floor tolerances of the substation floors cannot be guaranteed to the standard of finish of 1mm / 1000mm required. Tenderers must therefore make allowance in their tenders for methods to overcome the tolerances normally obtained with self-levelling screeds.

Circuit breakers shall be complete with sufficient auxiliary contacts for monitoring and control purposes. Allowance must be made for opening/closing switchgear from the PLC system and all required opening/closing coils must be installed in this regard.

All the circuit breaker and feeder panels shall be equipped with electronic protection relays suitable for incomer, bus-bar, motor- or feeder protection as the case may be for the particular switchgear panel. All relays shall be equipped with I/O cards and with MODBUS, Ethernet or similar communication ports. All terminals shall be properly marked and the labels and markings shall correspond with the numbers on the drawings of the manufacturer. Power monitor equipment shall be installed on incoming circuit breakers and will have communication facilities to communicate via MODBUS, Ethernet or similar communication protocols to the PLC system.

Switchgear panels shall be equipped with earthing switches which shall be interlocked with circuit breakers or fuse/contactor units to enable the making safe of outgoing feeder cables for maintenance purposes.

The switchgear manufacturer shall be responsible for the correct installation of the switchgear on site as well as the relevant testing and commissioning and handing over thereof. All testing in the factory and on site must be witnessed by the Employer's representative. Over current and earth fault tests must be simulated during the factory inspection to demonstrate the protection grading of the relays. On completion of manufacture of switchgear, the following tests shall be conducted at the manufacturers' works:

1. An operational test on all circuit breaker operating mechanisms, including the checking of mechanical interlocking, spring charging mechanisms and all opening and closing systems.
2. A primary injection test at no less than full rated current to verify the tripping times of and operation of all over current, earth fault and other protection relays. This test shall also verify the current transformer rations and polarity
3. A primary injection and voltage test on all metering circuits to ensure the correct connection and operation of all power meters and verify the current transformer ratios and polarity
4. Primary current injection tests shall be made on all power circuits containing CT's to check ammeters, and calibration of relays. During the overload and earth leakage tests, the circuit breaker shall be closed to confirm tripping of the circuit breaker under fault conditions
5. The testing and checking of all indication lamp circuits and the operation of lamp test and associated circuits
6. The testing of all alarms circuits and feedback contacts
7. High voltage pressure tests on the equipment between phases and between phases and earth such that all combinations are fully tested
8. Test all auxiliary relays for correct operation
9. Test all trip, close and control circuits for correct operation
10. Tests on site shall be the tests specified for each item of plant in the relevant British or other approved Standards and the tests shall be conducted in accordance with this specification. The Contractor shall provide all equipment and personnel required to carry out the tests, including provision, installation and removal of all test instruments, the connection and disconnection of plant items and obtaining of all records. The Contractor shall prepare and submit to the Employer's representative, prior to the commencement of testing, schedules in approved format for each test together with a program for the Tests on Completion. The Employer's representative will be responsible for overall co-ordination and safety control of tests. The Contractor shall submit one copy of the result of each of the tests at Site to the Employer's representative within one week of the tests being carried out. Four copies of the certified results of each of the tests at Site in the form of test reports or tests certificates shall be provided to the Employer's representative within one month of the tests being carried out. The staff of the Client shall be invited to observe and participate in the Tests on Completion.
11. The tests on manufacturing completion shall be carried out to the satisfaction of the Employer's representative before factory acceptance certificates are presented for signing.

The inspection and witnessing of tests shall not relieve the Contractor of his responsibility for meeting all of the requirements of the Specification and will not prevent any subsequent rejection if such material or equipment is later found to be incorrect or defective. The Contractor shall be responsible for all tests. Should any tests prove any equipment to not comply with this Specification, all costs to ensure compliance and of any subsequent tests, which the Employer may require, at his discretion, to prove such compliance, shall be borne by the Contractor.

It will be the contractor's responsibility to ensure that all protection current and time settings are coordinated with the relevant Eskom supply protection settings to ensure that proper grading of tripping curves are obtained to ensure downstream protection from the point of supply to avoid random tripping. The calculations and tripping curves will be submitted to the Employer's representative and shall be presented to ESKOM for approval before transformers and/or motors are energized. The costs of such current and time setting calculations shall be for the Contractor's account and must be included in the costing presented in the Bill of Quantities.

The following minimum site tests shall be carried out on the switchgear in the presence of the Employer's representative

1. DC voltage tests on the main and secondary circuits in accordance with BS 162, BS 5227 or IEC 298.
2. Insulation resistance tests.
3. Entering the calculated trip settings into all relays
4. Primary and secondary current injection tests to prove calculated settings and the operation of current transformers and protection relays and ammeters.
5. Earth continuity and earth resistance.
6. Mechanical and electrical functional tests.
7. The continuity and phase rotation of all circuits shall be tested.
8. Rotation and polarity tests shall be carried out on all current transformers.
9. Each current transformer shall be checked to ensure that it is earthed at one point only.
10. The manual and electrical close and trip mechanism of each circuit breaker shall be tested and the semaphore indicator(s) checked.
11. All electrical and mechanical indicators shall be checked to ensure that they function correctly.
12. All circuit breaker interlocks shall be checked to ensure that they are working properly.
13. All isolating switches, earthing switches and associated interlocks shall be checked in order to make sure that they are working correctly.
14. All connections to the earth system shall be checked for correctness.
15. All alarms, indicators, tripping units, fuses and switches shall be checked separately.
16. Tripping units shall be checked for proper operation at 50% voltage, as specified in BS 5311: Part I.
17. Each circuit breaker shall be checked with the tripping coil energised, to prove trip-free operation.
18. The insulation of all secondary wiring circuits shall be subjected to a voltage withstand test.
19. The insulation resistance of all secondary wiring shall be determined.
20. Ratio and insulation resistance tests shall be carried out on all voltage transformers if applicable
21. The earthing of their cases and windings shall be checked.
22. The resistance of the earthing system shall be measured and noted
23. All circuit labelling shall be checked.
24. The control, protection, instruments, metering equipment and circuits shall be tested to prove compliance with the tests described.
25. Three copies of the relevant test certificates shall be supplied by the Contractor.
26. Final relay settings will have to be carried out on site to suite the incoming 3.63kV supply breaker settings.

Costing must include all insurance, transport to site, delivering, off-loading and placing switchgear in position, all lifting and/or handling equipment must be provided by the contractor. Insurance must include cover against lightning damage to the switchgear from the date of power on to the final handover date of the switchgear after the lapse of the retention period.

7. BATTERY TRIPPING UNIT (D.C. AUXILIARY SUPPLIES)

The 3.3 KV switchgear assemblies will require 24V DC voltage battery tripping units with NiCad or NIMH type batteries of capacity not less than 22A/h. The exact number of cells and capacity shall be determined from the voltage requirements of the circuit breaker closing and tripping circuitry and the discharge duties required by the switchboard.

The battery capacity shall be sufficient to perform either of the following functions:

(a) Five successive tripping and re-closing operations of all the circuit breakers on the switchboard
or
(b) A single tripping and re-closing operation of all the circuit breakers on the switchboard plus supplying all the standing loads on the battery for at least ten (10) hours.

A constant voltage type charger with current limiting facilities shall form part of the unit. The output voltage shall be kept with 1% of the float charge voltage designed for maximum charge conservation and a maximum battery life for variations of plus minus 10% of the input voltage. The charger capacity shall be adequate to supply any standing load on the battery plus a charging current which will recharge a fully discharged battery within eight (8) hours. The charger shall be suitable for operation on a nominal 230 Volt, 50 Hz mains supply or from a supply obtained from a voltage transformer.

The charger must be supplied complete with all the required controls including isolating circuit breaker, ammeter indicating rectifier output, battery voltmeter, mains on led indication, mains fail led, charge fail led indication and potential free alarm contacts for external monitoring. In addition, external monitoring contacts for battery fail, battery voltage low and high and earth must be provided. HRC fuse protection must be provided for each DC circuit supply.

The batteries and charger shall be housed in a 3CR12 cubicle separate from the MV switchgear. The cubicle must be fitted with a removable, galvanized gland plate for bottom cable entry.

8. VARIABLE SPEED DRIVES

1. General

The variable speed drives to be supplied for this contract will be the WEG MV01 series air-cooled units, rated to 3.3 KV and the specific motor sizes at the applicable pump stations. This part of the specification is for the design, design drawings, supply, manufacture, testing in the works of the manufacturer, packing, transport, shipping to site, off-loading on site, installation and assembly on site, connection of cables, testing on site, setting up software, commissioning and handing over of the Variable Speed Drives (VSD's) as specified.

2. Environmental Conditions

The equipment required shall be suitable to operate in the following environmental conditions:

Site - 1 100m m ASL
Ambient Temperature - 40 deg C
Relative Humidity - 50% Non-condensing

The equipment required will operate in a dusty and hot environment. The make-up air presented to the equipment for ventilation will be normal outdoor. Precautions are in place in the design of the buildings to minimize the presence of dust in the air and the VSD rooms will be air-conditioned. The ventilation equipment required for removal of radiated heat of the VSD shall form part of the VSD. The required equipment, fans and ducts for this purpose must form part of the structure of the VSD. The Contractor shall ensure that sufficient ventilation is provided for the equipment by drawing air from the room, through the equipment, and to the outside of the building if required.

3. General Requirements of the Equipment

Full technical details of the overall dimensions, total mass, mass and placement of the heaviest section of the equipment as well as ventilation requirements shall be stated in the Technical Data Schedules for VSD's offered in this Tender. The VSD drives will be supplied with power from separate 3.3kV switchgear panels which will be situated in the same rooms as the VSD's. The drives must have network- and hard wire control facilities for starting and stopping.

The Contractor/Manufacturer/Supplier of the VSD equipment must carry out a modeling study of the power supply, drive equipment and motor combination to ensure that the drives equipment will not fail during transient conditions of whatever form during start-up, power down or running cycles of the drives.
Any damage to MV cables, motors or other equipment of the Employer, due to drive malfunction, will be for the account of the Contractor.

The drives shall be complete with harmonic filters and shall generate as low as possible 5th, 7th, 9th and 11th level harmonics on the line side or load side of the drives (voltage and current). The harmonic distortion generated (IEEE 519) by the drives shall be as low as possible and an upstream power factor of near unity are desired at all times.

A HMI terminal is required on the low voltage control cubicle door of the VSD.

The manufacturer of the equipment shall prepare and submit full working power- and control diagrams within the period as stated in the Design Criteria schedule herein. These drawings must be submitted for approval of the Employer's representative before any construction of the equipment is undertaken. The following elements must form part of the design and diagrams:

Auxiliary Supply Requirements
Communication Interface Communications Protocols (Ethernet/IP)
External I/O requirements for hardwired external control and output indications
Analog Inputs and Outputs

The VSD equipment supplied under this contract must be commissioned on site by the manufacturers of the equipment and in accordance with this specification and the drawings and to the full satisfaction of the Employer's representative and the Employer. All control- and protection equipment settings of the VSD's and the programming of the software must be done by the manufacturers of the equipment, in the presence of the Employer's representative.

It cannot be assumed that the floor of the VSD room will be absolutely straight and level. This must be allowed for in the design of the equipment and the relevant pricing for installation of the equipment.

The incoming and outgoing MV cables for the VSD will be as specified in the cable specification section of this document and the Bill of Quantities. The copper earth wire installed with the MV cable from the 3.3 KV switchgear shall be bolted to the earth bar of the VSD assembly. The incoming and outgoing cable connections to the VSD's will enter from below the VSD drives.

All control wiring and power wiring ends, regardless on which equipment it terminates, shall either be lugged or ferruled. Ferrules or pin lugs shall be used on ends of small power wires where clamp terminals are used.

Labels on the front of panels and inside panels shall be fully descriptive, engraved on black on white engraved wafer material. All internal wiring must be numbered with all numbers indicated on the associated electrical diagrams. All labels shall all be done in English.

Control wiring internally to the equipment shall be housed in trunking mounted on the sides and above and below all DIN rail mounted equipment, forming a complete wire-way surround for control wiring.

4. Cooling and Ventilation

Tenderers must state clearly in their offers whether the equipment offered will operate in the environmental conditions of the MV/VSD room areas. The contractor must make allowance for the exhaustion of hot air to the exterior of the building via sheet metal ducting, or propose alternative arrangements, if the proposed air-conditioning system will not be sufficient to limit operating environmental temperatures within acceptable limits. Any such systems shall form part of the VSD portion of the contract and shall be manufactured, supplied and installed by the VSD contractor. All such ventilation ducts shall be either hot dip galvanized or powder coated sheet steel.

VSD front door grilles shall be fitted with removable and washable matted dust filter media, mounted in frames for easy removal and replacement.

5. HMI, Remote I/O Controls and Network

The HMI terminal of the VSD shall be located in the door of the low voltage or electronic control section of the VSD. The cubicle space behind the HMI shall not contain MV equipment or voltage higher than 230V. Any 230V terminals or live equipment shall be screened of for safety should the door be opened for access to the rear of the HMI or any of the connections thereto. The VSD's must be equipped with remote I/O and network facilities, switches and indicator lamps as stipulated below. Switches shall be key type with the key removable in any of the switch positions. It shall not be possible to turn the switch unless the key is inserted. Lamps shall preferably be of the multi-eye, 20mm diameter LED type with replaceable bayonet type lamps.
Control Buttons, Switches and Indicator lamps at HMI terminal

The following control push buttons, switches and indicator lamps are required on the operating panel section of the VSD and below the HMI terminal.

Door Mounted Push Buttons:
• Start
• Stop
• Jog (if available)
• Emergency stop (Lock-stop)

Door Mounted Selector Switches:

• Local/Remote key switch
• Off/Auto/Manual key switch
• Potentiometer for local operation.

Indicator Lights: (LED)

Run (Green LED)
System ready (Blue LED)
Ready (Blue LED)
Fault (Red flashing LED)
Warning (Amber LED)
Stopped (Red LED)

The HMI display may also be used for some of the above indications but main indications such as RUN and STOP shall be available in LED indicator lamps.

Digital and Analog I/O's

The following I/O's are required internally to the VSD.

Digital Inputs:
• Remote
• Local
• Forward
• Run
• Stop

Digital Outputs:
• In Torque Limit
• Cooling Alarm
• At Speed
• In Test Mode
• Warning
• Fault
• Running
• Stopped

Analog Inputs:
• Speed reference input (4mA - 20mA input signal).

Analog Outputs:
• Speed output (4mA - 20mA).

Communication

The following communication facilities shall be available in the VSD.
• Profinet
.
The signals that shall be available via the field bus system shall be programmed in accordance with the requirements of the Employer. All the available parameters of the VSD must be accessible by the PLC.
The communication between the VSD and the PLC shall be via fiber-optic cable or copper core twisted and screened signal cabling, to the choice of the Employer's representative.

HMI Terminal

The terminal display and drive control system shall be available for use when the auxiliary 400V / 230V power is available in the VSD.
The terminal shall be user friendly and easy to use and the software of the control system shall be complete with a set-up wizard.
The set-up wizard shall automatically start when the drive at power up for the first time.
The instructions of the wizard shall assist with the setting up all the available system operating parameters and the drive as well as the external control facilities.
Warnings and comments shall appear on the display, together with help text to assist the user in setting up the operating system.
The display shall also have all the monitoring and troubleshooting facilities.
The VSD control shall have an "auto tuning" facilities which will operate together with the HMI and system software so that the drive can automatically tune itself to the load to enable fast start-up and smooth operation.
The display shall further show any warnings or abnormality when the drive is in operation.
Auto/Off/Manual and Local/Remote Operation

Operation of Key Switches

The operation of the switches shall offer the following functions:

Auto/Off/Manual settings

(i) With the Auto/Off/Manual switch set to OFF the VSD shall not operate at all.
(ii) With the Auto/Off/Manual switch set to AUTO and with the Local/Remote switch set to REMOTE the VSD shall operate fully automatically and shall START and STOP upon hard wire or network commands from a remote position (PLC control). The potentiometer on the VSD shall be inactive and the speed shall be set by the PLC software and via the network or via an analog signal from the PLC.
(iii) With the Auto/Off/Manual switch set to MANUAL the VSD shall only operate only with the START and STOP buttons on the VSD control panel or by using the user buttons on the HMI and also only when the Local/Remote switch is set to LOCAL. In this case the potentiometer on the drive control panel shall be operational and shall control the motor speed.
(iv) Whenever the Auto/Off/Manual switch is turned from AUTO through OFF to MANUAL the drive shall STOP and shall not start again until the Local/Remote switch is switched into the LOCAL or REMOTE position and then only as specified in EL-18.9.2 herein.

Local/Remote settings

(i) With the Local/Remote switch set to LOCAL the VSD shall only operate by means of the START and STOP buttons on the VSD control panel or by using the user buttons on the HMI.
(ii) With the Local/Remote switch set to REMOTE the VSD shall only be able to operate remotely by the remote hard wire signals or the PLC software via the network port.

The Off/Auto/Manual and Local/Remote switches will therefore form an interlock to prevent simultaneous operation from two sources i.e. the PLC controls and the drive controls.

Start-Up Alarm

An adjustable (15 seconds to 30 seconds) start-up delay period shall be active whenever any of the Auto/Off/Manual or Local/Remote switches on a VSD are switched or before any drive shall start, either locally or remotely controlled. During this period a start-up audio alarm shall sound in the pump station.

9. GENERAL CONTROL SPECIFICATION

This portion of the specification covers the minimum technical requirements for the design, manufacture, documenting and testing of a PLC control system for the monitoring and local- and remote operation of the various pump stations. The following items need to be considered:

1. Each pump station will have a HMI on the Control Panel containing the PLC equipment.
2. In addition, each pump station will also have a remote HMI installed in a suitable location closer to the pumps.
3. Each HMI will offer complete control of the local pump station, as well as provide interaction to the other, remote pump station information and control. All reservoir and sump levels will also be available on these HMI's.
4. Two SCADA systems will be installed, one in the Henkriesmond Water Treatment Works Control Room, the second in the Okiep Control Room. Control and monitoring of all systems will be available from both the SCADA systems.

A control philosophy will be available and must be used for the final design of the PLC control system. The control philosophy will have all pertinent information regarding of what equipment and control is needed. An approved system integrator must be employed to ensure that the PLC control system is installed and configured correctly and that the required graphic displays on HMI screens and SCADA monitors are done in a professional manner and to the satisfaction of the Employer's representative. The software programming and the screen graphics of the system therefore form part of this Contract.

There will be one PLC per pump station, with a Remote I/O Junction Box for each pump set, controlling the stopping/starting and duty of the pumps in the specific pump station. This PLC will also monitor reservoir levels, temperatures, flows and general alarm conditions. It will also interact with the PLC's in the other pump stations, Eenriet Reservoir and the SCADA Systems. The fibre optic cable will be used to transmit and receive the signals between the various elements of the system to establish a cohesive, integrated control system.

The type of PLC's will be as per the included electrical diagrams. The HMI's required in this Contract shall be of the colour TFT HMI touch type screen with minimum size of 10" and sufficient memory to accommodate all controls and related graphic pages, alarm logs and trend graphics.

The PLC cabinets, pump junction boxes and the control consoles shall include all the required marshalling terminals, internal wiring, fuses, relays, fibre optic termination equipment, PLC backplanes, PLC modules, network cards, etc., all as applicable for the particular PLC and as indicated on the electrical diagrams.

10. SYSTEM SOFTWARE

The principal of operation in the project software shall be automatic operation of the pump stations to ensure maximum level retention on all reservoirs.

Auto/Off/Manual controls switches shall be available in all starters and all actuators will have Local/Remote switch facilities for maintenance use and for possible manual control should the automatic system malfunctions.

All actuators in the works will be remotely controllable from the PLC systems, allowing the automated operation of the pump stations as required. All I/O required for this is indicated on the relevant electrical diagrams. It will be an advantage if the Actuators are fitted with network interface cards (Modbus TCP or Ethernet IP) but is not a specific requirement, as the control design has been based on hard-wired control.

The Employer or the Employer's representative will decide, after award of tenders, which of the data must be displayed on the HMI and SCADA screens and/or used in the control system for proper system control. The Contractor shall check and discuss the I/O list together with the Employer's representative to make sure that all signals available on site in the pump station are included in the final I/O list before commencing with ordering of equipment and the programming of the PLC systems.

The Contractor shall supply and use the required software packages as part of this tender. The software and all setup files and the final installed and working program(s) (in software and hardware) shall become the property of the Employer upon completion of the project. It will remain the responsibility of the Contractor to provide the software packages required to complete this project.

11. CABLE INSTALLATION

1. Installation of Cables

(a) Cables with copper conductors shall be used throughout unless otherwise specified or approved.
(b) All un-armoured cables shall be installed in metal trunking, sleeves or conduit unless clearly specified to the contrary.

2. Competence of Personnel

It is a definite requirement that the Contractor shall only employ personnel fully conversant with cable manufacturer's recommendations for joining and terminating of cables.

3. Identification of Cables

Cables shall be identified at all terminations by means of strap-on type cable labels with PVC digit inserts. The use of PVC tape with punched characters is not acceptable. The identification numbers of cables shall be shown on "as built" drawings of the Installation.

4. Installation of Underground Cables

Cables shall be installed at the following minimum depths below final ground level:

Up to 1 KV:	600 mm
Above 1 KV:	1000 mm

All cable depth measurements shall be made to the top of the cable when laid directly in ground or to the top of the duct or sleeve where these are provided. The above depths shall apply to the top layer where cables are installed in layers. The Contractor may only deviate from the above depths provided prior authority in writing has been obtained from the Employer's representative. In this event the cables

shall be protected with a suitable concrete covering. The depth of cable pipes or ducts beneath railway lines or roads shall be not less than 1,1 m below the formation level.

5. Cable Spacing

Cables installed in the same trench shall be laid parallel to each other with the following spacing between the cables:

LV/LV:	2 cable diameters.
LV/ Existing H:	300 mm minimum.

Where HV and LV cables have to be installed in the same trench, the HV cable shall be laid on the one side of the trench at a depth of 800 mm and then covered with 300 mm of soil. The LV cable shall then be laid on the other side of the trench, i.e. not above the HV cable, and then completely backfilled. (HV cables referred to in this paragraph are existing HV cables).

Cables for telephones, communication systems and other low voltage systems (less than 50 Volt) shall be separated from power cables by at least 1 m. All control or pilot cables shall be laid at least 300 mm from power cables. Cables shall not be buried on top of each other unless layers are specified. The minimum spacing between layers shall be 200 mm.

All cable must be installed on the specified cable ladders and trenches in the pump stations and other areas indicated. Control cables shall be installed as far away as possible from 3.3 KV and 400V cables on cable ladders or in trenches and shall be mounted in hot dip galvanised trunking or steel conduits. These services can be mounted on the side of cable ladders.

Spacing between control cables and 400V power cables on cable ladders shall not be less than 100mm.

6. Cable Laying

Except where ducts, tunnels or pipes are provided, cables shall be laid directly in the ground. The cable shall be removed from the drum in such a manner that the cable is not subjected to twisting or tension exceeding that stipulated by the cable manufacturer. Cable rollers shall be used as far as possible to run out cables. Rollers shall be spaced so that the length of cable in the trench will be totally suspended during the laying operation and sufficiently close to prevent undue sagging and the cable from touching the ground. Rollers shall also be placed in the trench in such a manner that they will not readily capsize. Cable rollers shall have no sharp projecting parts liable to damage the cables. Where cables have to be drawn around corners, well-lubricated skid plates shall be used. The skid plates shall be securely fixed between rollers and shall constantly be examined during cable laying operations.

Where cables have to be drawn through pipes or ducts, a suitable cable sock shall be used and particular care shall be exercised to avoid abrasion, elongation or distortion of any kind. The maximum allowable tension when pulling a cable is 70 N/mm sq of conductor area. It will be assumed that the price or rates contained in the tender includes for the installation of cables in pipes and ducts or below existing or newly installed services as specified in the Bill of Quantities.

The Employer's representative shall be informed timeously of the intention to carry out all cable laying operations to allow an inspection of the works if so required.

7. Installation of Cable on Trays, in Building Trenches and Service Ducts

Cables shall be installed in one of the following ways:

(a) On horizontal cable trays.
(b) On horizontal metal supports with suitable clamps.

(c) On vertical cable trays or metal supports fixed to the side of the trench. The cables shall be clamped in position.

Cables shall not be bunched and laid on the floor of the building trenches.

Suitable clamps (cleats) which will secure cables without damage shall be used. Metal clamps or expanding type fixings shall be used. Clamps shall consist of adjustable metal wings which clamp to a metal support, or consist of two halves that are bolted together. The correct clamp size to fit the cable shall be used. Cables of different sizes may only be fixed by a common clamp when the clamp is specially made to accommodate the various cables.

8. Spacing of Supports

The maximum spacing between cleats (clamps) to which cables are fixed in horizontal and vertical cable routes shall be determined as indicated below. Take note that additional cleats shall be installed at each bend or offset in the cable run.

The maximum distance between supports or cleats for multi-core control cables shall be 20 times the outside diameter of the cable with a maximum spacing of 550 mm for un-armoured cables and 30 times the outside diameter of the cable with a maximum spacing of 900 mm for armoured cables. Spacing of supports for cables for high voltage lighting shall be in accordance with the relevant SANS specifications.

A minimum of 20 mm ventilation clearance shall be maintained between cables and the wall to which they are cleated.

9. Cables for Other Services

Cables for telephones, communication systems and other low voltage systems (less than 50 Volt) shall be separated from power cables. In building ducts a physical barrier shall be provided between power cables and cables for other services. Where armoured cables are used for such other services, they shall be installed on separate cable trays or shall otherwise be at least l m away from power cables. Where un-armoured cables are used for these other services, they shall be installed in separate conduits or metal channels.
For larger cables the spacing shall be 10 x outside diameter of the cable.

10. Termination and Jointing of Cables

General

Cable ends shall be terminated with glands or in cable boxes with the associated accessories such as clamps, shrouds, etc. complying in all respects to the Standard Specification for LV Installations. An O-Line channel or other approved means of support shall be provided to remove mechanical stress from the glands. Cable cores shall be marked with heat-shrunk sleeves where necessary to identify the phases.

Termination of PVC-insulated Cables

Cable ends shall be terminated by means of adjustable glands. The glands shall be fitted in accordance with the cable and gland manufacturer's instructions. The correct size and type of gland shall be used for the particular cable and application. Suitable lugs shall be used, crimped, using mechanical or pneumatic tools designed for this purpose, to the cable conductor ends. Contact surfaces shall be thoroughly cleaned and smoothed and fixing bolts shall match the hole size of the lug. Cables that are connected to clamp type terminals where the clamping screws are not in direct contact with the conductor need not be lugged but the correct terminal size shall be used. Ferrules shall be used as far

as possible where cable conductors are connected directly to equipment with screws against the conductor strands. When cutting away insulation from cable conductors to fit into lugs, care shall be taken that no strands are left exposed. Under no circumstances may any of the conductor strands be cut away to fit into lugs.

Joints

Joints in cable runs will not be allowed unless specified in the Project Specification or authorized by the Employer's representative. Jointing shall be carried out strictly in accordance with the manufacturer's instructions and by personnel competent in jointing the types of cables used. LV cable joints shall be of the epoxy-resin type.
Joints shall be fully water- and air tight and shall be free of voids and air pockets. The crossing of cores in joints will not be permitted under any circumstances.

Testing

Each cable shall be tested after installation in accordance with the relevant SANS (up to 1 kV) as well as the requirements of the Local and Supply Authorities. LV cables shall be tested by means of a suitable megger at 1 kV and the insulation resistance shall be tabulated and certified. The Contractor shall make all arrangements, pay all fees and provide all equipment for these tests. The cost of testing shall have been included in the tender price. The Contractor shall notify the Employer's representative timeously so that a representative of the Employer's representative may witness the tests. On completion of the tests on any cable, the Contractor shall without delay, submit three copies of the certified Test Reports to the Employer's representative.

Measurements

All measurements for payments shall be made jointly by the representatives of the Employer and the Contractor shall obtain the signature of the Employer's representative including approval of such measurements. All cable lengths indicated in the Project Specification and/or shown in the cable route drawings shall be regarded as estimates and are given for tendering purposes only. The successful tenderer shall measure actual cable lengths on site before ordering.

The final price for the supply and installation of all cables will be adjusted, on the basis of the actual lengths of installed cables, in accordance with the unit rates quoted at the time of tendering. Cable lengths shall be measured on site to the nearest 500 mm for this purpose and surplus cable will not be remunerated for. The Contractor shall carry out a final "as built" survey of the cable routes and present" as built" route plans of the complete installation. The following information shall be reflected on the plans or submitted as separate schedules with the plans:

(a) Overall length of each cable.

(b) Locations of all joints (if any) in relation to permanent reference points. Dimensions shall be shown and the method of triangulation i.e. two dimensions to each joint, shall be used.

(c) Identification of each cable.

The works will be deemed to be incomplete until all tests have been conducted successfully and all "as built" drawings and schedules have been handed to the Employer's representative.

12. EARTHING

Earth mats and earth conductors are required for the new MV switchgear on all the sites of the works. As there are existing earth mats on the sites, an earth resistivity measurement shall be undertaken on the sites, before any earthing installations are planned and materials installed. These measurements shall be undertaken by a specialist firm and their recommendations will be implemented as required, after approval by the Employer's representative. The cost of this survey must be included in the project costing.

The Contractor shall submit a detailed report from the survey specialist to the Employer's representative together with recommendations on the earthing systems required, thus meaning a detail design of routes and connections. The report shall clearly indicate whether the systems as specified (or installed) are sufficient and, if not, the proposed additional earthing requirements plus the cost thereof.
The required survey shall be done in compliance with the SANS code for lightning protection and the maximum earth system value required is 1 ohm, referred to zero as measured with a null balance megger. The maximum earth system value required is ≤1 ohm for electrical earths and ≤5 ohm for lightning protection earths.

Earthing materials have been measured in the Schedule of Quantities as preliminary quantities for
earth systems and the final quantities will be determined by the test results and the extent of the works.
All earthing shall be carried out as specified herein and shall also comply with the requirements for earthing as stated in SANS 10142-1 : Part 1 : Low Voltage Installations (as amended).

Final testing of the earth system shall only be undertaken once the earthing system is fully completed. No part of the new electrical installation shall be made alive until all earthing is solidly connected.
All main earth conductors shall be 70mm sq bare stranded copper earth wires and all joints in the ground shall be CADWELDED and taped with M23 self-bonding tape.

Earthing electrodes used for the main earth system shall be solid steel with bonded copper protection.
The nominal diameter of earthing electrodes shall not be less than 16mm unless the electrodes are specified for placing in pre-drilled holes in which event a minimum nominal diameter shall not be less than 12mm.

Main earth conductor ends in MV switchgear or LV distribution panels shall be lugged and bolted to the earth bars of such equipment.

Main earth mats/rings shall be installed next to new outdoor MV switchgear or MV switchgear rooms on all the sites, if required by the report of the specialist indicated above. The main earth mats/rings shall each consist of five separate 1,8m earth electrodes. Four electrodes shall be installed at the corners of a rectangle measuring 4m x 4m with the top of the electrodes at least 300mm below the slab with one 1,8m earth electrode placed at the center of the rectangle. Bare stranded 70mm sq copper earth wires shall be Cad welded to the 4 corner electrodes and shall end and be extended to, and Cad welded, to the center electrode.

Earthing electrodes used for the earth mat shall be solid steel with bonded copper protection. The nominal diameter of earthing electrodes shall not be less than 16mm diameter. Bare stranded 70mm sq copper earth wire shall further be installed from the earth mat to the earth bar of the particular MV switchgear on the site as well as to the transformer tank earth studs and to the neutral terminal on the 400V side of transformers. Bare stranded 70mm sq copper earth wire shall also further be installed from the earth mat to the earth bar of the LV switchgear and to the earth bars of the VSD's. All metal structures carrying or housing electrical equipment shall be bonded together with 70mm sq copper earth wires.
Main 70mm sq copper earth wires shall be installed together with all MV cables and main LV supply cables.
All MV cable armouring shall be properly bonded to the earth bars or cable box earth studs at the MV switchgear or transformers.

Earthing of the pump motors shall be done by means of BCEW as indicated on the Bill of Quantities.

Final tested earth readings shall be filled on the COC for each site or separate section of each site.
The contractor shall issue the Certification of Compliance and the Contract will not be regarded as completed and will not be accepted by the Employer's representative unless all the requirements for testing, drawings, manuals and the certification has not been completed and all data has been handed to the Employer's representative.

All the junction boxes, cabinets, earth bars- or points in equipment cabinets and cable ladders installed under this Contract shall be earthed to the nearest earth point. It is a requirement of this Contract that the earthing and bonding of the installation comply with SANS 10142 -1 (latest edition). A sum amount must be tendered for earthing and bonding of the equipment specified in this Electrical Contract.

13. LV SWITCHGEAR

This portion of the specification provides for the design, manufacture, supply, works testing, delivery, off-loading, site erection, connections, site testing, commissioning and handing over of free standing indoor 400V / 230V distribution assemblies. The assemblies shall be suitable for 400V / 230V systems, and shall consists of an incoming circuit breaker and outgoing circuit breakers as indicated on the single line and other electrical diagrams. All ratings and preferred equipment are shown on these diagrams. Fault ratings must be as indicated on the diagrams.

Distribution boards and all other assemblies containing 400V / 230V shall be constructed and carried out in compliance with SANS 1765, Clauses 6.6.1 and 6.6.2 of SABS 10142-1 for assemblies which operate fault ratings of <10kA and SANS 1473-1, Clauses 6.6.1 and 6.6.2 of SABS 10142-1 as well as SANS 61439-1 for assemblies which operate fault ratings of >10kA.

All 400V assemblies and boards in this Contract shall be manufactured from 1.6 mm 3CR12 steel and shall be powder-coat finished in "Light Orange" powder coating in colour B26 of SANS. The assemblies shall all have hinged face panels. All face panels shall have heavy duty pedestal stainless steel hinges and folded edges and shall fit over lips on their compartments and shall be sealed all round with neoprene seals. Hinged face panels are required with 6mm square cam type locks, top and bottom on the lock side of the panels. All assemblies must also have hinged outer doors. All doors shall have heavy duty pedestal stainless steel hinges and folded edges and shall fit over lips on assembly and shall also be sealed all round with neoprene seals. The rating of the circuit breakers and other equipment required in the assembly shall be as shown on the single line diagrams accompanying this document.

Circuit breakers and instrumentation shall be mounted on removable chassis flush behind the face plates in the assembly. All door handles shall make provision for padlocks. Danger warning signs shall be fitted to outer doors as required by the OHS Act

Busbar compartments or busbar arrangements for indoor assemblies shall always be mounted at the top of assemblies. Busbars of outdoor assemblies shall be mounted in the top section of the assembly, below the pitched roof, on high impact plastic insulators. Neutral busbars in three-phase, four wire assemblies containing three phase balanced loads shall have a cross-section of at least 50% of the cross-section of the phase busbars.

Removable 2 mm thick galvanized gland plates, covering the whole bottom of assemblies, shall be provided. The gland plates shall consist of separate removable sections, lying front to back in the assembly. Gland plates shall be at least 300mm above floor level in assemblies for ease of cable glanding. Assemblies shall further be fitted with removable covers to give access to cable glands below gland plate level.

14. LIGHTING INSTALLATION

All the materials for the lighting installation have been allowed for in the Schedules of Quantities. All light fittings will be supplied complete with lamps. The positions of light fittings will be indicated on layout drawings to the successful tenderer.

All light circuits shall consist of 2,5mm sq 3- and 4 core armoured cable mounted on cable ladders or the surface of the structure.

Circuit supply wires, neutral wires, earth wiring and switch return wires shall all form part of such a single cable run and only one phase must be present in any cable run.

Cables to lights shall follow cable ladder routes as far as possible. Straight runs of cables on surface from a cable ladder shall be mounted in 20mm hot dip galvanised conduit and conduit shall be saddled at 1 m intervals on hot dip galvanised spacer saddles (hospital saddles).

T-off on cable runs to switches and to light fittings shall be by means of PRATLEY boxes and compression cable glands.

All the cabling and light fittings must be tested on completion of the system by the Electrical Contractor for this Contract together with the Employer's representative.

15. CABLE LADDER AND LADDER INSTALLATIONS

All the cable ladder materials shall be factory manufactured by a reputable supplier (for example O-Line) and shall be of the hot-dip galvanized mild steel type. Detailed layout drawings of the installations have not been provided, but sufficient materials have been measured in the Schedule of Quantities to allow for complete installations. The cable ladder installation shall also be done complete with radius bends or offset sections, where the ladders change direction.

The Contractor shall measure the actual lengths and number of T-sections, bends, supports, etcetera required on site before ordering materials to avoid over-supply of material on site.

All horizontal bends, internal- and external bends, T-offs and 4-way sections shall be from the same supplier as the racking and must be of the same size, construction and rung heights as the racking onto which they are fitted. All joints in ladders shall have heavy duty angle side splice plates with 8 x M8 bolts to each splice on each side of the ladder.

Cable ladders shall be mounted on sections of hot dip galvanised strut, mounted on the structure of the Works with expanding type bolts. Supports shall be installed at 1000mm distances along all the ladder routes.

Cutting and welding of cable ladders will not be allowed on site. The total ladder installation shall be bolted together on site using hot dip galvanised bolts and nuts. The standard clamps, spring loaded strut clamps, etc. of the ladder and ducting suppliers shall be used throughout.

Fixing of ducting, where specified, to building structure shall be by means of staggered fixing points, 1.5m apart, through the back of the ducting. Expanding bolts for this purpose shall be 5mm diameter minimum.
Ducting mounted in cable trenches shall be fixed to the side of the trench and as far away as possible from MV or 400V cables in the same trench. Final mounting positions will be determined on site for all trunking and cable ladders.

16. MOTOR EMERGENCY STOP/ FIELD JUNCTION BOXES

Each motor will have this unit mounted on a free-standing pedestal next to the applicable motor. The enclosure and its' contents are detailed in the electrical diagrams included with this tender. The enclosure shall be equipped with an E-Stop pushbutton, hard-wired into the stop-circuit of the applicable pump starter. The units will also act as a remote Start facility for the applicable motor, as well as a field instrumentation junction box with Remote I/O for monitoring motor/pump temperatures and vibrations, no-flow conditions, delivery pressure and inlet flow, as well as monitoring and control of actuated valves. The Remote I/O will communicate with the pump station PLC via an Ethernet IP communication interface.

17. MANUALS, DATA RECORDS AND DRAWINGS

All data pamphlets packed with equipment and other pamphlets, handbooks of equipment, operating instructions of equipment, drawings, etc., shall be kept in safe storage by the Contractor during the Contract period. The Contractor shall also keep accurate records of all tests carried out on equipment and cables and of the test results so achieved. Records shall be kept of setting values of instrumentation and all meter readings taken during testing and commissioning, as well as records of all final adjustment readings or changed settings done during the maintenance period.

A comprehensive operational- and maintenance hard copy manual shall be built-up by the Contractor, using the above, as well as other data and descriptions as specified below. All drawings and diagrams shall be done in AUTOCAD 2010 (or later) format and all text shall be submitted in the latest edition of Microsoft Word format. All tabular data shall be submitted in the latest edition of Microsoft Excel format. All pamphlet and brochure data shall be submitted in Acrobat 5 (or later) format.

The number of copies as scheduled in the Bill of Quantities, of the manuals described herein, shall be made up by the Contractor. The manuals shall be presented to the Employer's representative on the first day of "wet commissioning", if handover of the Works is done on that day. The manuals shall be neatly housed in lever arch files and shall be in typewritten and/or printed format, properly indexed, with appropriate 2 or 3 layer card dividers between each section to facilitate ready reference.

A main index shall be placed in the beginning of each manual. The project name and project description shall appear at the top on the main index of the manual. Colored dividers shall preferably be used.
The manuals and drawings shall cover all installation, operation, and maintenance schedule aspects of each item of equipment and all circuitry provided under this Contract.

The manuals, if approved, will be handed to the Employer or the representative of the Employer, so that the Works can be operated correctly and safely. Any changes which may be necessary to the contents of the manual after the commissioning of the Works shall be done by the Contractor and sufficient copies of the altered data shall again be submitted to the Employer's representative for binding into the manuals. This process shall be repeated for the duration of the maintenance period or until the final certificate is issued by the Employer's representative for the project.

A "Practical Completion Certificate" and subsequent "Certificate of Commissioning" will only be issued on receipt of accurate and final "as-built" drawings and documentation to the approval of the Employer's representative. Such documentation shall be presented to the Employer's representative on the first day of commissioning of the works. Any certification of "Practical Completion" or "Commissioning" of the works is subject to final approval of such documents and drawings by the Employer's representative. Wherever manufacturer's manuals refer to types of equipment other than the exact type as installed, the exact type shall be highlighted throughout such manuals. This will serve to ensure that:

- The Employer knows where all the equipment and materials are installed
- Fault finding in the electrical system can be done in future
- Alterations and additions can be undertaken in future by referring to the drawings to determine the built-in capacity of the electrical system without having to determine this data on site. It is therefore imperative for the Contractor to produce and supply as-built diagrams, together with detailed installation schedules, to be included in the above.

The Contractor shall keep all drawings and diagrams prepared during the course of production and installation of the Works and shall present this to the Employer's representative on completion of the Contract. Such drawing shall at least consist of all the drawings the Contractor used for construction and installation work as well as all data of final positions and final settings of equipment. All cable positions on the site of the Works shall be shown on layout drawings, together with dimensions taken on site from fixed points to show exact location of underground cables. Drawings shall preferably be done in A3 format and on the standard border and title block sheets of the Employer, unless permission is granted in writing by the Employer's representative for other formats of title blocks. All drawings shall be properly numbered with the numbering system required by the and the number of the particular sheet and the total number of sheets shall be shown on each drawing.

Electronic copies, on disc or CD, of all “as built” drawings prepared by the Contractor during the course of the Contract, as well as all electronic copies of software and descriptions of equipment, handbooks or sales data shall also be handed to the Employer’s representative, together with the hard copy “as built” drawings and manuals, in quantities and formats as specified in the Project Specifications

A set of three (3) prints of the shop drawings for all the distribution boards, motor control panels and electronic control panels shall be submitted for approval before any of the aforementioned boards or panels are manufactured.

The manuals shall contain detailed operational description (of all switchgear and control equipment in substations, motor control panels, distribution boards, etc. i.e. all proprietary assemblies), and shall be provided to assist the user personnel of the Employer with advanced knowledge of the equipment for short, medium and long term maintenance- and operations of the plant and the works.
The descriptions must be complete in all respects and the Contractor shall also ensure that these manuals are prepared in such a manner that, in the opinion of the Employer’s representative, a competent and qualified technician can trace any fault, identify any defective component, replace it with the correct spare part and follow, without difficulty, the exact function of every component. To this end, care must be exercised to correlate the text with the circuit diagrams, to relate the diagrams one with another and to provide a simple method of diagnosis and test to be used wherever breakdowns occur. The manuals shall also include block diagrams giving the layout of equipment as well as a description of the function and operation of every unit in the system. The manuals shall be neatly prepared, in typewritten and/or printed format, indexed, with appropriate dividers between each section to facilitate ready reference. All documentation shall be presented in the English language.

The description shall, as a minimum requirement, include Operational and maintenance data and details of all assemblies or components of electrical equipment installed in the plant. Copies of operational manuals of manufacturers can be inserted in these descriptions. In the case of insufficient descriptions in manuals of manufacturers, the Contractor shall provide additional descriptions to enable maintenance of the equipment.

The descriptions shall include:

(i) Technical details of all equipment installed
(ii) A complete description of the operation of all equipment.
(iii) A parts and spares list of every item of equipment together with a description of the item, the name, address and telephone number of the original supplier or wholesaler of the equipment. Brochures may be added as additional information but must not replace the data required.
(iv) Complete equipment schematics
(v) All manufacturers’ handbooks having reference to the equipment
(vi) Installation test and alignment procedures
(vii) All circuit diagrams
(viii) All interconnection and inter-cabling diagrams
(ix) Complete trouble shooting procedures and any other information deemed necessary to permit rapid and efficient maintenance of any part of the equipment by a qualified technician.

The operating procedures contained in the manuals shall contain the following detailed features in fully descriptive format:

Operating Procedures

a) Pre start-up checks of all electrical equipment
b) Routine running attention
c) Stopping the plant
d) Prolonged shut-down of the plant
e) Re-commissioning of the plant after repairs, maintenance or prolonged shut-down

Maintenance

Routine maintenance procedures
a) Description
b) Schedule

Fault Finding Procedures

a) Supply faults
b) Main control faults
c) Investigation procedure for detection of motor starter faults and remedies:
   i) Symptom ii) Probable fault iii) Remedy
d) Investigation procedure for detection of auxiliary equipment faults and remedies:
   i) Symptom ii) Probable fault iii) Remedy

Safety Precautions

a) The nature of each hazard
b) The level of seriousness
c) How to avoid the hazard
d) The possible consequences of not avoiding the hazard

In the case of sealed assemblies or advanced assemblies of equipment that cannot be opened or maintained or repaired on site, the Contractor shall provide sufficient data and instructions for the replacement of the assembly and shall further describe the measures which the user or operator of the plant can follow to operate the plant in an emergency and, if necessary, operate the plant manually, to overcome total shut-down or non-operation of the plant or Works until a new replacement can be installed. The descriptions for temporary operational measures shall be of sufficient nature to enable interim safe operating conditions of the plant and shall further not be of a nature which shall cause damage to other parts or sections of the plant.

18. TESTING AND TEST EQUIPMENT

1. General

All materials and workmanship shall be of the respective kinds described in the Contract and in accordance with the Employer's representative's instructions and shall be subjected from time to time to such tests and by such persons as the Employer's representative may direct at the place of manufacture or fabrication or on the site or at all or any of such places. The LV equipment, MCC's and other distribution boards, etc., shall be tested in the factory by the manufacturer and the Contractor in the presence of the Employer's representative before the equipment is shipped to site. The Employer's representative must be given minimum one week notice ahead of testing, to enable him to attend the tests. Except as otherwise provided in the Specification, the Contractor shall supply such assistance, accommodation, instruments, machines, labour and materials as are normally required for examining, measuring and testing of any work and the quality thereof. For witness testing of Variable Speed Drives, Switchgear or other items which is not done in South Africa, it will be the responsibility of the Contractor to make provision for the Travel, accommodation and Dining costs for the Employer's representative.

The cost of making any test shall be borne by the Contractor if such test is clearly intended by or provided for in the Specification and (in the case of a test under load or a test to ascertain whether the design of any finished or partly finished work is appropriate for the purposes which it was intended to fulfil) if such is particularized in the Specification in sufficient detail to enable the Contractor to price or allow for the same in his Contract Price.

If any test is ordered by the Employer's representative which is either -
(a) not so intended by or provided for; or
(b) not so particularized; or
(c) though so intended by or provided for is ordered by the Employer's representative to be carried out by an independent person or body at any other place than the site or the place of manufacture or fabrication of the materials or equipment tested; then the cost of such test shall be borne by the Contractor if the test shows the workmanship or materials not to be in accordance with the provisions of the Contract or the Employer's representative's instructions, but otherwise by the Employer.

The Contractor shall keep records of all the data of tests and shall submit this data to the Employer's representative upon completion of all tests. Such data shall include the results of:

(a) Earth tests
(b) Insulation tests
(c) Continuity tests
(d) Pressure tests
(e) Impedance tests
(f) Performance or rating tests
(g) Impulse tests
(h) Temperature tests, etc.

Tests carried out in the factory of the manufacturer or at a testing facility shall be done in accordance with the prescribed standards for such tests. The applicable standards for such tests shall be SANS, BSI, IEC, DIN, NEMA or such acceptable standard as may be applicable to the product or equipment or assembly.

The Contractor shall further carry out any other special test as may be required by the Employer's representative in a manner or in accordance with the standards as may be required by the Employer's representative. The Employer's representative will have the right to obtain a quotation from the Contractor for any special tests which are required by him and to instruct the Contractor to carry out such tests.
If equipment should fail a standard or prescribed standard test by a testing authority, the cost thereof shall be for the account of the Contractor.

2. Factory Tests and Inspections

The Contractor shall inform the Employer's representative as soon as any equipment or any part of an installation in the place of manufacture or on site is ready for inspections or tests. The Employer's representative shall be given sufficient notice in advance of inspections or tests and final dates and times of such inspection will then be confirmed with the Contractor by the Employer's representative.
The inspection or testing of manufactured equipment in a factory by the Contractor or by any other test facility in the presence of the Employer's representative must not be regarded as acceptance of responsibility by the Employer's representative for the correct performance of such equipment on site.
The factory tests shall be done as far as possible with full control conditions as may be experienced on site. All remote controls of equipment must be simulated during these tests by using temporary connected toggle switches to replace remote field devices such as probes, lock-stops, etc. No wire straps which have to be inserted or taken out whilst testing is under way, will be acceptable.

Temporary simulated signals for the future field instrumentation or signals for future telemetry controls and field instrumentation must be available during the factory tests and must be fully operative and all field signals must be simulated during these tests by using toggle switches or signal generators.

3. Site Tests and Inspections

The inspections by the Employer's representative of any part of an installation or Works on site do not exempt the Contractor from his responsibilities in terms of the Contract. The Employer's representative will only accept the completed installation work after having received all test results, commissioning results and certificates of compliance or test certificates of the Supply Authority (if applicable) on completion of the whole of the Works. The Contractor shall provide a clean and safe testing area on site of any equipment to be tested and inspected by the Employer's representative. All live equipment shall either be screened off or enclosed so that inspecting persons are not endangered during such tests or inspections.

Test equipment, test leads, clean writing top space and all other facilities shall be provided for Employer's representative during such tests. The Employer's representative reserves the right to instruct the Contractor to carry out the re-testing of any equipment which does not pass the first inspection or test.
The time and travelling cost of the Employer's representative for the purpose of any re-testing of equipment which did not pass the first or a previous test may be for the account of the Contractor. Any delays in Contract time caused by failures of inspections or tests will also be for the account of the Contractor.

The Contractor shall carry out all tests and shall do all settings of electrical equipment to safeguard the equipment of other Contractors, before site testing is carried out by the Employer's representative. Any abnormal condition, beyond the control of the Contractor, which may come to the attention of the Contractor during any preliminary or final tests or commissioning procedures shall immediately be reported to the Employer's representative.

19. COMMISSIONING

The commissioning on site shall include all of the following procedures and is defined as follows:

1. Dry Commissioning

The "Dry Commissioning" of the plant shall comprise the checking and confirmation of the installation of all equipment as described in the works, including switchgear, distribution and control boards, instrumentation and any other related equipment. In addition, all cable connection and terminations will be checked and confirmed during this action. All equipment labels will be checked and confirmed. All earthing installation work must be completed. In addition, the following must be implemented:

All safety checks and tests must be completed.
All basic settings of motor protection equipment and overloads must be set and checked where possible.

On completion of the above, switchgear must be brought to a ready state, with lock-stop circuits, liquid level protection, external controls such as stop-start stations, telemetry connections, etc., i.e. all controls which can prevent start-up of the equipment, completed and in correct working order.

The relevant system may be powered on to allow the checking of motor direction, to be checked in conjunction with the supplier and/or contractor responsible for the mechanical installation, preferable with the Employer's representative present as well. The responsibility of correct rotational or operational tests rests with the Electrical and Mechanical contractors. Couplings of motors shall be uncoupled from pumps for the purpose of direction of rotational checking.

Submersible pumps shall be submersed in water during such tests.

The Contractor can then proceed to complete the installation to bring it to a ready state for "wet commissioning" of the Works.

2. Wet Commissioning

"Wet Commissioning" shall include the following actions and shall be done with the Employer's representative present and shall require the presence of the Contractor for as long as it is necessary to carry out all the actions hereunder or as may be further required by the Employer's representative.

(a) The motors and pumps and other ancillary equipment shall be run under load with the equipment and loads connected, aligned and ready for operation, and with sufficient water in the suction lines in the case of pumping installations.
(b) Protection equipment, such as protection relays, overloads, level settings, pressure settings, etc., shall be set by the Contractor in the presence of the Employer's representative. All the settings shall be recorded by the Contractor for handing over to the Employer's representative after commissioning.
(c) Underload settings or phase angle settings of protection relays, pressure devices, flow monitor devices, level monitoring devices, etc., shall be set under test conditions, with the Contractor on standby, when inlet and/or outlet valves are closed and opened on pumps.
(d) Telemetry signals and/or remote controls shall be tested to ensure that level controls for emptying and/or filling of reservoirs function correctly.
(e) Other safety and/or remote starting and stopping devices shall be tested for correct functioning.

(f) The plant shall be stopped when the Employer's representative is satisfied with all tests and all connections and after operation of the plant for the number of hours as required by the Employer's representative. This period is normally not shorter than 4 hrs. Terminals in panels and at motors (power and controls) shall then be checked for tightness.
(g) Any small items such as alterations to labels, faulty ammeters, etc. shall be recorded for repairs.
(h) The number of required maintenance and operational manuals (complete in all respects) shall be handed over to the Employer's representative. (Refer to the Project Specifications for requirements of manuals)
(i) The switchboards and all instruments shall be clean and neat.
(j) All lights and power points shall be operative and all earthing and bonding shall be completed and tested.
(k) A Certificate of Compliance shall have been handed to the power supply authority with a copy on site for the Employer's representative.
(l) The Contractor shall hand to the Employer's representative all the test results of cables, earthing, switchgear, etc. which was logged by him together with the settings of all protection equipment, control equipment, level sensing equipment, circuit breakers, etc. This information shall be made available on properly structured test sheets and log sheets and shall be dated and signed by the Contractor.
(m) The Contractor shall then proceed with training of the operating personnel of the Employer as may be required in the Project Specification.

No last minute repairs or installation work shall be done by the Contractor on the day of "wet commissioning" of the Works. The successful completion of all the above shall be the "wet commissioning" of the Works and shall be regarded as the "first hand over day" of the Works to the User or Owner of the installation. The retention period of the Works normally starts on that day, unless abnormal conditions prevent the handing over of the Works to the Client. An abnormal occurrence that prevents handing over will not be seen as failure of the Contractor in this respect. If the commissioning should have to be stopped or abandoned due to the failure of the Contractor to complete the Works and have the Works ready for inspection or if the Works has not gone through the "dry commissioning" procedures as stated or through the "wet commissioning" procedures as stated above, then the further costs for re-commissioning later will be for account of the Contractor. Such costs will include all the

traveling, accommodation and time rate costs of the Employer's representatives. The commissioning shall be regarded as incomplete until all tests have been conducted successfully and all datasheets of

tests have been completed and all drawings have been updated to show any deviation from factory built equipment details.

3. Training

Training provided by the Contractor shall be directly applicable to the actual equipment to be used at the installation. All training shall be carried out on site, unless otherwise requested by the Employer.

Training are normally required as follows and should be undertaken with the manuals and documentation indicated previously, available on site.

(a) Training of operators.
(b) Maintenance training of technical staff.
(c) Software training (related to SCADA computer - primary course only for operation of SCADA).

The above training sessions will be separate sessions, with the personnel with the appropriate skill-levels attending the specific sessions.

Training shall include the training of technical personnel of the Employer during the installation period and commissioning stages of equipment on site to make the technical staff and or skilled operators completely conversant with the installed equipment and the use thereof. The Employer thus reserves the right to appoint certain staff to the Contractor's team during the installation and commissioning phases of the works.

4. Certification by the Employer's Representative

The following certificates must be issued by the Employer's Representative

(a) Practical Completion of Works
(b) Certificate of Commissioning (after successful commissioning of the Works have been attained)
(c) Final Approval of Works (at the beginning of the guarantee and retention period). The date of Issue of this certificate may be the same date of the "Certificate of Commissioning.

5. Certification by the Contractor

The Contractor shall issue the necessary completion certificates and Certificates of Compliance to the Employer's representative and the applicable Authorities as per SANS 10142 :Part 1: Low Voltage Installations, or as required in terms of the Occupational Health and Safety Act, Act 85 of 1993, as and when required by the Employer's representative or the Authorities. The certificates shall include the Certificate of Compliance as would be required by SANS 10142 (latest amendment) where any 231/400 Volt (or higher voltage) work is carried out by the Contractor.

None of the certificates of the Employer's representative, as specified hereinbefore will be issued if the Contractor does not comply with the requirements of this clause. Until the Certificates of Compliance is issued by the Contractor, the Employer's representative will not consider issuing of a Certificate of Completion. The original Certificate of Compliancy for every separate site or installation shall be handed to the Employer. Copies must be issued to the Employer's representative and the Supply Authority and copies can further be included in the Operational and Maintenance manuals.

20. CONSTRUCTION OF STRUCTURED DATA CABLING, SUPPLY AND INSTALLATION OF A PABX AND CCTV SYSTEM

1. General Scope of Work

In general, the work comprises the supply and installation of certified structured cabling networks at the various control locations as per the Bill of Quantities, as well as the linking of the control locations via the already installed fibre-optic network. The supply and installation of a PABX and CCTV system is included in the work.

2. Product Information

All cabling will be Category 6, 1000Base-T for data and must be compliant with ISO 11801, ISO 11801 Class E, EIA/TIA 568B and EN 50173 standards. The above shall be used for all applications that require data connectivity; these include data outlets for PLC, IP Telephony and CCTV.

3. Network Cabinets

All network cabinets must conform to the following basic specification as well as the detail provided per location in the Bill o Quantities:

a. Rack configuration – Single
b. Colour – Standard Grey
c. Floor standing or wall-mount according to location
d. Width – 600mm (standard 19" rack)
e. Depth – As per equipment requirements

All equipment and materials must be new. Used, re-conditioned, and refurbished equipment and materials are not acceptable.

4. Cabinet placing

The Cabinet placing is the location in a building where a transition between the backbone and the horizontal distribution system occurs. Network cabinet, network equipment installations and terminations will be done within the Network Cabinet. The station cable route distance to the furthest device, is within 90 meters. Care must also be taken to allow all four doors for floor standing cabinet and all three doors of the wall mount cabinets to be opened with enough working space allowed. The cabinet's final position will be determined on site.

5. Ducting and supporting structures

All ducting systems: Baskets, trays, conduits, power skirting must be provided and installed by the appointed contractor. The contractor is responsible for installation of the ducting from the patch room to the end device and will supply blanking plate hardware at such points. The installer must laisse with the main electrical contractor regarding the use of shared routes where applicable

6. Management and Installation practice requirements

The contractor must recognize the importance of the installation practices on the resulting performance capabilities of the cable distribution system and be cognizant of the proper methods during installation.

a. The contractor shall be a CERTIFIED installer; proof in the form of a certificate is required. The contractor's on-site representatives are required to individually be certified on the product, proof in the form of a certificate is required.
b. All installation work shall be done in a neat, high quality manner. Attention must be paid to the support materials used, cable pulling tension, preservation of cable construction, maintenance of

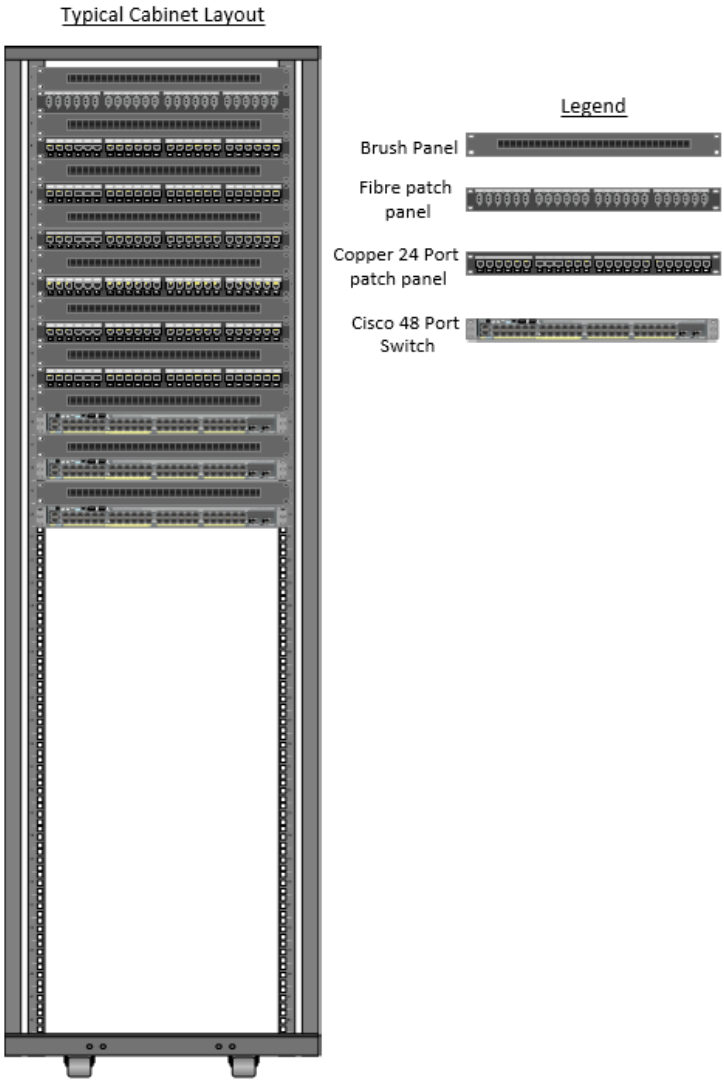
   pair twists to points of termination, and the placement of cable with the proper bend radius.
c. The supplied product shall, once installed, conform to ISO 11801 Class E electrical characteristics for the purposes of Vendor warranty.
d. The eight-pin modular jack shall be wired and pined as per the EIA/TIA-568A wiring scheme standard for an eight-pin modular jack.
e. It is the responsibility of the contractor to report to the professional team any concerns relating to ducting/routing installations if horizontal cable length is going to exceed the 90-metre limit. Maximum permanent link length shall be no more than 90m.
f. It is the responsibility of the data cabling contractor to calculate all actual cable meters required. All system cable runs are to be continuous without splices.

g. All cable reels are to be visually inspected for damage incurred during shipping and transit prior to installation. Cable and connecting components found to be damaged or defective prior and during the installation process are to be removed immediately and returned to the supplier.
h. Cables shall be placed with enough bending radius so as not to kink, shear, or damage the cable. The bending radius shall never be less than that specified by the manufacturer. As a rule, the bending radius shall be a minimum of eight times the outside diameter of the cable.
i. During the installation process, installers are required to visually inspect cable and connecting hardware components for damage. If such damage is found, e.g. tears in the outer jacket of the cable, severe kinks as identified by white/grey bands of discoloration on cable jacket, these components are to be replaced immediately;
j. Cables shall be protected from sharp edges by installing bushings and/or grommets where necessary.
k. Care should be taken not to score conductors during the removal of the outer insulating sleeve of the cable when preparing to terminate pairs.
l. Neatly tie all cables within equipment cabinets, housings, and terminal cabinets with Velcro cable ties at no more than 300mm intervals. Install in accordance with the latest EIA installation standards. Cable ties or zip-lock will not be accepted.
m. Secure all cables in equipment cabinets to provide strain relief at all connections. Secure cables to cable-form bars or other supports in cabinets. Do not support cables from the electronic equipment.
n. Cable is not to be pulled in under excessive load. At all times during any given “pull”, the cable under load should easily react and feed to pulling tension. Whenever possible cable should be placed into pathways as opposed to be pulled in under tension. Cable being pulled in should always be handled by no less than 2 individuals to avoid damage to the cable by means of kinks, twisting along its own axis, getting snagged etc. It is recommended that 3 installers co-operate in the pulling in of any given cable run, 1 on each end and another in the middle or positioned near any obstructions to feed slack and thus avoid undue stress on the cable.
o. Cable shall under no circumstances be strapped to PVC electrical conduit or any structures belonging to an unrelated functional unit such as an air conditioning drain pipe.
p. Outlet boxes are to be permanently fixed with the appropriate fixing material, no double side tape or glue/adhesive of any kind is allowed.
q. Cable may be laid adjacent to sources of interference such as 240V electrical branch circuits with a minimum separation of 50mm where a continuous grounded metallic barrier exists between electric cable and structured cabling and durable non-metallic insulation exists, other than the insulation material of the cable.
r. At no point may data cabling cross the path of any power or fluorescent lighting unit at an angle less or greater than 90 degrees.
s. One Metre of slack shall be left in each horizontal cable. This slack shall be left at the outlet (jack) end of the run. The slack shall be neatly coiled and looped on the cable basket or inside the power skirting. The coil of cable shall be loosely tied with a Velcro fastener. The Velcro shall be loose around the coil thereby allowing the wrap to rotate. A tightly wrapped coil will potentially alter the electrical characteristics and performance of the cable.
t. No equipment will be taken over if it’s unsafe or if all the requirements have not been met.
u. The Employer’s Delegate has the right to intervene and stop the project at any stage, if it becomes evident that the work does not comply with this specification. The work will then only

proceed once written approval has been obtained to do so from the Employer’s Delegate.
v. Infrastructure will only be taken over after all snag items have been rectified in full and the commissioning process proved the installation performing to specifications.
w. Installations will not be taken over in parts. The final takeover shall take place when all works are completed.

6. Typical Network Cabinet Layout

The typical cabinet layout applies to single network cabinets and details spacing between patch panels, brush panels and network switches.



7. Labelling and patch lead color standards

a. All labelling shall be permanent and neat. Hand written labels are not acceptable;
b. A total of 6 labels per cable will be required;
c. A permanent label shall be installed in each of the following locations:
- Surface-mount box;
- All cabling shall be clearly labelled at both ends to the rear of the point of termination no more than 100mm from such a termination point;
- Patch panel face plate;
- Both ends of the patch leads;

Labelling shall follow the standard below:

Cabinet	–	Floor where outlet is located	–	Trade	–	Point Number
C		Room Number		C-CCTV		
				P-PLC		
				T-IP Telephone		

Samples of an approved label would be: **C1_G_P_001**

Patch lead colour standards are detailed below:

Trade	Patch Lead Color	Color
PLC	Green	
IP Telephone	Blue	
CCTV Camera	Red	

8. Post installation test, certification and documentation

a. The contractor is required, throughout the duration of the project to be in possession of Copper **UTP certification test equipment and must be:**
   Level III or greater;
   NVP set to the NVP printed on the cable;
   Cable set to CAT6 (100Ohm, UTP);
   Test standard set to ISO CLASS E (2002) or TIA 568B CAT6. Contractor must choose Permanent Link;
b. Test equipment able to only do qualification testing will not be accepted;
c. Personnel responsible for the Certification testing should be trained on the specific equipment model being used;
d. The contractor is required to produce the test equipment calibration certificate when requested to do so;
e. The Contractor will give at least Five (5) working days written notice, prior to the hand–over or any inspection required on the network to the ICT consultant.
f. The Project Management Team reserves the right to insist on being present during the self-calibration of the test unit and the instruments initial configuration prior to test and during the test process itself;
g. The contractor is required to make available the test equipment and necessary personnel at no extra cost should a member of the Project Management Team wish to perform random acceptance testing on approximately 10% of the installed cabling infrastructure;
h. Where it is found that the random tests do not match those presented, the Project Management Team reserves the right to insist on a supervised re-test of any or all installed cables prior to acceptance;
i. The Contractor shall perform tests on every cable and all associated hardware and officially certify the installed cabling system;
j. The contractor shall submit the test results in the original file format as exported directly from the testing device on a CD together with the software for opening such an original file. No text or PDF files will be accepted;

k. The contractor shall prepare the system floor plans in digital format which show and label the:
   - Pathways (including risers and outdoor runs);
   - Outlet positions and numbers;
   - Floor, building and campus patch rooms;
   - MAC addresses of Wi-Fi access points;

l. Any other system documentation the contractor has prepared;

9. Warranty Information

a. The warranty shall be the 25-year warranty;
b. Warranty shall be for Permanent link certification;
c. The contractor is to note that the Structured Cabling System's vendor warranty requirements are to be met;
d. All cost relating to the certification and warranty is for the contractor, including costs related to site inspections by vendor agents for warranty certification;
e. It is the sole responsibility of the contractor to ensure that the appropriate Vendor test and documentation requirements are met in order that the University be provided with a warranty certificate issued by the Vendor.
f. Any contention regarding Vendor warranty requirements is to be resolved between the Vendor and the contractor and has thus no bearing on the Project Management Team requirements as outlined here.

10. Network Specification - General Notes

a. Items in the Bill of Quantities are deemed to include supply, delivery, installation and connection where appropriate, unless stated to the contrary.
b. In the event of discrepancies between the drawings, specifications and Bill of Quantities the Employer's Representative shall decide whether the work as executed shall be measured on site or whether re-measurement shall be affected from the working drawings only.
c. Provision is made for the addition and pricing of items which the Contractor may deem necessary to price separately for the successful completion of the Works. The total price is thus deemed to be for the complete and functional installation, in accordance with the specifications, drawings and standard practice. Under no circumstances will additional payments therefore be made for any work or material forming part of the installation, which could reasonably have been foreseen at tender stage as being required to complete the Works. (This is not to be confused with additional work which, subject to the approval of the consultant, may at times become necessary or be requested and for which additional payments will be made.)
d. The following Fiber testing shall be carried out to the satisfaction of the Employer's Representative or his duly appointed representative:
   All fibre in all cable must be tested by a qualified installer with a Optical Time Domain Reflectometer (OTDR) in the following instances:
   - After installation to verify that no damage occurred to any fiber and that minimum bending radius are adhere to.
   - After completion of each splice and termination to verify the loss of each splice.
   - End to end testing. This must always be done bi-directional as specified in document IEC 60793-1-40
   - Bi-directional testing to test inline splices for loss and ensure that accurate readings are obtained.
   - Results must be available for future reference on software until received and accepted.
   - Re-testing to be done request with a power source and light meter.

The following loss criteria must be observed:
Single Mode Fibre (SM)
Typical wavelength losses :
• 1310nm = 0.34 to 0.40 dB/km • 1550nm = 0.22 to 0.25 dB/km
Splice Losses :
• 0.1 dB to 0.4 dB • Connector Losses • 0.4 dB
Return Loss :
• -45 dB with a flat face connector

11. Telecommunication Solution Specification

The service provider shall provide a real-time, IP Voice Communication solution, capable of providing Voice-over-IP telephony services, subject to the following specifications:

11.1 Handset Specifications

The service provider shall provide the Municipality with handsets that comply with the following minimum specifications:

Entry level VOIP Handset with the following standard features:
a. Is a full featured IP Phone?
b. At least 2-line graphical display
c. A Keypad
d. At least 2 to 4 programmable buttons to indicate programmed user's status
e. Volume control
f. Integrated Ethernet switch with a speed of 1000 Base-T
g. Full Duplex hands free acoustics
h. IEEE 802.3af POE support (Class 1)
i. Handset price may not exceed R2200.00 (Vat Incl.)

11.2 Switchboard

- 12 Lines, 6 SIP Accounts, 5 Soft keys
- 48 on screen digitally customizable BLF/speed dial keys
- 4.3" (480x272) Color LCD Screen
- Dual Gigabit ports, integrated POE

11.3 System Features

- Gigabit Ports 2
- POE/USB/SD Support Yes
- FXO Ports 4
- FXS Ports 2
- Registered SIP Devices 20
- Concurrent VOIP Calls 8
- DHCP Server Support Yes

12. CCTV Solution Specification

The service provider shall provide a real-time Video Recording Solution, subject to the following Specifications:

Recordings to be kept for 1 week

Video/Audio Input:

Two-way audio input:	1-ch, RCA (2.0 Vp-p, 1kΩ)
IP video input:	32-ch

Network

Remote connection:	128
Incoming bandwidth:	320Mbps or 200Mbps(when RAID is enabled)
Outgoing bandwidth:	256Mpbs or 200Mbps(when RAID is enabled)

Video/Audio Output

HDMI/VGA output:	2-ch, resolution: HMDI1:4K (3840 × 2160)/60Hz, 4K (3840 × 2160)/30Hz, 2K (2560 × 1440)/60Hz, 1920 × 1080p/60Hz, 1600 × 1200/60Hz, 1280 × 1024/60Hz, 1280 × 720/60Hz, 1024 × 768/60Hz VGA1: 2K (2560 × 1440)/60Hz, 1920 × 1080p/60Hz, 1600 × 1200/60Hz, 1280 × 1024/60Hz, 1280 × 720/60Hz, 1024 × 768/60Hz HDMI2/VGA2:1920 × 1080p/60Hz, 1280 × 1024/60Hz, 1280 × 720/60Hz, 1024 × 768/60Hz
Recording Resolution:	12MP/8MP/6MP/5MP/4MP/3MP/1080p/UXGA/720p/VGA/4CIF/DCIF/2CIF/CIF/QCIF
Audio Output:	2-ch, RCA (2.0Vp-p, 1KΩ)
Synchronous Play back:	16-ch
Decoding	
Capability:	4-ch@8MP,16-ch@1080P
Live view / Playback:	12MP/8MP/6MP/5MP/4MP/3MP/1080p/UXGA/720p/VGA/4CIF/DCIF/2CIF/CIF/QCIF

Hard Disk	
Interface Type:	1 eSATA interface
SATA:	8 SATA interfaces for 8 HDDs
Capacity:	Up to 6TB capacity for each HDD
Disk array	
Array type:	RAID0, RAID1, RAID5, RAID10
Number of array:	4
External Interface	
Network Interface:	2 RJ-45 10/100/1000Mbps self-adaptive Ethernet interfaces
Serial Interface:	RS-232, RS-485, Keyboard
USB Interface:	Front panel: 2 × USB 2.0 Rear panel: 1 × USB 3.0
Alarm In:	16-ch
Alarm Out:	4-ch
General	
Power Supply:	100 to 240 VAC, 50 to 60 Hz
Consumption (with out hard disk and POE):	≤30 W
Working Temperature:	-10 oC ~ +55 oC (+14 oF~ + 131 oF)
Working Humidity:	10 % ~ 90 %
Chassis:	19-inch rack-mounted 2U chassis
Dimensions:	445 × 470 ×90 mm (17.5"× 18.5" × 3.5")
Weight(without HDD):	≤ 10 Kg (22 lb)

Typical Camera Specifications:

4MP WDR Vari-focal Dome Network Camera

- 1/3” Progressive Scan CMOS
- Up to 4 megapixel resolution
- 120dB WDR
- 3D DNR
- Up to 30 meters IR range
- Built-in Micro SD/SDHC/SDXC card slot, up to 128 GB
- Audio/alarm I/O (-S)
- Mobile Monitoring
- 12V DC±25% & PoE(802.3af Class3)
- Support H.264+
- IP67
- IK10

4 MP IR Vari-focal Bullet Network Camera

- 1/3" Progressive Scan CMOS
- 2688 ×1520@30fps
- 2.8 to 12 mm varifocal lens
- Color: 0.01 Lux @ (F1.2, AGC ON), 0.018 Lux @ (F1.6, AGC ON), 0 Lux with IR
- H.265+, H.265, H.264+, H.264
- Three streams
- 120dB WDR
- 2 Behavior analyses, and face detection
- BLC/3D DNR/ROI
- IP67, IK10
- Built-in micro SD/SDHC/SDXC card slot, up to 128 GB
- 3-Axis adjustment

21. SCADA AND SCADA HARDWARE- GENERAL SPECIFICATION

1. General

This section covers the basic requirements for a Supervisory Control and Data Acquisition (SCADA) system that is properly designed, constructed and configured and installed on hardware applicable to the requirements of the SCADA system. Items not specifically detailed in this Specification but which are necessary to provide a safe and fully operational working system, shall be deemed to be included. All equipment, both hardware and software, shall have a proven track record with a verifiable user and technical support base.

2. System Overview

The SCADA system shall form an integral part of the automation and control of the system. It shall provide the interface between the operator and the various elements of the system (such as PLC's), allowing overall supervision, co-ordination, control, parameter adjustment and monitoring and control of alarms and fault conditions. Data will be collected from PLC's and other related field devices and will be recorded in a relational database. The system shall communicate via appropriate data transmission protocol drivers with field devices and PLC's. The data obtained and recorded by the SCADA system shall be available via a SCADA local network (LAN) to other SCADA computers on the network for visualization, trending and analysis.

3. General Requirements

The SCADA system shall communicate with all field devices at all times. All process measurements shall be done on-line to allow real-time responses to take place from the SCADA or operator. The following functions must form part of the SCADA operation:

a) Process data acquisition.
b) Logging of process to a database.
c) Visualization of the process and the equipment in the various pump stations, reservoirs and sumps.
d) Real time and historical data trending.
e) Provide Operator interfaces for controlling/operation of the system elements, with different levels of operation allowed via different levels of authorization.
f) Allow the Operator to make allowed parameter adjustment.
g) Alarm management and Report generation

4. SCADA Hardware

The hardware supplied shall include all necessary components to support a fully functional SCADA installation and shall be rated for continuous operation under the environmental conditions experienced at this site. It is the Contractors' responsibility to ensure that the hardware offered and installed is adequate to support the offered SCADA software and the specified SCADA functionality, including future expandability.

All computer equipment shall be from a reputable, branded supplier and carry a minimum of a 2-year warranty. At least one printer shall be included as part of the system. The printer shall be a colour laser printer with at least A4 printing capability. The printer shall be connected to the SCADA System's local area network and will be accessible from all SCADA computers (server and workstations). The printer will be used for alarm and event messages, measured value trend printing reports or the printing of any other reports as required.

Each computer shall be supplied from an in-line single phase 230 V AC, 50 Hz uninterruptible power supply (UPS) from a reputable supplier. It shall be sized the full load of the applicable computer load plus 25 % spare capacity, and shall be able to accommodate the inrush currents of all connected equipment. It shall be capable of maintaining the connected load fully operational for a minimum period of 30 minutes.

All computer hardware and peripheral power supplies shall be protected against lightning and power line surges. The installation shall be properly earthed and bonded to a common earth bar.

Computer operating system software, hardware and peripheral drivers as well as general computer operations and maintenance software (e.g. anti-virus software, back-up software etc.) must be included in the supply of the equipment.

5. SCADA Software

The SCADA software package shall be the Adroit Smart Scada system. It must be supplied with the capability to configure or use all the features of the system without the purchase of extra software or licenses. All software supplied under this contract shall be registered and licensed to the Employer and the Contractor shall include proof of such licences in the Operations and Maintenance Manuals to be submitted on completion of the contract.

The system must be configured to automatically restart after a power loss is restored, and all measured values and statuses from PLC's shall be retrieved and updated after such an event.

Process control logic will not be permitted in the SCADA package and as such, the operational status of the SCADA system shall not affect the automation and control of the works. The PLC's and Instrumentation shall continue operating the works even with the SCADA system shut-down.

All measured values, events and alarms shall be written to a dedicated log file for long term storage on the SCADA server hard drive, database server or back-up media. It shall be possible to set individual logging rates for each item of data depending on their rate of change and logging accuracy required, and archive the log files and / or database files at predetermined time intervals or on a demand basis.

6. SCADA Process Visualization and Operation

The SCADA mimics and interfaces design shall be based on industry accepted graphical interface (GUI) design principles. The system shall allow for a hierarchy of mimics, beginning with a plant / works overview that progresses down to individual plant / works area overviews and finally individual equipment detail.

SCADA mimic layout representing the process / plant shall be based on the works or plant process flow diagrams (PFDs) as well as piping and instrumentation diagrams (P&IDs). The mimics shall be laid out to follow the flow of water through the works. Equipment status, such as the operating condition of a pump, shall be displayed by variation of the graphic symbol, for example “green” when running and “red” when stopped. Alarm values from discrete instrumentation shall be graphically, for example, level alarms from a level switch shall be indicated on a pump sump to indicate “green” when healthy and “red” when activated.

Provision must be made for selection of operating modes, with appropriate indications displaying the mode change to the operator.

A message line section shall be provided consisting of the three most recent operator messages. Messages shall typically consist of alarms and operator alerts. The SCADA Alarm handling facility shall provide detailed fault and error indication, including acknowledgement and clearing procedures, with changed colour display indicating the different actions that have already been followed.

In the event that a fault occurs during normal operation, the specific area display shall start flashing, an audible alarm shall be activated and an alarm indicated. The operator should be guided to the specific item where the fault has occurred, be able to view detail (if available) and acknowledge the alarm.
Acknowledged alarm text messages that have not yet been cleared in the field, shall be displayed by means of a steady-state font colour. Only after the fault/error has been cleared/reset, shall the alarm text be removed from the list of current alarms. Provision must be made for a system able to accommodate a minimum of 4 000 alarm messages at any one time. Once the limit has been reached, all acknowledged and cleared alarms shall be archived to make space for new alarms. Archiving shall also take place automatically once per day.

The software must allow for the configuration and display of trends of both live and historical values of measured items.

The SCADA software must have strong reporting capabilities, with options for standard reports as well as demand query type reports.

7. Access Security

Access security must be provided on the SCADA system to prevent unauthorized system access. A secure username and password system shall prevent accidental reconfiguration by the process controllers and / or managers and provide a traceable log of all SCADA activity.

A minimum of three levels of security shall be provided, each with unique username and password access, allowing the following actions per level:

a) Operators

View, monitor and control the plant by navigating from mimic to mimic.
Stop, start and resetting of all equipment
Change value settings
View, acknowledge and reset alarms
Select, display, print and reconfigure trend periods
Print trends

b) Managers

In addition to the permissions of operators, the managers will be able to make controller parameter and /or control loop setting changes, view, print and reconfigure events lists.

c) Administrators/Engineering

Full access to all SCADA design time/ configuration menu items and functionality, SCADA Software Setup and Communications Protocol Management.

8. Testing and Commissioning

Pre-commissioning testing of the system will be done on-site during which the SCADA mimic displays, faceplates, trends and reports shall be electronically verified separately from the plant or works that it controls using a simulation environment. On successful completion of the above, communication shall be tested to the various PLC's and other field devices physically connected to the system, where after functional testing of the various control elements will commence and the control philosophy implemented.

9. Documentation and Training

Comprehensive documentation, training, operations and maintenance manuals shall be provided for the complete SCADA system provided under this contract for the works. The documentation will include a detailed control system functional description produced by the Contractor, for approval by the Employer's representative before configuration commences. The following detail must also be included:

a) Detail of the SCADA hardware configuration.
b) Tag List with detailed description of each tag.
c) Mimics and Page Layouts indicating all the various plant elements, including Control Network detail, Electrical Network and Instrumentation detail, Drive, Pump and Valve Overviews.
d) Alarms Page
e) PID Control Loops and Set point page
f) Reports
g) Database Design
h) Trending/logging
i) Security Features, Passwords and Access Hierarchy

The above documentation must be included in the plant operational- and maintenance manuals.

VAAL CENTRAL WATER

CONTRACT NO.

BW316/UPSHRMP/22

UPGRADING OF PUMP STATIONS ON THE HENKRIES RISING MAIN PIPELINE

PART C4

SITE INFORMATION

SITE INFORMATION

DESCRIPTION OF SITE AND ACCESS

Henkriesmond raw water Booster pump station is located on the banks of the Orange River approximately 60 km upstream from Vioolsdrift. The pump station will be refurbished and will pump water to the Henkries water treatment works through the new rising main.

Henkries Water Treatment Works is situated approximately 10 km south of the Henkriesmond raw water booster pump station.

Doringwater clear water booster pump station is situated approximately 19 km away from the Henkries Water Treatment Works.

Access is according to the rules and approved accesses procedures of Vaal Central Water. Vaal Central Water rules, regulations and requirements must be adhered to at all times.

VAAL CENTRAL WATER

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UPGRADING OF PUMP STATIONS ON THE HENKRIES RISING MAIN PIPELINE

ANNEXURE A

TENDER DRAWINGS

LIST OF DRAWINGS: MECHANICAL WORKS

DRAWING NUMBER	DESCRIPTION
31942.08S158-04	PIPE SUPPORT DETAIL
31942.08S-700-01	DISCHARGE MANIFOLD SPECIALS (HENKRIESMOND PUMP STATION)
31942.08S-700-02	SUCTION PIPEWORK SPECIALS
31942.08S-700-03	DISCHARGE PIPEWORK SPECIALS
31942.08S-700-04	INTAKE DETAIL (HENKRIES WATER TREATMENT WORKS)
31942.08S-700-05	MAIN FLOWMETER
31942.08S-701-01	EXISTING PIPEWORK LAYOUT
31942.08S-701-06	HENKRIESMOND SUMP & BUTTERFLY VALVE CHAMBER
31942.08S-701-07	TEMPORARY PARALLEL CONNECTION
31942.08S-701-08	HENKRIESMOND DETAIL SECTIONS
31942.08S-701-09	HENKRIESMOND DETAIL SECTIONS
31942.08S-701-10	DISCHARGE MANIFOLD – SUPPORT STRUCTURE
31942.08S-701-11	HENKRIES WTW EXISTING PIPEWORK LAYOUT
31942.08S-701-16	HENKRIES WTW DETAIL SECTIONS
31942.08S-701-17	DORINGWATER EXISTING PIPEWORK LAYOUT
31942.08S-701-18	DORINGWATER DETAIL SECTIONS
31942.08S-702-01	SITE LAYOUT

LIST OF DRAWINGS: CIVIL WORKS

DRAWING NUMBER	DESCRIPTION
31942.00-100-01	HENKRIES WTW MCC BUILDING SITE LAYOUT
31942.00-201-01	HENKRIES WTW MCC BUILDING – FOUNDATION AND SURFACEBED LAYOUT
31942.00-100-01	HENKRIESMOND MCC BUILDING – FOUNDATION AND SURFACEBED LAYOUT
31942.00-201-01	HENKRIES WTW MCC BUILDING – RECTAGRID LAYOUT
31942.00-201-02	HENKRIES WTW MCC BUILDING – RING BEAM LAYOUT
31942.00-201-03	HENKRIESMOND MCC BUILDING – RING BEAM LAYOUT
31942.00-201-03	HENKRIESMOND MCC BUILDING – RECTAGRID LAYOUT
31942.08S-701-02	HENKRIESMOND PHASE 1 DEMOLITION
31942.08S-701-03	HENKRIESMOND PHASE 1 CONSTRUCTION
31942.08S-701-04	HENKRIESMOND PHASE 2 DEMOLISTION
31942.08S-701-05	HENKRIESMOND PHASE 2 CONSTRUCTION
31942.08S-701-12	HENKRIES WTW PHASE 1 DEMOLITION
31942.08S-701-13	HENKRIES WTW PHASE 1 CONSTRUCTION
31942.08S-701-14	HENKRIES WTW PHASE 2 DEMOLITION
31942.08S-701-15	HENKRIES WTW PHASE 2 CONSTRUCTION
31942.08S-701-19	DORINGWATER PHASE 1 DEMOLITION
31942.08S-701-20	DORINGWATER PHASE 1 CONSTRUCTION
31942.08S-701-21	DORINGWATER PHASE 2 DEMOLITION
31942.08S-701-22	DORINGWATER PHASE 2 CONSTRUCTION
31942.00-602-01	HENKRIESMOND MCC BUILDING – BUILDING PLAN LAYOUT
31942.00S-602-01	MCC BUILDINGS HENKRIES WTW

LIST OF DRAWINGS: ELECTRICAL WORKS

DRAWING NUMBER	DESCRIPTION
31942.08-300-01-T1	LV R&R OF PUMP STATIONS AT HENKRIES – LEGENDS, NOTES AND SCHEDULES
31942.08-301-01-T1	LV R&R OF PUMP STATIONS AT HENKRIES – WATER EXTRACTION PLANT: LOW VOLTAGE LAYOUT
31942.08-301-02-T1	LV R&R OF PUMP STATIONS AT HENKRIES – HENKRIESMOND PRE-SEDIMENTATION FACILITY: LOW VOLTAGE LAYOUT
31942.08-301-03-T1	LV R&R OF PUMP STATIONS AT HENKRIES – HENKRIES WATER TREATMENT WORKS: LOW VOLTAGE LAYOUT
31942.08-301-04-T1	LV R&R OF PUMP STATIONS AT HENKRIES –DORINGWATER BOOSTER PUMP STATION: LOW VOLTAGE LAYOUT
31942.08-301-05-T1	LV R&R OF PUMP STATIONS AT HENKRIES – WATER EXTRACTION PLANT: LOW VOLTAGE LAYOUT
31942.08-301-06-T1	LV R&R OF PUMP STATIONS AT HENKRIES – HENKRIESMOND PRE-SEDIMENTATION FACILITY: LOW VOLTAGE LAYOUT
31942.08-301-07-T1	LV R&R OF PUMP STATIONS AT HENKRIES – HENKRIES WATER TREATMENT WORKS: LOW VOLTAGE LAYOUT
31942.08-301-08-T1	LV R&R OF PUMP STATIONS AT HENKRIES – DORINGWATER BOOSTER PUMP STATION: LOW VOLTAGE LAYOUT
31942.08-312-01-T1	LV R&R OF PUMP STATIONS AT HENKRIES – SCHEMATIC LAYOUT OF EX: DB-M
31942.08-312-02-T1	LV R&R OF PUMP STATIONS AT HENKRIES – SCHEMATIC LAYOUT OF EX: DB-S
31942.08-312-03-T1	LV R&R OF PUMP STATIONS AT HENKRIES – SCHEMATIC LAYOUT OF EX: DB-1
31942.08-312-04-T1	LV R&R OF PUMP STATIONS AT HENKRIES – SCHEMATIC LAYOUT OF EX: DB-2
31942.08-312-05-T1	LV R&R OF PUMP STATIONS AT HENKRIES – SCHEMATIC LAYOUT OF EX: DB-3
31942.08-312-06-T1	LV R&R OF PUMP STATIONS AT HENKRIES – SCHEMATIC LAYOUT OF WTW: DB-WTW
31942.08-312-07-T1	LV R&R OF PUMP STATIONS AT HENKRIES – SCHEMATIC LAYOUT OF WTW: DB-1

DRAWING NUMBER	DESCRIPTION
31942.08-312-08-T1	LV R&R OF PUMP STATIONS AT HENKRIES – SCHEMATIC LAYOUT OF WTW: DB-1-1
31942.08-312-09-T1	LV R&R OF PUMP STATIONS AT HENKRIES – SCHEMATIC LAYOUT OF WTW: DB-2
31942.08-312-10-T1	LV R&R OF PUMP STATIONS AT HENKRIES – SCHEMATIC LAYOUT OF WTW: DB-3
31942.08-312-11-T1	LV R&R OF PUMP STATIONS AT HENKRIES – SCHEMATIC LAYOUT OF WTW: DB-4
31942.08-312-12-T1	LV R&R OF PUMP STATIONS AT HENKRIES – SCHEMATIC LAYOUT OF WTW: DB-5
31942.08-312-13-T1	LV R&R OF PUMP STATIONS AT HENKRIES – SCHEMATIC LAYOUT OF WTW: DB-6
31942.08-312-14-T1	LV R&R OF PUMP STATIONS AT HENKRIES – SCHEMATIC LAYOUT OF WTW: DB-8
31942.08-312-15-T1	LV R&R OF PUMP STATIONS AT HENKRIES – SCHEMATIC LAYOUT OF WTW: DB-9
31942.08-312-16-T1	LV R&R OF PUMP STATIONS AT HENKRIES – SCHEMATIC LAYOUT OF WTW: DB-1
31942.08-312-17-T1	LV R&R OF PUMP STATIONS AT HENKRIES – SCHEMATIC LAYOUT OF WTW: DB-2
31942.08-403-01-T1	LV R&R OF PUMP STATIONS AT HENKRIES – SCHEMATIC LOW VOLTAGE DISTRIBUTION
31942.08-411-01-T1	LV R&R OF PUMP STATIONS AT HENKRIES – RIVER EXTRACTION: POWER DISTRIBUTION LAYOUT
31942.08-411-02-T1	LV R&R OF PUMP STATIONS AT HENKRIES –HENKRIESMOND: POWER DISTRIBUTION LAYOUT
31942.08-411-03-T1	LV R&R OF PUMP STATIONS AT HENKRIES –HENKRIES WTW: POWER DISTRIBUTION LAYOUT
31942.08-411-04-T1	LV R&R OF PUMP STATIONS AT HENKRIES –DORINGWATER: POWER DISTRIBUTION LAYOUT
31942.08-431-01-T1	LV R&R OF PUMP STATIONS AT HENKRIES –HENKRIES WTW: SITE LIGHTING LAYOUT
31942.08-431-02-T1	LV R&R OF PUMP STATIONS AT HENKRIES –HENKRIESMOND: SITE LIGHTING LAYOUT

LIST OF DRAWINGS: ELECTRICAL CONTROL AND INSTRUMENTATION

DRAWING NUMBER	DESCRIPTION
BVI-SBW-RA-001	RIVER ABSTRACTION
BVI-SBW-RA-002	ELECTRICAL OVERVIEW
BVI-SBW-RA-003	FIELD JUNCTION BOX FJB-RA
BVI-SBW-RA-004	FIELD JUNCTION BOX FJB-RA
BVI-SBW-RA-005	HOOKUP DIAGRAM
BVI-SBW-RA-006	FIELD JUNCTION BOX FJB-RA GENERAL ARRANGEMENT
BVI-SBW-HM-001	HENKRIES MOND PUMP STATION
BVI-SBW-HM-002	ELECTRICAL GENERAL ARRANGEMENT
BVI-SBW-HM-003	MV VSD ROOM LAYOUT
BVI-SBW-HM-004	MAIN LV DISTRIBUTION BOARD SINGLE LINE DIAGRAM
BVI-SBW-HM-005	MAIN LV DISTRIBUTION BOARD
BVI-SBW-HM-006	MAIN LV DISTRIBUTION BOARD
BVI-SBW-HM-007	MAIN LV DISTRIBUTION BOARD GENERAL ARRANGEMENT
BVI-SBW-HM-008	VSD ROOM LV DISTRIBUTION BOARD SINGLE LINE DIAGRAM
BVI-SBW-HM-009	VSD ROOM LV DISTRIBUTION BOARD
BVI-SBW-HM-010	PLC SYSTEM
BVI-SBW-HM-011	PLC SYSTEM
BVI-SBW-HM-012	PLC SYSTEM
BVI-SBW-HM-013	VSD ROOM LV DISTRIBUTION BOARD GENERAL ARRANGEMENT
BVI-SBW-HM-014	FIELD JUNCTION BOX JB-HM1 COVER SHEET
BVI-SBW-HM-015	FIELD JUNCTION BOX JB-HM1 GENERAL ARRANGEMENT
BVI-SBW-HM-016	FIELD JUNCTION BOX JB-HM1
BVI-SBW-HM-017	FIELD JUNCTION BOX JB-HM2 COVER SHEET
BVI-SBW-HM-018	FIELD JUNCTION BOX JB-HM2 GENERAL ARANGEMENT
BVI-SBW-HM-019	FIELD JUNCTION BOX JB-HM2
BVI-SBW-HM-020	3.3 KV SWITCHGEAR COVER SHEET
BVI-SBW-HM-021	3.3 KV SWITCHGEAR GENERAL ARRANGEMENT
BVI-SBW-HM-022	3.3 KV SWITCHGEAR/ VSD INTERFACE
BVI-SBW-HW-001	HENKRIES WATER TREATMENT WORKS PUMP STATION
BVI-SBW-HW-002	ELECTRICAL GENERAL ARRANGEMENT
BVI-SBW-HW-003	MV VSD ROOM LAYOUT
BVI-SBW-HW-004	MAIN LV DISTRIBUTION BOARD SINGLE LINE DIAGRAM
BVI-SBW-HW-005	MAIN LV DISTRIBUTION BOARD
BVI-SBW-HW-006	MAIN LV DISTRIBUTION BOARD
BVI-SBW-HW-007	MAIN LV DISTRIBUTION BOARD GENERAL ARRANGEMENT
BVI-SBW-HW-008	VSD ROOM LV DISTRIBUTION BOARD SINGLE LINE DIAGRAM
BVI-SBW-HW-009	VSD ROOM LV DISTRIBUTION BOARD
BVI-SBW-HW-010	PLC SYSTEM
BVI-SBW-HW-011	PLC SYSTEM
BVI-SBW-HW-012	PLC SYSTEM
BVI-SBW-HW-013	VSD ROOM LV DISTRIBUTION BOARD GENERAL ARRANGEMENT
BVI-SBW-HW-014	3.3 KV SWITCHGEAR COVER SHEET
BVI-SBW-HW-015	3.3 KV SWITCHGEAR GENERAL ARRANGEMENT
BVI-SBW-HW-016	3.3 KV SWITCHGEAR/ VSD INTERFACE

DRAWING NUMBER	DESCRIPTION
BVI-SBW-DW-001	DOORNWATER PUMP STATION
BVI-SBW-DW-002	ELECTRICAL GENERAL ARRANGEMENT
BVI-SBW-DW-003	MV VSD ROOM LAYOUT
BVI-SBW-DW-004	MAIN LV DISTRIBUTION BOARD SINGLE LINE DIAGRAM
BVI-SBW-DW-005	MAIN LV DISTRIBUTION BOARD
BVI-SBW-DW-006	MAIN LV DISTRIBUTION BOARD
BVI-SBW-DW-007	MAIN LV DISTRIBUTION BOARD GENERAL ARRANGEMENT
BVI-SBW-DW-008	VSD ROOM LV DISTRIBUTION BOARD SINGLE LINE DIAGRAM
BVI-SBW-DW-009	VSD ROOM LV DISTRIBUTION BOARD
BVI-SBW-DW-010	PLC SYSTEM
BVI-SBW-DW-011	PLC SYSTEM
BVI-SBW-DW-012	PLC SYSTEM
BVI-SBW-DW-013	VSD ROOM LV DISTRIBUTION BOARD GENERAL ARRANGEMENT
BVI-SBW-DW-014	3.3 KV SWITCHGEAR COVER SHEET
BVI-SBW-DW-015	3.3 KV SWITCHGEAR GENERAL ARRANGEMENT
BVI-SBW-DW-016	3.3 KV SWITCHGEAR/ VSD INTERFACE
BVI-SBW-ER-001	EENRIET RESERVOIR
BVI-SBW-ER-002	ELECTRICAL GENERAL ARRANGEMENT
BVI-SBW-ER-003	SOLAR SUPPLY SYSTEM
BVI-SBW-ER-004	DATA INTERFACE PANEL
BVI-SBW-ER-005	DATA INTERFACE PANEL GENERAL ARRANGEMENT
BVI-SBW-CS-001	CONTROL SYSTEM ARCHITECTURE
BVI-SBW-CS-002	GENERAL ARRANGEMENT
BVI-SBW-FJB-001	PUP FIELD JUNCTION BOX FJB-PUMP
BVI-SBW-FJB-002	ELECTRICAL DETAIL
BVI-SBW-FJB-003	ELECTRICAL DETAIL
BVI-SBW-FJB-004	GENERAL ARRANGEMENT

VAAL CENTRAL WATER

CONTRACT NO.

BW316/UPSHRMP/22

UPGRADING OF PUMP STATIONS ON THE HENKRIES RISING MAIN PIPELINE

ANNEXURE B

ENVIRONMENTAL MANAGEMENT PLAN

Contractor	Witness 1	Witness 2	Employer	Witness 1	Witness 2