water & sanitation

Department:
Water and Sanitation
REPUBLIC OF SOUTH AFRICA

REQUEST FOR BID

BID NUMBER W11235

Establishment of a Panel of Service Providers for Provision of Maintenence, Calibration, Installation Replacement of Existing Water Quality Instrument, Instrumentation Housing and Near Real Time Data Transmission for a Period of Twenty Four (24) Months

CLOSING DATE:
13 July 2017

CLOSING TIME:
11:00 am

Compulsory Briefing Session
Date: 05 July 2017
Time: 12h00
Venue: Department of Water and Sanitation
173 Francis Baard Street, Emanzini Building G18 Boardroom
Pretoria
0001

SUBMIT TENDER DOCUMENT

TO

POSTAL ADDRESS:
DIRECTOR-GENERAL: WATER AND SANITATION
PRIVATE BAG X 313
PRETORIA,0001

OR

TO BE DEPOSIT IN:
THE TENDER BOX AT THE ENTRANCE
OF ZWAMADAKA BUILDING
157 FRANCIS BAARD STREET
(FORMERLY SCHOEMAN STREET)
PRETORIA,0002

TENDERER: (Company address and stamp)

TABLE OF CONTENTS

INVITATION TO BID

YOU ARE HEREBY INVITED TO BID FOR REQUIREMENTS OF THE DWS

BID NUMBER: **W11235** CLOSING DATE: **13 July 2017** CLOSING TIME: **11:00**

DESCRIPTION: **Establishment of a Panel of Service Providers for Provision of Maintenence, Calibration, Installation Replacement of Existing Water Quality Instrument, Instrumentation Housing and Near Real Time Data Transmission for a Period of Twenty Four (24) Months**

The successful bidder will be required to fill in and sign a written Contract Form (SBD 7).

BID DOCUMENTS MAY BE POSTED TO:
Private Bag x313,
Pretoria,
0001
OR
DEPOSITED IN THE BID BOX SITUATED AT *(STREET ADDRESS)*
Tender Box, Zwamadaka Building
157 Francis Baard Street (Formerly Schoeman),
Pretoria
0001

Bidders should ensure that bids are delivered timeously to the correct address. If the bid is late, it will not be accepted for consideration.

The bid box is generally open 24 hours a day, 7 days a week.

ALL BIDS MUST BE SUBMITTED ON THE OFFICIAL FORMS – (NOT TO BE RE-TYPED)

THIS BID IS SUBJECT TO THE PREFERENTIAL PROCUREMENT POLICY FRAMEWORK ACT AND THE PREFERENTIAL PROCUREMENT REGULATIONS, 2011, THE GENERAL CONDITIONS OF CONTRACT (GCC) AND, IF APPLICABLE, ANY OTHER SPECIAL CONDITIONS OF CONTRACT

THE FOLLOWING PARTICULARS MUST BE FURNISHED
(FAILURE TO DO SO MAY RESULT IN YOUR BID BEING DISQUALIFIED)

NAME OF BIDDER……

POSTAL ADDRESS……

STREET ADDRESS……

TELEPHONE NUMBER CODE……NUMBER……..

CELLPHONE NUMBER……

FACSIMILE NUMBER CODE …… . NUMBER……

E-MAIL ADDRESS……

VATREGISTRATIONNUMBER……

HAS AN ORIGINAL AND VALID TAX CLEARANCE CERTIFICATE BEEN SUBMITTED? (SBD 2) YES or NO

HAS A B-BBEE STATUS LEVEL VERIFICATION CERTIFICATE BEEN SUBMITTED? (SBD 6.1) YES or NO

IF YES, WHO WAS THE CERTIFICATE ISSUED BY?

AN ACCOUNTING OFICER AS CONTEMPLATED IN THE CLOSE CORPORATION ACT (CCA)……..…….....□

A VERIFICATION AGENCY ACCREDITED BY THE SOUTH AFRICAN ACCREDITATION SYSTEM (SANAS);OR……..…..☐

A REGISTERED AUDITOR ……..☐

[TICK APPLICABLE BOX]

(A B-BBEE STATUS LEVEL VERIFICATION CERTIFICATE 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 or NO

[IF YES ENCLOSE PROOF]

SIGNATURE OF BIDDER:……

DATE:……

CAPACITY UNDER WHICH THIS BID IS SIGNED……

TOTAL BID PRICE……TOTAL NUMBER OF ITEMS OFFERED……

ANY ENQUIRIES REGARDING THE BIDDING PROCEDURE MAY BE DIRECTED TO:

Department: **Department of Water and Sanitation**

Contact Person: Mr. Syabonga Gwamanda

Tel: 012 336 6611

Fax: 086 459 0176

E-mail address: gwamandas@dws.gov.za

ANY ENQUIRIES REGARDING TECHNICAL INFORMATION MAY BE DIRECTED TO:

Contact Person: Musariri Musariri

Tel: 021 941 7949

E-mail address: musaririm@dws.gov.za

PRICING SCHEDULE
(Professional Services)

NAME OF BIDDER: ……BID NO.:**W11235**
CLOSING TIME **11:00** CLOSING DATE: **13 July 2017**

OFFER TO BE VALID FOR **90** DAYS FROM THE CLOSING DATE OF BID.

ITEM NO	DESCRIPTION	BID PRICE IN RSA CURRENCY **(ALL APPLICABLE TAXES INCLUDED)

1. The accompanying information must be used for the formulation of proposals.

2. Bidders are required to indicate a ceiling price based on the total estimated time for completion of all phases and including all expenses inclusive of all applicable taxes for the project.

R……..……..

5.1 Travel expenses (specify, for example rate/km and total km, class of airtravel, etc). Only actual costs are recoverable. Proof of the expenses incurred must accompany certified invoices.

DESCRIPTION OF EXPENSE TO BE INCURRED	RATE	QUANTITY	AMOUNT
R……..	.....		.....
R……..	.....		.....
R……..	.....		.....

TOTAL: R……

** ”all applicable taxes” includes value- added tax, pay as you earn, income tax, unemployment insurance fund contributions and skills development levies.

5.2 Other expenses, for example accommodation (specify, eg. Three star hotel, bed and breakfast, telephone cost, reproduction cost, etc.). On basis of these particulars, certified invoices will be checked for correctness. Proof of the expenses must accompany invoices.

DESCRIPTION OF EXPENSE TO BE INCURRED	RATE	QUANTITY	AMOUNT
R……..	…….....		……..
R…….....	…….....		……..
R…….....	…….....		……..

TOTAL: R…….

6. Period required for commencement with project after Acceptance of bid ……

7. Estimated man-days for completion of project ……

8. Are the rates quoted firm for the full period of contract? *YES/NO

9. If not firm for the full period, provide details of the basis on which adjustments will be applied for, for example consumer price index.

……

……

……

……

*[DELETE IF NOT APPLICABLE]

SBD 4

DECLARATION OF INTEREST

1. Any legal person, including persons employed by the state[1], or persons having a kinship with persons employed by the state, including a blood relationship, may make an offer or offers in terms of this invitation to bid (includes an advertised competitive bid, a limited bid, a proposal or written price quotation). In view of possible allegations of favouritism, should the resulting bid, or part thereof, be awarded to persons employed by the state, or to persons connected with or related to them, it is required that the bidder or his/her authorised representative declare his/her position in relation to the evaluating/adjudicating authority where-

   - the bidder is employed by the state; and/or

   - the legal person on whose behalf the bidding document is signed, has a relationship with persons/a person who are/is involved in the evaluation and or adjudication of the bid(s), or where it is known that such a relationship exists between the person or persons for or on whose behalf the declarant acts and persons who are involved with the evaluation and or adjudication of the bid.

2. **In order to give effect to the above, the following questionnaire must be completed and submitted with the bid.**

2.1 Full Name of bidder or his or her representative: ……

Identity Number:……

2.2 Position occupied in the Company (director, trustee, shareholder[2], member):

.....

2.3 Registration number of company, enterprise, close corporation, partnership agreement or trust:

……..……..……

2.4 Tax Reference Number:……

2.5 VAT Registration Number: ……

2.6.1 The names of all directors / trustees / shareholders / members, their individual identity numbers, tax reference numbers and, if applicable, employee / PERSAL numbers must be indicated in paragraph 3 below.

[1]"State" means –
(a) 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);
(b) any municipality or municipal entity;
(c) provincial legislature;
(d) national Assembly or the national Council of provinces; or
(e) Parliament.

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

2.7 Are you or any person connected with the bidder presently employed by the state? **YES / NO**

2.7.1 If so, furnish the following particulars:

Name of person / director / trustee / shareholder/ member: ……...……
Name of state institution at which you or the person connected to the bidder is employed : ……
Position occupied in the state institution: ……

Any other particulars:
……
……
……

2.7.2 If you are presently employed by the state, did you obtain the appropriate authority to undertake remunerative work outside employment in the public sector? **YES / NO**

2.7.2.1 If yes, did you attach proof of such authority to the bid document? **YES / NO**

(Note: Failure to submit proof of such authority, where applicable, may result in the disqualification of the bid.

2.7.2.2 If no, furnish reasons for non-submission of such proof:

……
……
……

2.8 Did you or your spouse, or any of the company's directors / trustees / shareholders / members or their spouses conduct business with the state in the previous twelve months? **YES / NO**

2.8.1 If so, furnish particulars:
……..
……..
……...

2.9 Do you, or any person connected with the bidder, have any relationship (family, friend, other) with a person employed by the state and who may be involved with the evaluation and or adjudication of this bid? **YES / NO**

2.9.1If so, furnish particulars.
……...
……..….
……
2.10 Are you, or any person connected with the bidder, aware of any relationship (family, friend, other) between **YES/NO**

any other bidder and any person employed by the state who may be involved with the evaluation and or adjudication of this bid?

2.10.1If so, furnish particulars**.**

……
……
……

2.11Do you or any of the directors / trustees / shareholders / members of the company have any interest in any other related companies whether or not they are bidding for this contract? **YES/NO**

2.11.1 If so, furnish particulars:

……
……
……

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

Full Name	**Identity Number**	**Personal Income Tax Reference Number**	**State Employee Number / Persal Number**

4 DECLARATION

I, THE UNDERSIGNED (NAME)……

CERTIFY THAT THE INFORMATION FURNISHED IN PARAGRAPHS 2 and 3 ABOVE IS CORRECT. I ACCEPT THAT THE STATE MAY REJECT THE BID OR ACT AGAINST ME SHOULD THIS DECLARATION PROVE TO BE FALSE.

…….. ..……

Signature Date

…….. ……

Position Name of bidder

PREFERENCE POINTS CLAIM FORM IN TERMS OF THE PREFERENTIAL PROCUREMENT REGULATIONS 2017

This preference form must form part of all bids invited. It contains general information and serves as a claim form for preference points for Broad-Based Black Economic Empowerment (B-BBEE) Status Level of Contribution

NB: BEFORE COMPLETING THIS FORM, BIDDERS MUST STUDY THE GENERAL CONDITIONS, DEFINITIONS AND DIRECTIVES APPLICABLE IN RESPECT OF B-BBEE, AS PRESCRIBED IN THE PREFERENTIAL PROCUREMENTREGULATIONS, 2017.

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1. GENERAL CONDITIONS

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

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

1.2

a) The value of this bid is estimated to exceed/not exceed R50 000 000 (all applicable taxes included) and therefore the preference point system shall be applicable; or

b) Either the 80/20 or 90/10 preference point system will be applicable to this tender (*delete whichever is not applicable for this tender*).

1.3 Points for this bid shall be awarded for:

(a) Price; and

(b) B-BBEE Status Level of Contributor.

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

	POINTS
PRICE	
B-BBEE STATUS LEVEL OF CONTRIBUTOR	
Total points for Price and B-BBEE must not exceed	

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

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

2. DEFINITIONS

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

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

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

(d) **"Broad-Based Black Economic Empowerment Act"** means the Broad-Based Black Economic Empowerment Act, 2003 (Act No. 53 of 2003);

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

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

(g) **"prices"** includes all applicable taxes less all unconditional discounts;

(h) **"proof of B-BBEE status level of contributor"** means:

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

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

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

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

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

3. POINTS AWARDED FOR PRICE

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

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

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

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

Where

Ps = Points scored for price of bid under consideration

Pt = Price of bid under consideration

Pmin = Price of lowest acceptable bid

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

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

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

5. BID DECLARATION

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

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

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

(Points claimed in respect of paragraph 7.1 must be in accordance with the table reflected in paragraph 4.1 and must be substantiated by relevant proof of B-BBEE status level of contributor.

7. SUB-CONTRACTING

7.1 Will any portion of the contract be sub-contracted?

(***Tick applicable box***)

YES		NO	

7.1.1 If yes, indicate:

i) What percentage of the contract will be subcontracted.....……%
ii) The name of the sub-contractor……..
iii) The B-BBEE status level of the sub-contractor.....……..
iv) Whether the sub-contractor is an EME or QSE
(Tick applicable box)

YES		NO	

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

Designated Group: An EME or QSE which is at last 51% owned by:	EME √	QSE √
Black people		
Black people who are youth		

Black people who are women		
Black people with disabilities		
Black people living in rural or underdeveloped areas or townships		
Cooperative owned by black people		
Black people who are military veterans		
OR		
Any EME		
Any QSE		

8. **DECLARATION WITH REGARD TO COMPANY/FIRM**

8.1 Name of company/firm:……..

8.2 VAT registration number:……

8.3 Company registration number:……..……..…….

8.4 TYPE OF COMPANY/ FIRM

- □ Partnership/Joint Venture / Consortium
- □ One person business/sole propriety
- □ Close corporation
- □ Company
- □ (Pty) Limited

[TICK APPLICABLE BOX]

8.5 DESCRIBE PRINCIPAL BUSINESS ACTIVITIES

……
……
……
……..

8.6 COMPANY CLASSIFICATION

- □ Manufacturer
- □ Supplier
- □ Professional service provider
- □ Other service providers, e.g. transporter, etc.

[*TICK APPLICABLE BOX*]

8.7 Total number of years the company/firm has been in business:……

8.8 I/we, the undersigned, who is / are duly authorised to do so on behalf of the company/firm, certify that the points claimed, based on the B-BBE status level of contributor indicated in paragraphs1.4 and 6.1 of the foregoing certificate, qualifies the company/ firm for the preference(s) shown and I / we 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 paragraphs1.4 and 6.1, the contractor may be required to furnish documentary proof to the satisfaction of the purchaser that the claims are correct;

iv) If the B-BBEE status level of contributor has been claimed or obtained on a fraudulent basis or any of the conditions of contract have not been fulfilled, the

purchaser may, in addition to any other remedy it may have –

(a) disqualify the person from the bidding 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 bidder or contractor, its shareholders and directors, or only the shareholders and directors who acted on a fraudulent basis, be restricted by the National Treasury from obtaining business from any organ of state for a period not exceeding 10 years, after the *audialterampartem* (hear the other side) rule has been applied; and

(e) forward the matter for criminal prosecution.

WITNESSES 1. …….. 2. ……	…… SIGNATURE(S) OF BIDDERS(S) DATE: …….. ADDRESS …….. …….. ……..

DECLARATION OF BIDDER'S PAST SUPPLY CHAIN MANAGEMENT PRACTICES

1 This Standard Bidding Document must form part of all bids invited.

2 It serves as a declaration to be used by institutions in ensuring that when goods and services are being procured, all reasonable steps are taken to combat the abuse of the supply chain management system.

3 The bid of any bidder may be disregarded if that bidder, or any of its directors have-

a. abused the institution's supply chain management system;

b. committed fraud or any other improper conduct in relation to such system; or

c. failed to perform on any previous contract.

4 **In order to give effect to the above, the following questionnaire must be completed and submitted with the bid.**

Item	Question	Yes	No
4.1	Is the bidder or any of its directors listed on the National Treasury's Database of Restricted Suppliers as companies or persons prohibited from doing business with the public sector? **(Companies or persons who are listed on this Database were informed `in writing of this restriction by the Accounting Officer/Authority of the institution that imposed the restriction after the *audi alteram partem* rule was applied).** The Database of Restricted Suppliers now resides on the National Treasury's website(**www.treasury.gov.za**) and can be accessed by clicking on its link at the bottom of the home page.	Yes ☐	No ☐
4.1.1	If so, furnish particulars:		
4.2	Is the bidder or any of its directors listed on the Register for Tender Defaulters in terms of section 29 of the Prevention and Combating of Corrupt Activities Act (No 12 of 2004)? **The Register for Tender Defaulters can be accessed on the National Treasury's website (www.treasury.gov.za) by clicking on its link at the bottom of the home page.**	Yes ☐	No ☐
4.2.1	If so, furnish particulars:		
4.3	Was the bidder or any of its directors convicted by a court of law (including a court outside of the Republic of South Africa) for fraud or corruption during the past five years?	Yes ☐	No ☐
4.3.1	If so, furnish particulars:		
4.4	Was any contract between the bidder and any organ of state terminated during the past five years on account of failure to perform on or comply with the contract?	Yes ☐	No ☐
4.4.1	If so, furnish particulars:		

CERTIFICATION

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

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

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

Js365bW

SBD 9

CERTIFICATE OF INDEPENDENT BID DETERMINATION

1 This Standard Bidding Document (SBD) must form part of all bids[1] invited.

2 Section 4 (1) (b) (iii) of the Competition Act No. 89 of 1998, as amended, prohibits an agreement between, or concerted practice by, firms, or a decision by an association of firms, if it is between parties in a horizontal relationship and if it involves collusive bidding (or bid rigging).[2] Collusive bidding is a *pe se* prohibition meaning that it cannot be justified under any grounds.

3 Treasury Regulation 16A9 prescribes that accounting officers and accounting authorities must take all reasonable steps to prevent abuse of the supply chain management system and authorizes accounting officers and accounting authorities to:

a. disregard the bid of any bidder if that bidder, or any of its directors have abused the institution's supply chain management system and or committed fraud or any other improper conduct in relation to such system.

b. cancel a contract awarded to a supplier of goods and services if the supplier committed any corrupt or fraudulent act during the bidding process or the execution of that contract.

4 This SBD serves as a certificate of declaration that would be used by institutions to ensure that, when bids are considered, reasonable steps are taken to prevent any form of bid-rigging.

5 In order to give effect to the above, the attached Certificate of Bid Determination (SBD 9) must be completed and submitted with the bid:

[1] Includes price quotations, advertised competitive bids, limited bids and proposals.

[2] Bid rigging (or collusive bidding) occurs when businesses, that would otherwise be expected to compete, secretly conspire to raise prices or lower the quality of goods and / or services for purchasers who wish to acquire goods and / or services through a bidding process. Bid rigging is, therefore, an agreement between competitors not to compete.

CERTIFICATE OF INDEPENDENT BID DETERMINATION

I, the undersigned, in submitting the accompanying bid:

_____

(Bid Number and Description)

in response to the invitation for the bid made by:

_____

(Name of Institution)

do hereby make the following statements that I certify to be true and complete in every respect:

I certify, on behalf of:_____that:

(Name of Bidder)

1. I have read and I understand the contents of this Certificate;
2. I understand that the accompanying bid will be disqualified if this Certificate is found not to be true and complete in every respect;
3. I am authorized by the bidder to sign this Certificate, and to submit the accompanying bid, on behalf of the bidder;
4. Each person whose signature appears on the accompanying bid has been authorized by the bidder to determine the terms of, and to sign the bid, on behalf of the bidder;
5. For the purposes of this Certificate and the accompanying bid, I understand that the word "competitor" shall include any individual or organization, other than the bidder, whether or not affiliated with the bidder, who:

(a) has been requested to submit a bid in response to this bid invitation;
(b) could potentially submit a bid in response to this bid invitation, based on their qualifications, abilities or experience; and
(c) provides the same goods and services as the bidder and/or is in the same line of business as the bidder

6. The bidder has arrived at the accompanying bid independently from, and without consultation, communication, agreement or arrangement with any competitor. However communication between partners in a joint venture or consortium[3] will not be construed as collusive bidding.
7. In particular, without limiting the generality of paragraphs 6 above, there has been no consultation, communication, agreement or arrangement with any competitor regarding:

(a) prices;

(b) geographical area where product or service will be rendered (market allocation)

(c) methods, factors or formulas used to calculate prices;

(d) the intention or decision to submit or not to submit, a bid;

(e) the submission of a bid which does not meet the specifications and conditions of the bid; or

(f) bidding with the intention not to win the bid.

8. In addition, there have been no consultations, communications, agreements or arrangements with any competitor regarding the quality, quantity, specifications and conditions or delivery particulars of the products or services to which this bid invitation relates.

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

[3] 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.

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

…… ……

Signature Date

…….. ……

Position Name of Bidder

Js914w 2

GOVERNMENT PROCUREMENT GENERAL CONDITIONS OF CONTRACT.

NOTES

The purpose of this document is to:

(i) Draw special attention to certain general conditions applicable to government bids, contracts and orders; and

(ii) To ensure that clients be familiar with regard to the rights and obligations of all parties involved in doing business with government.

In this document words in the singular also mean in the plural and vice versa and words in the masculine also mean in the feminine and neuter.

- **The General Conditions of Contract will form part of all bid documents and may not be amended.**

- **Special Conditions of Contract (SCC) relevant to a specific bid, should be compile separately for every bid (if (applicable) and will supplement the General Conditions of Contract. Whenever there is a conflict, the provisions in the SCC shall prevail.**

TABLE OF CLAUSES

1. Definitions 1. The following terms shall be interpreted as indicated:

1.1 “Closing time” means the date and hour specified in the bidding documents for the receipt of bids.

1.2 “Contract” means the written agreement entered into between the purchaser and the supplier, as recorded in the contract form signed by the parties, including all attachments and appendices thereto and all documents incorporated by reference therein.

1.3 “Contract price” means the price payable to the supplier under the contract for the full and proper performance of his contractual obligations.

1.4 “Corrupt practice” means the offering, giving, receiving, or soliciting of any thing of value to influence the action of a public official in the procurement process or in contract execution.

1.5 "Countervailing duties" are imposed in cases where an enterprise abroad is subsidized by its government and encouraged to market its products internationally.

1.6 “Country of origin” means the place where the goods were mined, grown or produced or from which the services are supplied. Goods are produced when, through manufacturing, processing or substantial and major assembly of components, a commercially recognized new product results that is substantially different in basic characteristics or in purpose or utility from its components.

1.7 “Day” means calendar day.

1.8 “Delivery” means delivery in compliance of the conditions of the contract or order.

1.9 “Delivery ex stock” means immediate delivery directly from stock actually on hand.

1.10 “Delivery into consignees store or to his site” means delivered and unloaded in the specified store or depot or on the specified site in compliance with the conditions of the contract or order, the supplier bearing all risks and charges involved until the supplies are so delivered and a valid receipt is obtained.

1.11 "Dumping" occurs when a private enterprise abroad market its goods on own initiative in the RSA at lower prices than that of the country of origin and which have the potential to harm the local industries in the RSA.

1.12 ”Force majeure” means an event beyond the control of the supplier and not involving the supplier’s fault or negligence and not foreseeable. Such events may include, but is not restricted to, acts of the purchaser in its sovereign capacity, wars or revolutions, fires, floods, epidemics, quarantine restrictions and freight embargoes.

1.13 “Fraudulent practice” means a misrepresentation of facts in order to influence a procurement process or the execution of a contract to the detriment of any bidder, and includes collusive practice among bidders prior to or after bid submission) designed to establish bid prices at artificial non-competitive levels and to deprive the bidder of the benefits of free and open competition.

1.14 “GCC” means the General Conditions of Contract.

1.15 “Goods” means all of the equipment, machinery, and/or other materials that the supplier is required to supply to the purchaser under the contract.

1.16 “Imported content” means that portion of the bidding price represented by the cost of components, parts or materials which have been or are still to be imported (whether by the supplier or his subcontractors) and which costs are inclusive of the costs abroad, plus freight and other direct importation costs such as landing costs, dock dues, import duty, sales duty or other similar tax or duty at the South African place of entry as well as transportation and handling charges to the factory in the Republic where the supplies covered by the bid will be manufactured.

1.17 “Local content” means that portion of the bidding price which is not included in the imported content provided that local manufacture does take place.

1.18 “Manufacture” means the production of products in a factory using labour, materials, components and machinery and includes other related value-adding activities.

1.19 “Order” means an official written order issued for the supply of goods or works or the rendering of a service.

1.20 “Project site,” where applicable, means the place indicated in bidding documents.

1.21 “Purchaser” means the organization purchasing the goods.

1.22 “Republic” means the Republic of South Africa.

1.23 “SCC” means the Special Conditions of Contract.

1.24 “Services” means those functional services ancillary to the supply of the goods, such as transportation and any other incidental services, such as installation, commissioning, provision of technical assistance, training, catering, gardening, security, maintenance and other such obligations of the supplier covered under the contract.

1.25 “Written” or “in writing” means handwritten in ink or any form of electronic or mechanical writing.

2. Application.

2.1 These general conditions are applicable to all bids, contracts and orders including bids for functional and professional services, sales, hiring, letting and the granting or acquiring of rights, but excluding immovable property, unless otherwise indicated in the bidding documents.

2.2 Where applicable, special conditions of contract are also laid down to cover specific supplies, services or works.

2.3 Where such special conditions of contract are in conflict with these general conditions, the special conditions shall apply.

3. General

3.1 Unless otherwise indicated in the bidding documents, the purchaser shall not be liable for any expense incurred in the preparation and submission of a bid. Where applicable a non-refundable fee for documents may be charged.

3.2 With certain exceptions, invitations to bid are only published in the Government Tender Bulletin. The Government Tender Bulletin may be obtained directly from the Government Printer, Private Bag X85, Pretoria 0001, or accessed electronically from www.treasury.gov.za

4. Standards

4.1 The goods supplied shall conform to the standards mentioned in the bidding documents and specifications.

5. Use of contract documents and information; inspection.

5.1 The supplier shall not, without the purchaser's prior written consent, disclose the contract, or any provision thereof, or any specification, plan, drawing, pattern, sample, or information furnished by or on behalf of the purchaser in connection therewith, to any person other than a person employed by the supplier in the performance of the contract. Disclosure to any such employed person shall be made in confidence and shall extend only so far as may be necessary for purposes of such performance.

5.2 The supplier shall not, without the purchaser's prior written consent, make use of any document or information mentioned in GCC clause 5.1 except for purposes of performing the contract.

5.3 Any document, other than the contract itself mentioned in GCC clause 5.1 shall remain the property of the purchaser and shall be returned (all copies) to the purchaser on completion of the supplier's performance under the contract if so required by the purchaser.

5.4 The supplier shall permit the purchaser to inspect the supplier's records relating to the performance of the supplier and to have them audited by auditors appointed by the purchaser, if so required by the purchaser.

6. Patent rights.

6.1 The supplier shall indemnify the purchaser against all third-party claims of infringement of patent, trademark, or industrial design rights arising from use of the goods or any part thereof by the purchaser.

7. Performance security

7.1 Within thirty (30) days of receipt of the notification of contract award, the successful bidder shall furnish to the purchaser the performance security of the amount specified in SCC.

7.2 The proceeds of the performance security shall be payable to the purchaser as compensation for any loss resulting from the supplier's failure to complete his obligations under the contract.

7.3 The performance security shall be denominated in the currency of the contract or in a freely convertible currency acceptable to the purchaser and shall be in one of the following forms:

(a) A bank guarantee or an irrevocable letter of credit issued by a reputable bank located in the purchaser's country or abroad, acceptable to the purchaser, in the form provided in the bidding documents or another form acceptable to the purchaser; or

(b) A cashier's or certified cheque

7.4 The performance security will be discharged by the purchaser and returned to the supplier not later than thirty (30) days following the date of completion of the supplier's performance obligations under the contract, including any warranty obligations, unless otherwise specified in SCC.

8. Inspections, tests and analyses

8.1 All pre-bidding testing will be for the account of the bidder 8.2 If it is a bid condition that supplies to be produced or services to be rendered should at any stage during production

or execution or on completion be subject to inspection, the premises of the bidder or contractor shall be open, at all reasonable hours, for inspection by a representative of the Department or organization acting on behalf of the Department.

8.2 If it is a bid condition that supplies to be produced or services to be rendered should at any stage during production or execution or on completion be subject to inspection, the premises of the bidder or contractor shall be open, at all reasonable hours, for inspection by a representative of the Department or an organization acting on behalf of the Department

8.3 If there are no inspection requirements indicated in the bidding documents and no mention is made in the contract, but during the contract period it is decided that inspections shall be carried out, the purchaser shall itself make the necessary arrangements, including payment arrangements with the testing authority concerned.

8.4 If the inspections, tests and analyses referred to in clauses 8.2 and 8.3 show the supplies to be in accordance with the contract requirements, the cost of the inspections, tests and analyses shall be defrayed by the purchaser.

8.5 Where the supplies or services referred to in clauses 8.2 and 8.3 do not comply with the contract requirements, irrespective of whether such supplies or services are accepted or not, the cost in connection with these inspections, tests or analyses shall be defrayed by the supplier.

8.6 Supplies and services which are referred to in clauses 8.2 and 8.3 and which do not comply with the contract requirements may be rejected.

8.7 Any contract supplies may on or after delivery be inspected, tested or 8 analyzed and may be rejected if found not to comply with the requirements of the contract. Such rejected supplies shall be held at the cost and risk of the supplier who shall, when called upon, remove them immediately at his own cost and forthwith substitute them with supplies which do comply with the requirements of the contract .Failing such removal the rejected supplies shall be returned at the suppliers cost and risk. Should the supplier fail to provide the substitute supplies forthwith, the purchaser may, without giving the supplier further opportunity to substitute the rejected supplies, purchase such supplies as may be necessary at the expense of the supplier.

8.8 The provisions of clauses 8.4 to 8.7 shall not prejudice the right of the purchaser to cancel the contract on account of a breach of the conditions thereof, or to act in terms of Clause 23 of GCC

9. Packing

9.1 The supplier shall provide such packing of the goods as is required to prevent their damage or deterioration during transit to their final destination, as indicated in the contract. The packing shall be sufficient to withstand, without limitation, rough handling during transit and exposure to extreme temperatures, salt and precipitation during transit, and open storage. Packing, case size and weights shall take into consideration, where appropriate, the remoteness of the goods' final destination and the absence of heavy handling facilities at all points in transit.

9.2 The packing, marking, and documentation within and outside the packages shall comply strictly with such special requirements as shall be expressly provided for in the contract, including additional requirements, if any, specified in SCC, and in any subsequent instructions ordered by the purchaser.

10. Delivery and documents

10.1 Delivery of the goods shall be made by the supplier in accordance with the terms specified in the contract. The details of shipping and/or other documents to be furnished by the supplier are specified in SCC.

10.2 Documents to be submitted by the supplier are specified in SCC.

11. Insurance

11.1 The goods supplied under the contract shall be fully insured in a freely convertible currency against loss or damage incidental to manufacture or acquisition, transportation, storage and delivery in the manner specified in the SCC.

12. Transportation

12.1 Should a price other than an all-inclusive delivered price be required, this shall be specified in the SCC.

13. Incidental services

13.1 The supplier may be required to provide any or all of the following services, including additional services, if any, specified in SCC:

(a) Performance or supervision of on-site assembly and/or commissioning of the supplied goods;
(b) Furnishing of tools required for assembly and/or maintenance of the supplied goods;
(c) Furnishing of a detailed operations and maintenance manual for each appropriate unit of the supplied goods;
(d) Performance or supervision or maintenance and/or repair of the supplied goods, for a period of time agreed by the parties, provided that this service shall not relieve the supplier of any warranty obligations under this contract; and

(e) Training of the purchaser's personnel, at the supplier's plant and/or on-site, in assembly, start-up, operation, maintenance, and/or repair of the supplied goods.

13.2 Prices charged by the supplier for incidental services, if not included in the contract price for the goods, shall be agreed upon in advance by the parties and shall not exceed the prevailing rates charged to other parties by the supplier for similar services.

14. Spare parts

14.1 As specified in SCC, the supplier may be required to provide any or all of the following materials, notifications, and information pertaining to spare parts manufactured or distributed by the supplier:

(a) Such spare parts as the purchaser may elect to purchase from the supplier, provided that this election shall not relieve the supplier of any warranty obligations under the contract; and
(b) In the event of termination of production of the spare parts:
(i) Advance notification to the purchaser of the pending termination, in sufficient time to permit the purchaser to procure needed requirements; and
(ii) Following such termination, furnishing at no cost to the purchaser, the blueprints, drawings, and specifications of the spare parts, if requested.

15. Warranty

15.1 The supplier warrants that the goods supplied under the contract are new, unused, of the most recent or current models, and that they incorporate all recent improvements in design and materials unless provided otherwise in the contract. The supplier further warrants that all goods supplied under this contract shall have no defect, arising from design, materials, or workmanship (except when the design and/or material is required by the purchaser's specifications) or from any act or omission of the supplier, that may develop under normal use of the supplied goods in the conditions prevailing in the country of final destination.

15.2 This warranty shall remain valid for twelve (12) months after the goods, or any portion thereof as the case may be, have been delivered to and accepted at the final destination indicated in the contract, or for eighteen (18) months after the date of shipment from the port or place of loading in the source country, whichever period concludes earlier, unless specified otherwise in SCC.

15.3 The purchaser shall promptly notify the supplier in writing of any claims arising under this warranty.

15.4 Upon receipt of such notice, the supplier shall, within the period specified in SCC and with all reasonable speed, repair or replace the defective goods or parts thereof, without costs to the purchaser.

15.5 If the supplier, having been notified, fails to remedy the defect(s) within the period specified in SCC, the purchaser may proceed to take such remedial action as may be necessary, at the supplier's risk and expense and without prejudice to any other rights which the purchaser may have against the supplier under the contract.

16. Payment

16.1 The method and conditions of payment to be made to the supplier under this contract shall be specified in SCC.

16.2 The supplier shall furnish the purchaser with an invoice accompanied by a copy of the delivery note and upon fulfilment of other obligations stipulated in the contract.

16.3 Payments shall be made promptly by the purchaser, but in no case later than thirty (30) days after submission of an invoice or claim by the supplier.

16.4 Payment will be made in Rand unless otherwise stipulated in SCC.

17. Prices

17.1 Prices charged by the supplier for goods delivered and services performed under the contract shall not vary from the prices quoted by the supplier in his bid, with the exception of any price adjustments authorized in SCC or in the purchaser's request for bid validity extension, as the case may be.

18. Contract amendments

18.1 No variation in or modification of the terms of the contract shall be made except by written amendment signed by the parties concerned.

19. Assignment

19.1 The supplier shall not assign, in whole or in part, its obligations to perform under the contract, except with the purchaser's prior written consent.

20. Subcontracts

20.1 The supplier shall notify the purchaser in writing of all subcontracts awarded under this contracts if not already specified in the bid. Such notification, in the original bid or later, shall not relieve the supplier from any liability or obligation under the contract.

21. Delays in the supplier's performance

21.1 Delivery of the goods and performance of services shall be made by the supplier in accordance with the time schedule prescribed by the purchaser in the contract.

21.2 If at any time during performance of the contract, the supplier or its subcontractor(s) should encounter conditions impeding timely delivery of the goods and performance of services, the supplier shall promptly notify the purchaser in writing of the fact of the delay, its likely duration and its cause(s). As soon as practicable after receipt of the supplier's notice, the purchaser shall evaluate the situation and may at his discretion extend the supplier's time for performance, with or without the imposition of penalties, in which case the extension shall be ratified by the parties by amendment of contract.

21.3 No provision in a contract shall be deemed to prohibit the obtaining of supplies or services from a national department, provincial department, or a local authority.

21.4 The right is reserved to procure outside of the contract small quantities or to have minor essential services executed if an emergency arises, the supplier's point of supply is not situated at or near the place where the supplies are required, or the supplier's services are not readily available.

21.5 Except as provided under GCC Clause 25, a delay by the supplier in the performance of its delivery obligations shall render the supplier liable to the imposition of penalties, pursuant to GCC Clause 22, unless an extension of time is agreed upon pursuant to GCC Clause 21.2 without the application of penalties.

21.6 Upon any delay beyond the delivery period in the case of a supplies contract, the purchaser shall, without cancelling the contract, be entitled to purchase supplies of a similar quality and up to the same quantity in substitution of the goods not supplied in conformity with the contract and to return any goods delivered later at the supplier's expense and risk, or to cancel the contract and buy such goods as may be required to complete the contract and without prejudice to his other rights, be entitled to claim damages from the supplier.

22. Penalties

22.1 Subject to GCC Clause 25, if the supplier fails to deliver any or all of the goods or to perform the services within the period(s) specified in the contract, the purchaser shall, without prejudice to its other remedies under the contract, deduct from the contract price, as a penalty, a sum calculated on the delivered price of the delayed goods or unperformed services using the current prime interest rate calculated for each day of the delay until actual delivery or performance. The purchaser may also consider termination of the contract pursuant to GCC Clause 23.

23. Termination for default

23.1 The purchaser, without prejudice to any other remedy for breach of contract, by written notice of default sent to the supplier, may terminate this contract in whole or in part:

(a) If the supplier fails to deliver any or all of the goods within the period(s) specified in the contract, or within any extension thereof granted by the purchaser pursuant to GCC Clause 21.2;

(b) If the Supplier fails to perform any other obligation(s) under the contract; or

(c) If the supplier, in the judgment of the purchaser, has engaged in corrupt or fraudulent practices in competing for or in executing the contract.

23.2 In the event the purchaser terminates the contract in whole or in part, the purchaser may procure, upon such terms deems appropriate, goods, works or services similar to those undelivered, and the supplier shall be liable to the purchaser for any excess costs for such similar goods, works or services. However, the supplier shall continue performance of the contract to the extent not terminated.

23.3 Where the purchaser terminates the contract in whole or in part, the purchaser may decide to impose a restriction penalty on the supplier by prohibiting such supplier from doing business with the public sector for a period not exceeding 10 years.

23.4 If a purchaser intends imposing a restriction on a supplier or any person associated with the supplier, the supplier will be allowed a time period of not more than fourteen (14) days to provide reasons why the envisaged restriction should not be imposed. Should the supplier fail to respond within the stipulated fourteen (14) days the purchaser may regard the intended penalty as not objected against and may impose it on the supplier.

23.5 Any restriction imposed on any person by the Accounting Officer / Authority will, at the discretion of the Accounting Officer / Authority, also be applicable to any other enterprise or any partner, manager, director or other person who wholly or partly

exercises or exercised or may exercise control over the enterprise of the first-mentioned person, and with which enterprise or person the first-mentioned person, is or was in the opinion of the Accounting Officer / Authority actively associated.

23.6 If a restriction is imposed, the purchaser must, within five (5) working days of such imposition, furnish the National Treasury, with the following information:

(i) The name and address of the supplier and / or person restricted by the purchaser;
(ii) The date of commencement of the restriction
(iii) The period of restriction; and
(iv) The reasons for the restriction.

These details will be loaded in the National Treasury's central database of suppliers or persons prohibited from doing business with the public sector.

23.7 If a court of law convicts a person of an offence as contemplated in sections 12 or 13 of the Prevention and Combating of Corrupt Activities Act, No. 12 of 2004, the court may also rule that such person's name be endorsed on the Register for Tender Defaulters. When a person's name has been endorsed on the Register, the person will be prohibited from doing business with the public sector for a period not less than five years and not more than 10 years. The National Treasury is empowered to determine the period of restriction and each case will be dealt with on its own merits. According to section 32 of the Act the Register must be open to the public. The Register can be perused on the National Treasury website.

24. Anti-dumping and countervailing duties and rights

24.1 When, after the date of bid, provisional payments are required, or antidumping or countervailing duties are imposed, or the amount of a provisional payment or anti-dumping or countervailing right is increased in respect of any dumped or subsidized import, the State is not liable for any amount so required or imposed, or for the amount of any such increase. When, after the said date, such a provisional payment is no longer required or any such anti-dumping or countervailing right is abolished, or where the amount of such provisional payment or any such right is reduced, any such favourable difference shall on demand be paid forthwith by the contractor to the State or the State may deduct such amounts from moneys (if any) which may otherwise be due to the contractor in regard to supplies or services which he delivered or rendered, or is to deliver or render in terms of the contract or any other contract or any other amount which may be due to him.

25. Force Majeure

25.1 Notwithstanding the provisions of GCC Clauses 22 and 23, the supplier shall not be liable for forfeiture of its performance security, damages, or termination for default if and to the

extent that his delay in performance or other failure to perform his obligations under the contract is the result of an event of force majeure.

25.2 If a force majeure situation arises, the supplier shall promptly notify the purchaser in writing of such condition and the cause thereof. Unless otherwise directed by the purchaser in writing, the supplier shall continue to perform its obligations under the contract as far as is reasonably practical, and shall seek all reasonable alternative means for performance not prevented by the force majeure event.

26. Termination for insolvency

26.1 The purchaser may at any time terminate the contract by giving written notice to the supplier if the supplier becomes bankrupt or otherwise insolvent. In this event, termination will be without compensation to the supplier, provided that such termination will not prejudice or affect any right of action or remedy which has accrued or will accrue thereafter to the purchaser.

27. Settlement of Disputes

27.1 If any dispute or difference of any kind whatsoever arises between the purchaser and the supplier in connection with or arising out of the contract, the parties shall make every effort to resolve amicably such dispute or difference by mutual consultation.

27.2 If, after thirty (30) days, the parties have failed to resolve their dispute or difference by such mutual consultation, then either the purchaser or the supplier may give notice to the other party of his intention to commence with mediation. No mediation in respect of this matter may be commenced unless such notice is given to the other party.

27.3 Should it not be possible to settle a dispute by means of mediation, it may be settled in a South African court of law.

27.4 Mediation proceedings shall be conducted in accordance with the rules of procedure specified in the SCC.

27.5 Notwithstanding any reference to mediation and/or court proceedings herein,

(a) The parties shall continue to perform their respective obligations under the contract unless they otherwise agree; and

(b) The purchaser shall pay the supplier any monies due the supplier.

28. Limitation of liability

28.1 Except in cases of criminal negligence or wilful misconduct, and in the case of infringement pursuant to Clause 6;

(a) The supplier shall not be liable to the purchaser, whether in contract, tort, or otherwise, for any indirect or consequential loss or damage, loss of use, loss of production, or loss of profits or interest costs, provided that this exclusion shall not apply to any obligation of the supplier to pay penalties and/or damages to the purchaser; and

(b) The aggregate liability of the supplier to the purchaser, whether under the contract, in tort or otherwise, shall not exceed the total contract price, provided that this limitation shall not apply to the cost of repairing or replacing defective equipment.

29. Governing language

29.1 The contract shall be written in English. All correspondence and other documents pertaining to the contract that exchanged by the parties shall also be written in English.

30. Applicable law

30.1 The contract shall be interpreted in accordance with South African laws, unless otherwise specified in SCC.

31. Notices

31.1 Every written acceptance of a bid shall be posted to the supplier concerned by registered or certified mail and any other notice to him shall be posted by ordinary mail to the address furnished in his bid or to the address notified later by him in writing and such posting shall be deemed to be proper service of such notice.

31.2 The time mentioned in the contract documents for performing any act after such aforesaid notice has been given, shall be reckoned from the date of posting of such notice.

32. Taxes and duties

32.1 A foreign supplier shall be entirely responsible for all taxes, stamp duties, license fees, and other such levies imposed outside the purchaser's country.

32.2 A local supplier shall be entirely responsible for all taxes, duties, license fees, etc., incurred until delivery of the contracted goods to the purchaser.

32.3 No contract shall be concluded with any bidder whose tax matters are not in order. Prior to the award of a bid the Department must be in possession of a tax clearance certificate, submitted by the bidder. This certificate must be an original issued by the South African Revenue Services.

33. National Industrial Participation (NIP) Programme

33.1 The NIP Programme administered by the Department of Trade and Industry shall be applicable to all contracts that are subject to the NIP obligation

34. Prohibition of Restrictive practices

34.1 In terms of section 4 (1) (b) (iii) of the Competition Act No. 89 of 1998, as amended, an agreement between, or concerted practice by, firms, or a decision by an association of firms, is prohibited if it is between parties in a horizontal relationship and if a bidder (s) is / are or a contractor(s) was / were involved in collusive bidding (or bid rigging).

34.2 If a bidder(s) or contractor(s), based on reasonable grounds or evidence obtained by the purchaser, has / have engaged in the restrictive practice referred to above, the purchaser may refer the matter to the Competition Commission for investigation and possible imposition of administrative penalties as contemplated in the Competition Act No. 89 of 1998.

34.3 If a bidder(s) or contractor(s), has / have been found guilty by the Competition Commission of the restrictive practice referred to above, the purchaser may, in addition and without prejudice to any other remedy provided for, invalidate the bid(s) for such item(s) offered, and / or terminate the contract in whole or part, and / or restrict the bidder(s) or contractor(s) from conducting business with the public sector for a period not exceeding ten (10) years and / or claim damages from the bidder(s) or contractor(s) concerned.

35. SPECIAL CONDITIONS OF CONTRACT

35.1 The State reserves the right to verify and authenticate all the information supplied in this document by the bidder.

35.2 The Bid must be strictly in accordance with the conditions and specifications contained herein.

35.3 If it is found that any information has been tampered with during the evaluation process and/or after the Bid/Contract has been awarded that any false information has been provided, the State reserves the right to take the necessary action as it deems fit, including but not limited to the institution of criminal proceedings.

35.4 Failure to sign all relevant places shall invalidate your bid (**SBD1, SBD 3.1, SBD 4, SBD 6.1 or 6.2, SBD 8, SBD 9 and SCC)**

35.5 All queries should be sent to the relevant person via email state above. No query will be responded to if sent 3 days before the closing date.

35.6 If you are not a registered supplier with the Department of Water and Sanitation, please complete the supplier registration forms and banking details, supplier registration forms are available at Departmental website, www.dwa.gov.za

35.7 Bidders/ Individuals that are directors or members in more than one company bidding for this tender and do not openly declare their interests will be disqualified

35.8 **Failure to submit original and valid Tax Clearance Certificate shall invalidate your bid.**

35.9 The DWS reserves the right to not make an award on any of the responses to this Bid.

35.10 The DWS reserves the right to award only parts of this bid and re-bid for other parts.

35.11 All bid documents should be hand delivered and deposited in to the Tender Box, if sent via post,
envelope or package, the envelope must be clearly marked to avoid your submission been mixed with normal letters sent to the Department.

35.12 Only signed, original documents will be accepted.

36. ACCEPTANCE OF TERMS AND SPECIAL CONDITIONS

The above terms of the bid and all Annexure have been read, understood and accepted.

For and on behalf of the Bidder:

…….....……

_____	_____
Signature of Bidder:	**Date:**
_____	_____
Bidder's Name & Surname:	**Designation**
_____	_____
Witness Name & Surname:	**Date**
_____	_____
Signature:	**Address (Physical):**

TRADING NAME:_____

CONTACT PERSON:_____

CONTACT NUMBER: _____

CLOSING DATE:_____

This template must be completed by the bidder

TENDER NUMBER		
SERVICE /PROJECT DESCRIPTION		
NAME OF BIDDER		
TENDER AMOUNT		
BBBEE LEVEL		
COMPANY'S COMPOSITION OF EXISTANCE		
	% OWNERSHIP	TOTAL NUMBER
WOMEN		
PEOPLE WITH DISABILITIES		
BLACK MALES		
YOUTH		
PARTICIPATION IN PROJECT IMPLEMENTATION		
	TOTAL NUMBER	LEVEL OF PARTICIPATION (eg Project Management, Technical, Administrative)
WOMEN		
PEOPLE WITH DISABILITIES		
BLACK MALES		
YOUTH		

Please note that this information is for reporting purposes only, and will not prejudice the company in anyway nor will it be considered as an evaluation tool.

Name:.....

Position:.....

Signature:.....Date:.....

ESTABLISHMENT OF A PANEL OF SERVICE PROVIDERS FOR PROVISION OF MAINTENANCE, CALIBRATION, INSTALLATION, REPLACEMENT OF EXISTING WATER QUALITY INSTRUMENTATION, INSTRUMENTATION HOUSING AND NEAR REAL TIME DATA TRANSMISSION FOR A PERIOD OF 24 MONTHS

INSTRUCTIONS TO BIDDERS

1. ISSUING OF DOCUMENTS

(a) A complete set of bid documents are issued to a prospective Bidder.

(b) Bidders must satisfy themselves that the document is complete and conform to the index of this document. Should any figures or writing be indistinct or should any pages be missing from this document or should this document or the drawing(s) contain any obvious errors, the Bidders must immediately notify the Department in order to have any discrepancy rectified or clarified before submitting his bid. Such clarification will be valid only if made by the Department by means of formal amendment as described hereunder prior to the date of submission of bids. The Department may issue amendments to clarify or modify the Bid Documents. A copy of each amendment will be issued to each bidder and shall be acknowledged on the form issued with the amendments. No claim whatsoever will be entertained for faults in the bid price resulting from the above-mentioned discrepancies.

(c) No alterations, omissions or additions shall be made to this document, but should it be deemed necessary to do so, the Bidder is at liberty to qualify his bid.

(d) All Bidders shall be deemed to have waived, renounced and abandoned any conditions printed or written upon any stationery used by them for the purpose of or in connection with the submission of bids which are in conflict with the conditions laid down in this document.

2. QUERIES WITH RESPECT TO THIS BID

Queries of a specific technical nature may be discussed personally or telephonically with Chris Lloyd telephone 051 405 9248

3. COMPLETION OF BIDS

(a) The bid must be signed on the Invitation to Bid form (SBD 1) annexed hereto with all blanks in the bid and the appendix filled in.

(b) All spaces in the bid forms and other annexure shall be completed in full.

(c) The Technical Schedule contained in the bid document and the Pricing Schedule must be fully completed and priced out by the bidder. Failure to do so will deem your bid invalid.

(d) The bid documents shall not be separated in any way nor must any pages be detached from the original documents.

4. SUBMISSION OF BIDS

(a) The original Bid, together with a covering letter and supporting documents, shall be sealed in an envelope endorsed:

"ORIGINAL BID FOR THE ESTABLISHMENT OF A PANEL OF SERVICE PROVIDERS FOR PROVISION OF MAINTENANCE, CALIBRATION, INSTALLATION, REPLACEMENT OF EXISTING WATER QUALITY INSTRUMENTATION, INSTRUMENTATION HOUSING AND NEAR REAL TIME DATA TRANSMISSION FOR A PERIOD OF 24 MONTHS
and the name of the Bidder shall be clearly shown.

(b) Bids endorsed as above, will be received by: The Supply Chain Management Office or may be deposit in the bid box at the entrance of the Department Of Water and Sanitation, Zwamadaka Building not later than 11:00 on the date stipulated on the front cover of this document.

5. SIGNATURE ON BIDS

The Bid, if by an individual, must be signed by that individual or by someone on his behalf duly authorized thereto and proof of such authority must be produced. If the bid is by a Company it must be signed by a person duly authorized thereto by a Resolution of a Board of Directors a copy of which Resolution, duly certified by the Chairman of the Company is to be submitted with the bid.

If the bid is submitted by joint venture of more than one person and/or Companies and/or firms it shall be accompanied by the following:

(a) The original or a naturally certified copy of the original document under which such joint venture was constituted which must define precisely inter alia the conditions under which the joint venture will function, its period of duration and the participation of the several constituent persons and/or companies and/or firms.

(b) A certificate signed by or on behalf of each participating person and/or company and/or firm authorizing the person who signed the bid to do so.

6. GENERAL CONDITIONS OF CONTRACT

The General Conditions of Contract shall be regarded as an integral part of the contract documents.

7. FORM SBD 1

The copy of Form SBD 1 (Invitation to Bid), annexed to these documents, must be completed and signed by the Bidder. Failure to do so will deem your bid invalid.

8. PREFERENCE FOR EQUITY OWNERSHIP

Bidder desirous of claiming preference for equity ownership by previously disadvantaged individuals/women must fully complete and sign the Preference Certificate, Form SBD 6.1 or no preference will be allowed. A copy of your company registration forms and a valid accredited B-BBEE Status Level Verification Certificate **must** be submitted with the bid document.

9. BIDDERS TO COMPLY WITH DOCUMENTS

Where applicable, Bidders must allow in their Bids for all labour, material, machinery and everything necessary for the execution and completion of the Contract in accordance with the bid documents. No alterations may be made in the Invitation to Bid, Schedule of Quantities or other documents and the bid will be deemed to comply entirely with the terms of the documents.

10. TELEGRAPHIC BIDS

No bid forwarded by telegram, telex, facsimile, e-mail or similar apparatus will be considered.

11. THE DEPARTMENTS RIGHT TO DECLINE ANY BID

The Department does not bind itself to accept the lowest or any bid.

12. DEPARTMENT NOT LIABLE FOR BIDDER'S EXPENSES

The Department will not be held liable for any expenses incurred in preparing and submitting bids.

13. PAYMENTS UNDER THE CONTRACT

All payments due to the Contractor in terms of the contract will be done by means of Electronic Fund Transfer.

ADMINISTRATIVE COMPLIANCE

Please note that all bidders must comply with the following administrative compliance

No.	Name of the document that must be submitted	Requirements
1	Invitation to bid –SBD 1	Please complete and sign the supplied proforma document.
2	Pricing Schedule –SBD3.3	Please submit full details of pricing proposal.
3	Declaration of Interest–SBD 4	Please complete and sign the supplied proforma document.
4	Preference Point Claim Form–SBD6.1	Non-submission will lead to a zero score on BEE.
5	Declaration of Bidder's Past Supply Chain Management Practices– SBD8	Please complete and sign the supplied proforma document.
6	Certificate of Independent Bid Determination –SBD 9	Please complete and sign the supplied proforma document.
7	Certified Copy of BBBEE certificate	Non-submission will only lead to a zero score on BEE.
8	Registration with Central Supplier Database as per National Treasury SCM Instruction 4 of 2015/17 par 5.2	Verification will be done on the Central Supplier Database

14. EVALUATION CRITERIA

The Department of Water and Sanitation will evaluate all proposals in terms of the Preferential Procurement Regulations 2017. A copy of the Preferential Procurement Regulations 2017 can be downloaded from www.treasury.gov.za. A two phase evaluation criteria will be considered in evaluating the bid.

1. Phase 1: Mandatory compliance (if not complied with bid will be disqualified)

2. Phase 2: Functional / Technical Evaluation

Phase 1

Mandatory compliance (if not complied with bid will be disqualified)

Bidders are required to submit the following documents which should form part of the bid submitted by closing date. Omission to submit the listed documents will render your bid non responsive and the bid will not be considered for the phase 2 evaluation.

(a) Pre-qualification in terms of Preferential Procurement Regulation, 2017, the bidding company must be 51% black owned, minimum level 2 Exempted Micro Enterprise (EME). Bidders are required to submit certified and valid copy of BEE certificate and CIPC documentation.
(b) Attendance of Compulsory Briefing Session
(c) Appointment letter OR Certificate from the Manufacturer as Distributor/ Authorised Agent of the instrumentation in South Africa.
(d) Warranty certificate for 12 months

Phase 2
Technical Compliance:

The bid will be evaluated using the below criteria and failure to comply with **all** the specifications as listed will render your bid as not to specification and non-responsive.

(a) Standard Specifications as set out under Section 3: Specifications and the compliance thereof
(b) The bid will be rendered non-responsive if the bidder fails to complete the "Comply / Not Comply" section in the specification under Section 3: Specifications

Next to each detail specification a block is provided for the bidder to complete the following:

Offered equipment / item to specification	-	or	Y	✔
Offered equipment / item not to specification	-	or	N	X

The bidder must initialise each page, he/she has filled and completed

NOTE: All service providers who meet all the requirements in terms of phase 2 above, will be enlisted to the list of the panel of Service Providers. The service providers as listed on the panel will be approached and submit quotation.

15. REJECTION OF BID

Bids not complying with the above-mentioned requirements and specifications may be regarded as incomplete and may not be considered. Any document submitted will be subjected to verification.

16. RESULTS OF BIDS

Results of non-acceptance of bids will be sent to individual unsuccessful bidders

SECTION 2: CONDITIONS OF CONTRACT

CONTENTS

NOTE:

Failure to indicate whether you comply or not comply under the "Comply/Not Comply" column in the Specification will invalidate the bid. (*Clearly delete/cross-out whichever is not applicable.)

CONDITIONS OF CONTRACT

A. GENERAL CONDITIONS OF CONTRACT

The Contract shall be governed by: “General Conditions of Contract”, which is attached to this bid document.
The only variations from these General Conditions of Contract shall be given in the Special conditions of Contract below.

B. SPECIAL CONDITIONS OF CONTRACT

This section must be completed in full failure to do so may invalidate your bid

***Delete which are not applicable**

1.	Is the offer strictly in accordance with the conditions and specifications?	*YES / NO
	If not in accordance with the specification, furnish the deviations.	_____
2.	Period required for commencement with service after receipt of order.	_____
3.	Are you registered in terms of section 23(1) or 23(3) of the value Added Tax Act, 1991 (Act no 89 of 1991?	*YES / NO
	If so, state your VAT registration number.	_____
4.	Is the bid price firm for the duration of the contract period?	*YES / NO
5.	**The DEPARTMENT OF WATER AND SANITATION will not entertain any claims for non-firm price increases claimed at a later state. No exception will be made in this regard.**	**TAKE NOTE**
6.	It is a specific condition of this contract with DWS ,that consultants awarded this contract undertake not to divulge to others, or use for their own benefit, confidential information gained during the course of the work. In terms of section 21(2) of the Copyright act (Act no.98 of 1978) (“the Act “) the copyright regarding a work that is made under the direction or control of the State is owned by the state. Section 2(1) of the Act provides that the term “works”, if they are original, include literary works, musical works artistic works, cinematograph films, sound recordings, broadcasts, programme-carrying signals, published editions and computer programs.	

DEPARTMENT OF WATER AND SANITATION

BID W11235

THE PROVISION OF MAINTENANCE, CALIBRATION, INSTALLATION, REPLACEMENT OF EXISTING WATER QUALITY INSTRUMENTATION, INSTRUMENTATION HOUSING AND NEAR REAL TIME DATA TRANSMISSION FOR A PERIOD OF 24 MONTHS

SECTION 3: **DETAIL SPECIFICATIONS**

CONTENTS

GENERAL REQUIREMENTS:

DATA LOGGING EQUIPMENT:

SENSORS

18. Pressure Transducer For Water Level Measurement Using The “Piezo-Resistive” Method (Stainless Steel Sensor) With 1 – 5 V Or 4 – 20 mA Output Signal;
19. Pressure Transducer For Water Level Measurement Using The “Piezo-Resistive” Method With 4 - 20 mA Output Signal Or SDI 12 Interface;

POWER SUPPLY EQUIPMENT:

20. Scope;
21. Solar Panels;
22. Batteries;
23. Power Control Unit Or Mains Transformer;
24. Portable Power Back-Up;
25. Battery Chargers;
26. Battery Chargers;

WATER QUALITY

27. Scope
28. Multi-Parameter Handheld Water Quality System (With pH-, Dissolved Oxygen-, Electrical Conductivity- And Temperature Sensor);
29. Handheld Conductivity And Temperature System (Without pH- And Oxygen Sensor);
30. Handheld PH-, Conductivity- And Temperature Sensor (Without Oxygen Sensor);
31. Compact Wireless Temperature, Conductivity And Depth Profiler
32. Handheld Water Quality Profiling System (With Depth-, pH-, Oxygen-, Electrical Conductivity- And Temperature Sensor);
33. Multi-Parameter Handheld Water Quality System With Wireless Smart Device Display
34. Multi-Parameter Water Quality Sonde With pH-, Electrical Conductivity-, Temperature-, Depth And Optical Oxygen Sensors (Bluetooth Communication Capability) – Diameter Less Than Five Centimeters;
35. Deep Water (Minimum 245m) Multi-Parameter Water Quality Sonde With Optical And Smart Sensor Technology - Diameter Less Than Five Centimeters;
36. Deep Water (Minimum 245m) Multi-Parameter Water Quality Sonde With Optical And Smart Sensor Technology - Diameter Less Than Nine Centimetres;
37. Extreme Depth Profiling (Minimum 1500m) Multi Parameter Online/Memory Probe With Calculated Data Output – Up To 16-Channels For Physical, Chemical And Optical Parameters;
38. Three Channel Data Logger With Integrated Pressure, Temperature And Conductivity Sensors – For Unattended Deployment With No Cables Attached

39. Three Channel Data Logger with Integrated Pressure, Temperature And Conductivity Sensors – For Permanent Submerged Deployment With Fixed (Non Removable) Communication Cable And Vented Tube.
40. Three Channel Data Logger with Integrated Pressure Transducer, Temperature- And Conductivity Sensors – For Permanent Deployment with Fixed (Non Removable) Communication Cable, Vented Tube and Built-In SIM Telemetry System (GSM Standard, GSM Quad Band, GPRS).
41. Service

SECTION 3: DETAIL SPECIFICATIONS

GENERAL REQUIREMENTS:

1. SCOPE

1.1. The purpose for this bid is for the installation and maintenance of water quality data transmission systems and instrumentation for the Department Water and Sanitation (DWS). These sites are approximately 30 in number and could increase or decrease depend on the availability of funds. The details of site locations will be confirmed with the successful bidder. Depending on the specific site requirements, the following parameters will be monitored: electrical conductivity, temperature, pH and Dissolved Oxygen. These parameters could reduce or increase when monitoring in the tributaries.

1.2. This Standard Technical Specification describes the general requirements with regard to material, equipment and workmanship and should be read together with the General Conditions of Tender, Contract and Order, Detail Specifications and Schedules.

1.3. Where any conflict exists, the relevant clauses of the Detail Specification shall take preference over the clauses of the Standard Technical Specification.

1.4. Should any conflict arise between the requirements of this standard specification and the General Conditions of Contract, Contract and Order, the General Conditions of Contract, Contract and Order would take preference.

1.5. The works and services required in terms of this specification shall comply with all the requirements of this specification, read together with the detail specification.

1.6. The Manufacturers Certificate of Compliance for each item offered must be supplied as part of the Bid Document in order for the Evaluation Panel to confirm compliance or non-compliance.

1.7. The Contractor shall be deemed to have examined all the constituent parts of this document carefully before the contract was submitted. Any doubts as to the meaning of any terms, phrases or clauses of the document, or any missing pages, shall be submitted to the Engineer in writing before a contract is submitted. No claims traceable to non-compliance with this clause will be considered.

1.8. If it is found at any stage of this contract that the Contractor has deviated from the requirements of this specification without the written consent of the Engineer, then the Engineer shall have the right to order the Contractor to remove the item(s) in question and to supply and/or install the exact equipment specified without any adjustment in the contract price.

1.9. Definitions:

1.9.1 For the purposes of this contract all terms used shall be as defined in section 2 of SABS code 0142-1981, Article 1 of the Machinery and Occupational Safety Act, No 6 of 1983 and other relevant SABS specifications.

2. ENVIRONMENTAL CONDITIONS:

2.1. Except when otherwise specified, all equipment and material shall be designed and selected for the following climatic and environmental conditions:

2.1.1. Operating temperature range: - 10° C to + 70° C.

2.1.2. Relative humidity: maximum 95% below 35° C;
maximum 75% above 35° C.

2.1.3. Height above sea level: 0 - 3000 meters.

2.1.4. All the equipment shall operate satisfactorily in the presence of a fair amount of water and dust, and shall comply with rating IP 54 as defined in IEC 144.

2.2. Metal work exposed to the elements shall be of a suitable stainless steel type or shall be painted or protected against corrosion to the standards specified by the SABS and as approved by the Engineer. Samples shall be submitted for approval before installation is commenced with.

2.3. Contact between dissimilar metals shall be avoided wherever possible. The following electrode potentials shall not be exceeded:
2.3.1 For connections exposed to the weather or salt water - 0,25V
2.3.2 For connections of interior parts exposed to condensation but not contaminated by salt - 0,5V.

2.4. In addition to the normal operating conditions specified above, the equipment should also be capable of operating under temporary adverse periods. If additional protection is required for the equipment and installation under these conditions, then it shall be provided by the Contractor, at his cost, until conditions have improved to the point where additional protection is no longer required.

3. REGULATIONS AND STANDARDS:

3.1. The Contractor's manufacturing facility must be in existence of at least 5 years with an established office registered in the Republic of South Africa, to carry suitable stock and spares and employ technical personnel for service and maintenance.

3.2. The equipment must be Hydrometry dedicated and be field proven for at least 2 years. The Engineer may request the Contractor for any proof in this regard before the contract is awarded.

3.3. All material and equipment supplied shall be new and of an acceptable quality.

3.4. The work shall be carried out strictly in accordance with the latest revision and amendments of the following:
1.4.1 SABS 0142: "Code of practice for the Wiring of Premises" hereinafter called the "Wiring Code".
1.4.2 The "Machinery and Occupational Safety Act 1983", Act no 6 of 1983, hereinafter called the "Act".
1.4.3 The Municipal By-laws and any special requirements of the Local Supply Authority.
1.4.4 The Local Fire Office Regulations.
1.4.5 The regulations of the Department of Post and Telecommunications.

3.5. All work shall comply with the relevant SABS specifications for workmanship and material. Where no SABS specification exists, the applicable BS, DIN or IEC specification shall be followed.

3.6. Any conflict that should arise between any of the above mentioned regulations and this specification shall forthwith be referred to the Engineer in writing for his ruling. Under no circumstances shall the Contractor modify any part of the works to comply with amended regulations that may come in force during the construction period before the matter has been cleared with the Engineer.

3.7. The manufacturing company must preferably adhere to ISO 9001 standards.

4. DESCRIPTION OF THE PROJECT:

1.1 The project is completely detailed in **SECTION 4, Detail Specification**. Should the Bidder require any further information, then this shall be referred to the Engineer in writing.

5. SCHEDULES OF PRICES:

5.1 The attention of Bidders is drawn to the Schedules of Prices which form part of this specification and which are to be completed in full. Bidders, which do not adhere to this request, will be disqualified and their bids will not be considered.

6. SUB-CONTRACT WORK:

6.1 All work as specified shall only be performed by the Bidder's own personnel and shall under no circumstances be sub-contracted.

7. ORDERING OF MATERIAL AND EQUIPMENT:

7.1 The Electronic Contractor is made aware of the fact that material and equipment shall when required be ordered well in advance as late deliveries will be his sole responsibility. If for some reason late deliveries are found to be to the advantage of the Client or are to be postponed by the Contractor the prior approval shall be obtained from the Engineer.

8. DELIVERY AND HOISTING EQUIPMENT:

8.1 The Contractor shall make the necessary arrangements to get all equipment delivered to site / office in accordance with the program and in an undamaged condition. The Contractor shall be responsible for the acquisition of any insurance cover that may be required for equipment in transit and temporary storage.

9. WORKSHOP ASSEMBLY AND IDENTIFICATION OF SUB-SECTIONS AND COMPONENTS:

9.1 To assist in the erection and installation activities on site, components, equipment and sub-assemblies must be assembled in the workshop, after manufacture. Individual units shall be clearly marked by employing an identification code in such manner that actual re-assembly, erection and installation on site could be done in a minimum of time with a minimum of fitting and adjusting on site.

9.2 Equipment should be delivered to site in the largest sub-assemblies, which are practical.

9.3 Where practical, according to the discretion of the Engineer, complete electronic and other control units shall be assembled in the workshop for preliminary tests. This shall be done to check whether the equipment complies with predetermined set values and shall produce certain predetermined set results, as set out in the various parts of the document.

9.4 The Engineer may upon request of the Contractor inspect existing installations or proto-type assemblies in the factory to determine whether such units and workmanship are of the required standard for this installation. This may be done to obviate the possibility of having to replace unacceptable equipment at a later stage.

10. HANDBOOK AND INSTRUCTION MANUALS:

10.1 The Contractor shall keep accurate records of all tests carried out and the results achieved, all meter readings taken after installation of the equipment, etc. A comprehensive instruction shall be built up by the Contractor and shall be considered to be part of the equipment offered. This manual shall provide complete equipment schematics; Complete equipment layout drawings; All manufacturers handbooks having reference to the equipment; installation, test and alignment procedures; All inter connection and inter cabling diagrams; All parts and spares lists; 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. Three copies of all test results, amendments and readings, together with three copies of the instruction manual, built-up as indicated above shall be handed to the Engineer before he will accepts any equipment supplied to meet this specification. All the above shall be fully updated to include whatever final modifications are required to be made by the Contractor to his equipment in order for it to gain acceptance by the Engineer as being to specification.

10.2 The Contractor shall provide complete operating instructions and operating manuals that will enable staff to operate and understand the equipment and systems and to utilize the

equipment to its full extent.

11. TESTS:

11.1 All materials and workmanship shall be of the respective kinds described in the contract and in accordance with the Engineer's instructions and shall be subjected from time to time to such tests and by such persons as the Engineer may direct at the place of manufacture or fabrication or on the site or at all or any of such places. Excepts as otherwise provided in the specification the Contractor shall supply such assistance, instruments, machines, labour and materials as are normally required for examining, measuring and testing of any work and the quality, mass or quantity of any materials used and shall supply samples of material before incorporation in the works for testing as may be selected and required by the Engineer.

11.2 All samples shall be supplied by the Contractor at his own cost if the supply thereof is clearly intended by or provided for in the specification but if not, then at the cost of the Employer.

11.3 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 only 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 fulfill) if such is particularized in the specification in sufficient detail to enable the Contractor to price or allow for the same in his contract.

11.4 If any test is ordered by the Engineer which is either-

a) not so intended by or provided for; or

b) not so particularised; or

c) though so intended by or provided for is ordered by the Engineer to be carried out by an independent person or body at any other place that 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 of materials not be in accordance with the provisions of the Contract or the Engineer's instructions, but otherwise by the Employer.

12. TEST EQUIPMENT AND SPARES:

12.1 It is a requirement of this contract that the Contractor shall have available all the test equipment that would be required to allow the Employer's staff to commission any part of any system provided in terms of this contract.

12.2 The exact test equipment required will depend on the systems supplied and the Contractor shall submit a complete list of the test equipment to be used.

12.3 The Contractor shall recommend spares that would be required on site for emergency repairs, complete with unit costs for consideration by the Engineer.

13. TRAINING OF PERSONNEL:

13.1 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.

13.2 Three categories of training for technical personnel are required, viz:

13.2.1 Installation training.
13.2.2 Operation training.
13.2.3 Maintenance training.

13.3 The hardware maintenance training shall include the computers, microcomputers,

programmable logic controllers and all the peripheral equipment.

13.4 The Employer will bear the cost of salaries, accommodation and other allowances and travelling expenses of its personnel, but all other expenses shall be borne by the Contractor. The Contractor shall provide all course material including manuals.

13.5 The Bidder shall indicate his proposals and local facilities to provide training in particular aspects of operation and maintenance of the equipment being offered.

13.6 Training courses shall be made available and completed within the period of six months after the contract is awarded.

13.7 At the conclusion of the training periods, both in regard to the operation and maintenance of the equipment, the Engineer will give the Contractor a signed statement to the effect that these training sessions were adequate.

13.8 Training of technical staff will be presented at two venues in South Africa, as identified by the Engineer. All costs for these training sessions, i.e. Travelling, Accommodation and Meals etc. will be borne by the Bidder.

13.9 A course in the installation of the equipment, first line maintenance, faultfinding and operator's procedures, is required and this will be attended by a maximum of 25 people per venue.

13.10 Follow up on job training as per the request of the Technical Officials.

No guarantee can be given to the Bidder with regard to the quantity of each item required. Installation assistance, maintenance and back-up facilities shall be provided by the Bidder.

14. STANDARDS AND SPECIFICATIONS:

14.1 The offered equipment with regard to its operational performance is to be in strict accordance with each and every term of the documents listed below:

14.1.1 The Standard Specifications - Section 3.

14.1.2 The Detail Specifications - Section 4.

14.1.3 The information provided in the Technical Schedules - Section 5.

14.2 The Bidder shall be required to provide back-up and maintenance on all the equipment supplied.

14.3 Next to each detail specification a block is provided for the bidder to complete the following:

14.3.1 Offered equipment / item to specification - Y ✔
or

14.3.2 Offered equipment / item not to specification - N X
or
(Refer to Paragraph 3, below.)

14.3.3 The bidder must initialise each page, he/she has filled and completed

15. DEPARTURES FROM THE SERVICES TO BE RENDERED:

15.1 If, in their offers to meet these specifications, there are any departures whatsoever from any of the provisions, or from any of the terms set out in paragraph 2 (Standards and

Specifications), then Bidders shall list each and every departure in Section 1. (Annexure A). The list, which shall accompany the bid offer, shall be so numbered as to correlate each departure from the relative paragraph contained in the documents listed at 2.1 above.

15.2 Failure on the part of any Bidder to meet this requirement in full shall signify compliance with the terms and conditions of the contract.

16. PURPOSE OF THE EQUIPMENT:

16.1 The data loggers will be automatic, self-powered and required to sample selected parameters at different locations at a gauging site, parameters being: water level, conductivity, water temperature, pH, air temperature, precipitation, net radiation, wind speed, wind direction, turbidity, humidity and air temperature. The parameters will be sampled at predefined intervals and the data logger needs to store the collected data in the form of analogue values or digital signals.

16.2 At regular intervals, typically 30 to 60 days, the stored data will be read out via an USB, infrared interface or RS 232 port with a laptop computer or palmtop computer. The data will then be read out at the data processing facilities at Head Office in Pretoria, or at the Regional Offices.

16.3 The data loggers should have the capability of interfacing with either a transmitter to send data via satellite, national telephone link or cellular telephone link to the processing facilities at Head Office in Pretoria or Regional Offices.

17. TESTING OF EQUIPMENT:

17.1 The Engineer reserves the right to instruct the successful Bidder to submit a complete data logging system to the SABS to be tested for the following, before final awarding of the contract:

17.1.1 Compliance with the limits on the emission of radio frequency interference, as controlled in terms of the Radio Act.

17.1.2 Satisfactory operation of the equipment at the extremes of the ambient operation conditions specified.

The cost for the performance of these tests shall be for the Bidder's account.

17.2 It is a condition of this bid that, on request of the Engineer, the Bidder shall be able to demonstrate, within 2 weeks, after the closure of the bid, a unit of the equipment offered to the Engineer before the bid shall be awarded. On request of the Engineer, the Bidder shall install the unit/item at the Department's testing facility at Pretoria West, for evaluation of the equipment's performance. The Engineer will submit this request within two weeks after the closing date of this bid. The bid will be awarded after the Engineer is fully satisfied with the testing results performed at the testing facility.

Failure to comply with these requests will invalidate the bid offer.

18. INSTALLATION:

18.1 The equipment shall be designed to allow installation by relatively unskilled staff. No special precautions shall be applicable and connectors shall be so configured that damage will not result should devices be swapped around. Equipment shall be cross polarity protected.

18.2 It is a condition of this contract that the Bidder shall assist the Department with the installation of the equipment, in order to ensure proper operation thereof. Installation procedures shall be incorporated in the user manual and all wiring diagrams and information for the proper installation shall be given. Physical installation on site will however be undertaken by Departmental staff.

19. TRANSPORT:

19.1 The equipment shall be designed and packaged to withstand transport by vehicle over rough, unmade dusty roads. All printed circuit boards and modules shall be securely mounted using nuts, bolts, stand-offs and PC board sliding tracks. No components shall be glued to the cabinet or other parts.

20. MAINTENANCE, SPARES AND ACCESSORIES:

20.1 The Bidder shall be able to maintain and guarantee all the equipment supplied for a minimum period of one year, starting from the date of delivery.

20.2 The Bidder shall provide the equipment listed in the various parts of the specifications and he shall during the maintenance period be obliged to maintain the spares in proper working condition and any failed equipment shall be repaired promptly.

20.3 The Bidder shall, at all times, have available, four complete sets of spare equipment so that the Employer will be in a position to repair any part of the equipment by way of substitution. Any faulty equipment will be replaced on site by the Bidder with a spare unit and the faulty unit will be transported to the workshops for repair.

20.4 During the initial guarantee period, should it be deemed necessary by the Engineer that the Bidder needs to visit a particular site; the cost will be borne by the Bidder.

20.5 All equipment shall be designed to require a minimum of maintenance. Routine maintenance inspections shall be limited to the physical cleaning of the equipment housing and power supply system.

20.6 During the contract period, no equipment is to be repaired without an official quotation from the Bidder. No repairs will be paid without an official quotation and official government order.

20.7 A list of general spares / Services that are available on each item will be listed and priced in the Price Schedules – “Spares”.

20.8 Should any Accessories be available to be used with the main item, ie. Enclosures, GSM Modems, Antennae, Tools, etc., it should be listed and priced in the Price Schedules – “Accessories”.

21. MANUALS AND TRAINING:

21.1 The Bidder shall provide complete sets of user manuals, in English, included into the unit price, for each system and sub-system to be provided in terms of this contract. The user manual shall include the following:

- Equipment specifications;
- Assembly and operation details;
- Wiring diagrams;
- Troubleshooting;
- Explanation of error codes and possible remedial action;
- Maintenance;

21.2 The Bidder shall be required to provide the following training, should it be deemed necessary by the Employer:

21.2.1 Training of technical staff will be presented at two venues in South Africa, as identified by the Engineer. All costs for these training sessions, i.e. Travelling, Accommodation and Meals etc. will be borne by the Bidder.

21.2.2 A course in the installation of the equipment, first line maintenance, faultfinding and operator's procedures, is required and this will be attended by a maximum of 25 people per venue.

22. TECHNICAL SCHEDULE:

Bidders are advised that it is in their own interest to provide accurate and detailed information in answer to all the questions asked in the Technical Schedules, which appear in Section 5 of this specification.

Failure to comply with this request will invalidate the bid offer.

23. GENERAL TECHNICAL AND OTHER REQUIREMENTS:

23.1. All submersible instrumentation shall function reliably in water with a high saline content as well as a high silt content, including various chemical pollutants (including sulphates and phosphates) originating from agricultural run-off and other human sources.

23.2. Only high quality equipment capable of offering extended service under arduous, hostile conditions in a long-term installation, on unmanned sites, shall be offered.

23.3. All instrumentation shall fully comply or exceed the specifications laid down in this Section. No deviation from the specified standards will be accepted.

23.4. Only microprocessor-controlled, frequency-synthesis instrumentation incorporating the latest in surface-mount technology shall be acceptable.

23.5. Bidders shall not offer instrumentation that has been superseded by later models or that will be discontinued in the near future. All instrumentation offered shall be of the most recent design. Should the Bidder be aware of any impending modifications or new equipment he / she shall state the expected implications of such in his / her offer.

23.6. All equipment offered shall have a high reliability and shall have a proven record (case history) of usage in the field of Hydrometry / hydrological measurement.

23.7. Except when otherwise specified, all equipment shall be suitably protected against lightning and surge damage, up to 2 kV; the relevant test certificates should preferably accompany the bid offer or shall be made available on request to the Engineer.

23.8. Labels:
The instrumentation shall have durable, clearly legible labels, indicating the make, model, serial number, ratings and other relevant information.

23.9. Mounting Brackets:
The mounting brackets for the instrumentation must be robust and not sensitive to impact and vibration. Where possible, it should be manufactured from corrosion-resistant material, preferably stainless steel, or the equivalent thereof.

23.10. Various makes, models, manufacturers' equipment will be used and therefore the Bidder will at all times make the offered equipment's protocol available to the Engineer for the compatibility to other equipment offered on this contract.

23.11. All data logger software updates will be supplied free of charge during the contract period. These upgrades will be delivered / sent / emailed by the Bidder to the relevant offices, which make use of the Bidder's equipment.

23.12. Should the Bidder or Manufacturing Company do any additional development during the contract period, on any item awarded to him / her, the Bidder will inform the Engineer in writing of such action. The Bidder will also outline what the effect it will have on the current contract and/or equipment.

23.13. Should a newly developed model of any of the offered equipment be introduced into the open market, the Bidder can supply such equipment on the following conditions:

23.13.1. The Engineer will be informed in writing and only after the equipment has been tested and satisfying results have been obtained, the Engineer can approve such action.

23.13.2. Back up, Maintenance and spares on the existing equipment will still be made available by the Bidder, at no additional cost.

23.13.3. The client will still have the option to purchase the older model.

23.13.4. The newly developed item will be offered at no additional cost.

GENERAL SPECIFICATION FOR THE DESIGN, DEVELOPMENT AND PRODUCTION OF ELECTRONIC CIRCUITS AND SYSTEMS

1. ELECTRICAL SUPPLY CIRCUITS:

1.1. The design shall incorporate methods to protect personnel from accidental contact with potentially dangerous currents and voltages.

2. GROUND POTENTIAL:

2.1 The design and construction of the equipment shall be such that all external parts, surfaces and shields shall be at ground potential at all times during normal operation.

3. GROUNDING AND ELECTROMAGNETIC RADIATION:

3.1. Equipment is often required to operate within their specified limits adjacent to radio transmitters. Electromagnetic compatibility design principals shall be incorporated to accommodate this application. To allow systems integration, the equipment capability to withstand RF field strengths shall be clearly stated.

3.2. The design shall also provide measures to eliminate electromagnetic radiation from the equipment and if applicable, the technical specification for this shall be provided.

3.3. All equipment to be used shall be suitably suppressed against radio frequency interference which may be introduced by operating radio transmitters in the equipment room. The Bidder is required to indicate the maximum RF field strength that the equipment can handle satisfactorily. If this information is not supplied, it will be assumed that the equipment offered is suitably suppressed for all operating conditions. All electromagnetic radiations shall comply with the requirements of the Radio Act, Act No 3 of 1952.

4. ELECTRICAL CONNECTORS:

4.1 Connectors shall be selected so that it will be impossible to insert the plug in a receptacle other than intended.

5 CURRENT OVERLOAD PROTECTION:

5.1 Protector devices such as fuses, circuit breakers, thermal cutouts, and solid state current interruption devices shall be used.

5.2 Fuses providing protection to the equipment shall be so located that they are readily accessible and in a convenient location. At least one extra fuse of each type and rating used shall be supplied and attached to the applicable units of equipment. Panel mounted fuse posts shall be such to permit renewal of fuses without the use of tools.

5.3 Restoring of switching devices in the case of circuit breakers, shall be readily accessible to the operator. The circuit breaker shall give a visual indication when the breaker is tripped.

6 GALVANIC CORROSION:

6.1 When dissimilar metals are used in intimate contact, suitable protection against galvanic corrosion shall be applied.

7 ACCESSIBILITY:

7.1 Each article of equipment on each major sub assembly shall provide for the necessary access to its interior parts, terminals, and wiring for adjustments, required circuit checking, removal and replacement of maintenance parts.

7.2 The unsoldering of wires, or wire harnesses, parts or assemblies for routine maintenance purposes in order to gain access to terminals are not acceptable.

8 THERMAL DESIGN:

8.1 Adequate steps shall be taken in the design of the equipment. In order to maintain equipment parts within their permissible operating temperature limits.

8.2 Where necessary, the design shall incorporate temperature sensing devices, to prevent thermal run-away. If it is not desirable to completely shut off the equipment, the performance of such equipment will be reduced to a lower level until the temperature has dropped to a safe level.

8.3 It is preferable to use cooling techniques based on conduction, radiation and free convection. External devices such as cooling fans shall be used when natural cooling can not accommodated.

9 ERGONOMICS:

9.1 Ergonomics design criteria and principals shall be applied in the design of the electronic equipment so as to achieve effective performance by the operator, maintenance and control personnel and to minimize the skill requirements.

10 IDENTIFICATION AND MARKING:

10.1 Every assembly unit shall be marked with its serial number and version number and if applicable its part number.

10.2 When applicable, all controls, test points, components, functional markings, fuse designation and ratings, power supply polarities etc. shall be marked adjacent to the item itself.

11 GENERAL CONSTRUCTION:

11.1 All control switches, handles etc. shall be so designed and positioned in relation to other fittings as to be easily accessible.

11.2 All instrument dials and indicating devices such as displays shall be fitted in such a manner as to be clearly visible from the operator's normal operating position.

11.3 Fuses and circuit breakers shall (where applicable) be mounted on the exterior of the equipment and be easy accessible.

11.4 Adequate test and measuring points shall be incorporated in the design to facilitate ease of testing.

12 PRINTED CIRCUIT BOARDS:

12.1 Maximum use shall be made of plug-in printed circuit boards using reliable, high quality components. The boards shall be designed to operate satisfactorily under worst- case conditions.

12.2 The printed circuit boards shall be of high grade glass epoxy copper clad laminate. Phenolic or bakelised paper board will not be accepted.

12.3 The boards shall be of a thickness which is compatible with the weight of the components mounted on it, but in any case, shall not be less than 1,0mm.

12.4 The boards shall be of an adequate copper laminate. It is expected that the copper would be 600gm/m² (2 ozs/ft/ft). The size employed is to be indicated in the contract.

12.5 In general, printed circuit boards shall conform to RS 4025 or equivalent. If multi layer printed circuit board is used, the connections through the boards shall be plated through holes in accordance with BS 4597.

12.6 Particular attention will be paid to the hole location and size tolerance, the conductor thickness and width, the conductor spacing, the diameter of the holes relative to the component legs and the size of the solder pads and holes.

12.7 The minimum distance between the conductive tracks on the edge of the printed circuit boards and any adjacent conductive surface, such as frames, shall be calculated as follows: 0,0305mm per volt + 0,35mm. Boards that slide into guide rails or supporting structures shall have a minimum conductor to guide distance of at least 2,5mm. (This requirement is not applicable to ground planes or heat sinks). Tin lead plating shall be used to plate printed circuit boards to facilitate soldering.

12.8 Printed circuit boards shall be treated with a polymer conformal coating, after the production process to prevent the ingress of moisture and growth of fungus. Parts such as connectors, switches and adjustable components where mechanical movement is required to align and tune the electronic circuit, shall be protected during the application of the conformal coating.

12.9 Multi pin high quality plugs and sockets are preferred rather than printed board edge connectors.

12.10 Each plug-in card shall be polarized by means of a mechanical key to prevent a card from being plugged into a socket for which it was not intended, and to prevent a card from being inserted upside down. The key must be demonstrated to be permanent and not capable of being removed by the action of withdrawing the plug-in card. If this is not possible with the equipment offered, then the terminals shall be so arranged that no damage shall result if a card is accidentally or intentionally inserted into the wrong slot.

12.11 All components and parts shall be mounted on one side of the printed board only. All components shall be so mounted as to not obscure access to any terminations or any other parts. No portion of any component attached to the printed circuit board will extend beyond the edge of the printed circuit board.

12.12 Components and parts designed to be mounted with mechanical fasteners will be so mounted as to withstand all vibrations and mechanical shock hazards encountered during normal road transport.

12.13 No lead bend radius shall be less that the lead diameter.

12.14 All components and parts shall be located and spaced so that any other part can be removed from the printed circuit board without having to remove the other part. Parts shall not be placed across or on top of each other.

12.15 The frames into which the cards are plugged shall provide rigid and positive support and location for the card over the whole length to prevent rocking of the card in the container.

12.16 Component identification is essential and for this purpose the use of silk screen printing on the printed circuit boards is recommended.

13 COMPONENTS:

13.1 Only components with at least one and preferably two sources of alternative supply are to be used. Components shall be of the JEDEC-coded type or better, where possible. If the components are labelled with type numbers other than registered JEDEC numbers, then a list giving alternative replacement numbers shall be provided.

13.2 Preference will be given to systems utilizing large scale integrated circuits that are generally obtainable from the major component manufacturers. Specially developed components shall be avoided as far as possible.

13.3 The equipment shall not contain thermionic devices. (this excludes the cathode ray tube required for the terminal equipment, where specified). All semi-conductor components used shall be of the silicon type unless otherwise approved.

13.4 The use of electrolytic capacitors shall be kept to a minimum. Where they can not be avoided they shall have a guaranteed life time in excess of 100 000 hours. The capacitor elements and internal connecting leads shall be aluminium and no aluminium to copper joints shall be allowed inside the capacitor. Capacitors are not preferred on circuits which are responsible for basic clock pulse generation.

13.5 Any relays used shall preferably be of the sealed contact type or mercury wetted reed relays and shall be equipped with resistor/diode transients. Diodes shall be of the fast recovery types with an inverse voltage rating of at least double that of the relay supply voltage. The resistance value shall not exceed that of the supply voltage. The resistance value shall not exceed that of the relay coil. Failure of a relay contact or associated components shall not cause an undesired command to be given from the device in the case of output circuits.

13.6 Indicating devices shall use lamps of a locally produced type and preferably only one type of lamp shall be used throughout the installation. Where feasible, high quality LED or LCD's should be used. All lamps shall be easily replaceable from the front of the equipment, and if a lamp extractor is needed, one unit minimum shall provided for each location.

13.7 Where lamps are transistor driven, a series resistor shall be incorporated in the circuit to protect the transistor against cold switch-on surges. Each resistor shall be mounted close to the transistor and shall be rated such that the surface temperature rise is no more than 10 degree C above ambient under worst case conditions.

13.8 Annunciators shall incorporate at least two lamps in parallel and lettering shall not be less that 2,5 mm in height. The enunciator windows shall be large enough to accommodate the English and Afrikaans inscriptions in one window unless otherwise specified. Each window shall be able to accommodate at least 16 characters without undue crowding.

14 CONNECTORS:

14.1 The practice of hard wiring wires directly onto the printed circuit board shall not be permitted. Connectors will be used as far as possible.

14.2 Preference will be given to connectors which will be fitted to cables which provide some form of grip to discourage the practice of pulling the cable to release the connector. Connectors shall be provided with some means of retention adequate to the conditions of use.

14.3 Where similar connectors are so placed that possible mis-mating could occur, the connectors shall be provided with alternative inserts, key way settings etc. in addition to the clear identification markings.

14.4 Only high quality connectors suitable for the application will be used.

15 HAND SOLDERING:

15.1 Hand solder practices shall be of the highest standard and the following shall be considered: The solder shall cover the conductor and a concave fillet shall be formed between the lower half of the conductor and the other end of the soldering connection.

15.2 The contour of conductor and the stand of stranded wire shall not be obscured by the solder. Care shall be taken to prevent relative movement in the solder joint during solidification. (Forced cooling of the solder prior to solidification is prohibited).

15.3 After the solder has completely solidified, all residual flux and solids shall be removed within one hour using solvents which will remove polar and non polar contaminants.

15.4 The workmanship shall be of a quality level adequate to ensure that the processed products shall meet the performance requirements.

15.5 The solder connections shall have a smooth, bright appearance with metallic lustre and shall not have a chalky, gritty or irregular surface. It shall not exhibit point, pits, scars, fractures, tramped flux or foreign materials. (The connection shall be completely covered by solder to the extent that no base metal is visible including the ends of cut wire or leads).

16 WIRING AND WIRING HARNESSES:

16.1 Wiring harnesses shall not restrict the easy replacement of parts or components which may require replacement or adjustment.

16.2 Wiring routes shall be planned to avoid hot spots and to preclude the possibility of the use of wires as hand holds.

16.3 Wires shall be routed to avoid the formation of current loops which will produce undesirable netting fields so that interference would be experienced with other circuits or devices.

16.4 Where a harness is terminated in a connector mating with a connector fixed to an assembly, flexibility of the harness shall (where applicable) be such to allow the insertion of a test adapter between the harness termination and the assembly.

16.5 Wires shall not be carried over or bent round any sharp corner or edge without suitable protection.

16.6 Sufficient slack shall be left at the ends of wiring runs, to allow for the displacement of components to which they are attached, for inspection and servicing. All wires in a wiring harness shall be clearly identified by means of colour coding or other suitable means. Clamps designed to support the wire harnesses shall be such that it will not affect the mechanical or electrical performance of the wires adversely.

17 LIGHTNING AND SURGE PROTECTION:

17.1 The supply and installation of lightning and surge protection equipment forms part of this contract except when otherwise specified.

17.2 The Contractor shall supply and install all the necessary lightning protectors, arrestors and other devices to provide protection for people and equipment on the premises.

GENERAL SPECIFICATION FOR SOFTWARE DOCUMENTATION

1. SCOPE:

1.1 This specification covers the design and documentation requirements for software supplied under this contract.

2. SYSTEM DESIGN:

2.1 The system shall make use of a well defined, standard, tested, debugged and field-proven operating system to control other programme modules which handle the user functional requirements. The operating system shall be capable of handling all input/output organization, scheduling, time-keeping, power failure procedures and to control communications with field hardware and operator devices, process system outputs and command requests.

2.2 The operating system shall initialize software upon restart conditions and allocate memory usage of application programmes. Furthermore, the operating system shall enable the system operator to create, store and run application and user programmes while operating system is busy controlling the real time application system. This user programme modifying facility should be menu driven under operating system control to enable operations to easily effect user system changes.

2.3 The operating system shall preferably reside in firmware and the software shall be task orientated, with linking and synchronisation possible between tasks. Tasks shall be allocated priorities and shall be able to control themselves relative to real-time so that the complete system is not "hung-up" by a faulty input device, such as chattering alarm relay.

3. DOCUMENTATION:

The successful Bidder shall supply full software documentation within two months after the delivery date of the equipment.
Four copies of each of the following shall be provided:

3.1 A system manual containing detailed description of the operating system and the drivers of each software module, task or sub-module used. This description shall clearly specify the functions and structure of each module and the interfaces and links between them. This manual shall also describe how new software modules can be added, running under the same operating system.

3.2 A manual containing a complete set of programme listings.

3.3 An operator’s manual, specifying all the system operating procedures in detail, for each system forming part of this contract.

3.4 A software user's manual (for each system) providing detailed information on how additions to the system can be generated, for instance the addition of an out-station, creation of a new access control category etc., or how system parameters can be changed or deleted. This manual should avoid the use of computer system jargon, shall include a definition of terms used and shall be written in such a way that operators without formal computer hardware or software training will be able to effect the changes as far as possible.

4. DATA BASE COMPILATION AND BUILDING:

4.1 The successful Bidder shall create, edit, debug and put into operation the initial data base required for each system to be supplied in terms of this document. The data base shall be compiled and built from the specified parameters and from information which will be supplied by the Employer where applicable.

4.2 Bidders are, therefore, required to allow for the compilation of the required data basis in their contracts.

DATA LOGGING EQUIPMENT - DETAIL SPECIFICATIONS

24. SCOPE:

24.1 This part of the specification covers the detail hardware and software requirements for the Data logger equipment.

24.2 The data loggers will be utilised at remote measuring stations to collect data. Operation will be in a totally unattended mode, with inspections by staff on a 30 to 60 day cycle.

24.3 The installed logger shall be designed and built for minimum maintenance and maximum life expectancy of 10 years or more - and shall be completely fit for the intended purpose. The product is intended to be permanently installed and will be designed for long term unattended operation and minimal maintenance. The long term reliability of the product whilst operating in harsh environments and the product battery life will be considered as very significant factors in the product selection.

24.4 The equipment will be mounted in recorder huts, either from mild steel, concrete or brick, with a minimum size of 800 x 800 x 1 800 mm high or mounted in pipes with diameters from 100 mm to 300 mm, and will be subjected to a harsh environment.

24.5 Enclosures, if available, should be offered for this equipment under “Accessories”. These enclosures can be offered in Fibreglass, Robust Plastic, Mild Steel, Stainless Steel, etc.

24.6 Preference shall be given to enclosures that include anti-vandalism systems.

24.7 Each bidder shall offer complete power supply system/s with the logger offered and should be listed under “Accessories” in the Price Schedule.

24.8 Each bidder shall offer a suitable USB converter to enable configuration of the equipment via Laptop. The item should be listed under “Accessories” in the Price Schedule.

24.9 The logger and the associated meter interfaces must be able to be installed in an underground chamber, which could be flooded from time to time.

25. SUBMERSIBLE MULTI CHANNEL DATA LOGGER WITH A MINIMUM OF TWO CHANNELS WITH GSM / GPRS / SATELLITE DATA TRANSMISSION CAPABILITIES INCLUDING DATA HOSTING;

25.1 Hardware Requirements:

25.1.1 Environmental Conditions:

The equipment shall be designed to function satisfactorily under the following conditions:

a. Temperature range:

Storage:	-50° C to +85° C	
Operating:	-40° C to +70° C	☐
Display (On)	-20° C to +70° C	
Modem	-30° C to +70° C	

b. Relative humidity: 5% to 95%, condensing ☐

c. Elevation: 0 - 3 500 m above sea level ☐

d. The equipment shall be designed to operate without degradation under dusty conditions experienced at exposed sites. ☐

e. The data logger shall meet the requirement of IP68. In particular it shall tolerate submersions to a depth of 1 meter for 12 hours. ☐

25.1.2 Data Processing:

a. Only intelligent data loggers, equipped with a microprocessor will be considered. ☐

b. The data logger shall be equipped with a CPU watchdog circuit that will automatically restart the system in case of a severe electrical or electromagnetic disturbance. ☐

c. No drives will be allowed, solid state memory only. ☐

25.1.3 Real time clock:

a. The data loggers shall be equipped with battery backed hardware real time clock system with a minimum of 5 years life expectancy. ☐

b. The real time clock system shall provide time (24 hour system) and date information and shall make provision for leap years. ☐

c. The accuracy and stability of the real time clock shall be better than ±8 seconds per month, operating under the environmental conditions listed above. ☐

25.1.4 Memory:

The data loggers shall be provided with three types of memory systems:

a. EEPROM for system programs and default parameters. ☐

b. Non-volatile memory for system and station parameters and user defined variables. ☐

c. Battery backed RAM for intermediate data storage and processing. (Minimum 4 MB for up to 500 000 readings) ☐

- The data logger shall preferably be provided with a ring memory (first in, first out); ☐
- Data must still be available after being read out. ☐
- Remote data to be stored on memory stick (via USB) or SD memory card. ☐

25.1.5 Operator interface:

The data logger shall be provided with the following minimum **built in** facilities, to be used by operating and maintenance staff:

a. A LCD unit (graphical dot matrix: 122 x 32 pixels), capable of displaying the full ASCII character set with LED backlight. ☐

b. Jog shuttle controlled, onboard rotating operation and command selection button enabling the user to access menu's and perform sensor calibration without interfacing aids like a laptop, PDA or tablet. ☐

c. In order to conserve power, the data logger shall control the power supply to each sensor. Sensors shall be switched on in sequence and readings taken under processor control. The logger must control sufficient warm-up and stabilisation time for sensors. ☐

d. During non-measurement periods power supply to the sensors and signal converter units shall be interrupted for all the analogue channels. ☐

25.1.6 Communication ports:

Each data logger shall preferably be equipped to allow bi-directional ☐

communication with outside equipment (laptop) via one of the following ports:

a. 9-pin RS 232; (Allow user selection of the Number of data bits, start and stop bits and parity bits in accordance with the laid down standard. Baud rates of 300, 600, 1200, 2400, 4800 and 9600 baud shall be available for selection.) ☐

b. USB serial port; ☐

c. Host USB interface; ☐

d. Device USB interface; ☐

e. Infrared interface; ☐

f. TCP/IP ☐

25.1.7 Communication protocols:

The data logger shall have the following protocols available on each of the above mentioned communication ports:

a. Modbus; ☐

b. SDI-12 (via RS485); ☐

c. CREX code (satellite communication); ☐

d. Terminal Mode; ☐

e. FTP; ☐

f. The logger shall have the facility to interface withtransmission equipment. ☐

25.1.8 Power supply:

a. The supply voltage should be typically +9 VDC to +28 VDC; typically 12VDC; ☐

b. Power consumption should be within 25mA to 400mA at 12VDC dependant on sensors and configuration used; ☐

c. The logger must have low power consumption on standby mode; ☐

d. Logger should have a input Voltage protection of 36 VDC; ☐

e. The data logger must be reverse polarity protected; ☐

f. Each data logger shall be provided with an internal source that would prevent equipment shutdown or loss of data when the main battery is either disconnected for a short period or exchanged. (±15 minutes); ☐

g. Power for all the sensors will be derived from the main battery via the data logger and will be user definable between 12 VDC or 24 VDC for all Channels. ☐

h. Different sets of Power Supply System/s should be offered with the Logger. (Powering different amount of Sensors) ☐

25.1.9 Surge Protection:

a. The Bidder shall make provision for and bid separately for surge protection equipment on all system input/output circuits and power supply input (dc, mains) circuits. ☐

b. The following equipment shall be included as an absolute minimum requirement:

☐

- On all analog / digital input and output circuits - DEHN BLITZDUCTORS TYPE LZ or equivalent with appropriate voltage ratings.

- On all mains power supply circuits - DEHN type VA-280 surge arrestors or equivalent. ☐

- The Employer may allow the use of alternative types of surge arrestors, provided that equivalent or superior protection levels will be achieved. SABS and/or CSIR test reports to substantiate claims shall be provided for the alternative offers. ☐

- It is not anticipated that the stated equipment will be used on its own, necessarily, provide the required level of protection and the Bidder shall implement additional measures deemed necessary to achieve the required protection level. ☐

25.1.10 Input functions and interfacing:

The logger should have as a standard configuration, minimum of two (2) physical input channels with the following sensor interface capabilities:

a. Input or Output Interface:
- Analog; to input either:
  - 0 - 20 mA,
  - 4 -20 mA,
  - 0 - 10 V,
  - 1 - 10 V,
  - -2 +2V, ☐
  - 0…..5V,
  - 15V
- Status; ☐
- Pulse; ☐
- Switch; ☐
- Serial RS-232; ☐
- RS-485; ☐
- SDI-12. ☐

b. The minimum of two (2) channels on the logger should be configurable for any of the following interface types as required by the user: ☐
- Analog;
- SDI-12; ☐
- RS-485. ☐

c. The following expansion interface card upgrades to the standard configuration must be available on request from the employer:
- Analog input; ☐
- Analog Insulated input; ☐
- Analog output; ☐
- Serial input;
- Barometric input. ☐

d. Analogue input signals shall be converted to digital signals using an A - D converter with not less than 12 bits.

e. Digital inputs shall be parallel, pulse or V24 signals. ☐

f. Dedicated modules or changes to the internal software must be available to accept all types of sensors directly. ☐

g. The analogue input signals shall be measured to an overall accuracy of better than 0.1%. The input circuits shall be so designed that no errors will be introduced by ground loops. ☐

h. The input channel to be allocated to a specific sensor shall be user selectable and user configurable to any of the above mentioned interface connection types. ☐

i. In order to conserve power, the data logger shall control the power supply to each sensor. Sensors shall be switched on in sequence and readings taken under processor control. Sufficient warm-up and stabilisation time for sensors must be controlled by the logger. ☐

j. During non-measurement periods power supply to the sensors and signal converter units shall be interrupted for all the analogue channels. ☐

k. Full calibration procedures shall be provided for each sensor / signal conditioning unit. ☐

l. Input connectors for sensors shall be clearly labelled, shall be polarised to prevent mismatching of connectors and shall be configured so that no damage can occur if a unit is accidentally or intentionally connected to the wrong input channel. Each connector shall make provision for all the necessary signal lines, earth, 0V and 12V (switched) supplied lines. ☐

25.1.11 Enclosure and Housing:

a. Only compact data loggers will be accepted, therefore all electronic components, wiring, etc., will be fixed / mounted inside the logger housing. ☐

b. The data logger shall be enclosed in wall mounted enclosures, for installation in a recorder hut. ☐

c. The logger housing shall be water and dust protected and shall comply with rating IP41. ☐

d. All connections to be made internally - no external connections. ☐

e. The housing shall be manufactured of corrosion resistant material. ☐

f. Provision must be made in the housing to enable data transmission via telephone line and cellular telephone link, through a plug connector. ☐

g. The data logger housing shall preferably not exceed the following dimensions: ☐

h. Height - 130mm; Width - 130mm; Depth - 70mm. ☐

25.1.12 Internal software requirements:

General:

a. All software packages shall be written and structured in a high level programming language. To conserve memory space and thus power required, the use of a compiled program is recommended. ☐

b. The data logger operating software shall be located in ROM (EPROM) and the Bidder shall be responsible for the provision of all the software required to make a complete, operational system. ☐

c. It shall not be possible for the operator of any data logger to accidentally or intentionally destroy the database or data recordings by ☐

entering faulty or erroneous instructions or messages.

d. The data logger SOFTWARE shall allow the equipment to operate in a completely unattended mode and all reasonable precautions shall be taken in the structuring of the error trapping routines to prevent system hang-up. ☐

e. The data logger shall have the option to protect unauthorized configuration or entry of operating parameters by means of password protection. ☐

f. The software shall have the capability to enable the user to print or view a sensor connection diagram of configured and connected sensors on the logger. ☐

g. The supplier shall provide a list of standard error codes for identification of possible faulty wiring, configurations and sensors. ☐

25.1.13 Data acquisition:

a. The data logger shall operate with two logging sequences:

- Fixed interval logging; ☐
- Variable interval logging ☐

b. Each data input channel shall be treated separately and shall have its own scanning interval parameters. At start-up the default parameter set shall be loaded for each channel and it shall be possible for the operator to modify the parameter set at any stage. ☐

c. For each input channel the data logger shall provide a scaling factor and offset so that the measured value can be adjusted to the actual reading. For the water level channels the scaling factor will be determined by the transducer selected. This will allow for the transducer being placed above or below the zero thresholds. ☐

d. The water level must be sampled at set intervals. The operators shall however be able to select a fixed interval for sample and storing of the data: ☐

e. Minimum sampling time of 60 seconds; and

f. Maximum sampling time of 24 hours. ☐

g. The data logger must provide the option of sampling but not storing if user determined variable changes have not been exceeded for any recorded data channel e.g. Compare measured value with previous stored value at set time intervals. If it exceeds the pre-set difference, it must store the value, in addition to the last value. If not, it must ignore the value. ☐

25.1.14 Data processing:

a. The data logger shall the following options available in the software configuration to process measured values:

- Mean calculation; ☐
- Totals information; ☐
- Delta Storage; ☐
- Definition of sensor delay time; ☐
- Extreme value collection and recording; ☐
- Filtering functions; ☐
- Linearization; ☐

- Arithmetic function;
- Tendency determination;
- Virtual sensor;
- Alarm or action management (threshold or gradient).

25.1.15 Data storage:

a. Data records shall contain the following information:

- Station number, Time/Date code and measured value.
- The measured value shall be given in engineering units.
- Channels shall be numbered numerically.
- Data storage shall be done on a circulating storage system, first in - first out.
- The data must be able to be read out as often as desired, without destroying it.
- The memory contents must be retained in the case of a power supply breakdown.
- Power supply or consumption monitoring and recording thereof are a requirement for battery management purposes as well as possible identification of early logger malfunctioning.

25.1.16 Data display:

a. All communication between the data logger and the operator shall be done via a data reader unit, PDA, laptop or tablet.

b. All conversation between the data logger and the operator shall be done via the data reader unit, PDA, laptop or tablet.

c. When connecting to the data logger, the following information should be displayed:

d. Measured values, Date, Time, Battery status and minimum and maximum values for the previous 12-minute period.

e. The operator shall have the option to password protect the abovementioned data display.

25.1.17 Operator's procedures:

Menu-driven procedures:

a. All operator activities shall be menu driven from the set-up software.

b. Station Settings:

- The operator shall have the option to password protect all of the station settings.
- Alphanumeric station ID, with at least 10 digits. e.g. 0000J1R001;
- Alphanumeric station name, with at least 40 characters e.g. Prins River at Tygerkloof;
- Date and time settings.
- Internal lithium cell voltage.

- Software version.
- RAM capacity.
- Amount of sensors. ☐
- Last data readout date. ☐
- Port settings.
- Language settings (if necessary). ☐

25.1.18 Sensor settings:

a. The operator shall have the option to password protect all of the sensor settings. ☐

b. Sensor number. ☐

c. Sensor description. ☐

d. Display units. ☐

e. Show minimum and maximum values for the last 24 hours. ☐

f. Sample intervals. ☐

g. Storage intervals. ☐

h. Delta values for event logging. ☐

i. Each sensor must have user adjustable display and recording units ☐

j. Each sensor must be separately configurable - logging and sampling intervals. ☐

25.1.19 Service settings:

a. The operator shall have the option to password protect all of the service settings. ☐

b. Install additional channels. ☐

c. Remove unused channels. ☐

d. Erase selective channel data.

e. System reset / start-up date. ☐

f. Restore Factory Settings ☐

25.1.20 General settings:

a. When scanning the current, active parameter list, the operator shall have access to read the parameters as listed in the abovementioned Station- and Sensor settings. ☐

b. With the seen input channel facility the operator shall be able to select any input channel and the data logger shall measure and display the current input value (or a "non-selected" message if the channel is not activated). ☐

c. Where single channel, non-expandable, dedicated units can be used, it must be supplied so. ☐

d. The operator shall have the option to set and adjust port settings as required; ☐

e. The operator shall have the ability to add or remove channels in the configuration as required; ☐

f. The operator shall have the option to do a system reset or restore factory settings if required; ☐

g. The operator shall have the option to upgrade firmware if required means of a laptop on site ☐

h. The operator shall have the option to change any of the above mentioned configuration settings on site by means of an external communication device or remotely by means of Satellite transmission. ☐

25.1.21 Data retrieval:

a. Data shall be retrieved by a data reader unit, PDA, laptop, tabletor USB data storage device via any of the following interface connections:
- RS-232 port; ☐
- USB port; ☐
- SD card; ☐
- TCP/IP ☐

b. The following procedures shall be available to the operator using a data reader unit, PDA, laptop, tablet:
- View and alter time and date information of period to be retrieved. ☐
- Option to select individual sensors for data retrieval. ☐
- Period of data retrieved to be displayed in a graphic and text format, with options to scroll through the data and zoom in and out in the graphic display. ☐

c. The storage of measured data records shall be done in such a way that the data retrieval process at the station can be done without operator intervention. This means that the messages and data recorded shall be coded in different groups. ☐

d. The operator shall have the option to password protect all of the abovementioned data retrieval procedures. ☐

25.1.22 Determination of sampling intervals:

a. Time RecordingProcedure:
- Sample at set intervals: ☐
  Record each sample or average set of samples and store at set intervals. Minimum of 5 seconds and a maximum of 24 hours, for setting of sample and store intervals.
- Delta recording for water levels: ☐
  Compare measured value with previous stored value at set time intervals. If it exceeds the pre-set difference, it must store the value, in addition to the last value. If not, it must ignore the value. Wait for next time interval.

25.1.23 Future Extension:

a. The Bidder shall make provision in the system to accommodate for future extensions and ensure all future developments to be compatible with the current product for the term of the contract. These developments include Operating Software, Firmware and Hardware extensions. ☐

25.1.24 GSM/GPRS Modem

a. Application:

- The data-transferring network shall provide the required services for 24 hours per day. The cellular telephone modems shall be GSM type based on a pan-European specification by ETSI. The offered modems must be approved by S.A.T.R.A. (South African Telecommunications Regulatory Authority) ☐

- The GSM Data Logger Telemetry System should provide the user with a simple method of transferring data recorded by field loggers back to a central computer for integration into the Departments software programmes. ☐

b. GSM/GPRS Logger Modem:

- The system should be designed around receiving data from the probe with a sample period of at least 12 minutes. ☐

- The data should be able to be downloaded at specific user defined time intervals and will be transferred to a control centre using a standard GSM 900/1800MHz modem, in an SMS format. ☐

- The system should be capable of transferring data at RSSI levels of -90dBm. ☐

- The following indications should be available on the front of the unit: ☐
  - Power;
  - Transmit (TX);
  - Receive (RX);
  - Link Fail.

- From the above information it should be possible to determine: ☐
  - Power Supply Available;
  - Unit Transmitting;
  - Unit Receiving;
  - Network connection error (e.g. no network, SIM card error)

- In standard operation the system should be placed in “sleep” mode until the predetermined time when it powers itself up, reads the data from the probe and transmits the data to the control centre. ☐

- The following protection should be built into the design of the electronic circuit board (PCB) ☐
  - Reverse Polarity Protection
  - Voltage Clamping
  - DC filtering

- The GSM Logger Unit should control the following aspects using the Short Message Service (SMS) function; ☐
  - Interface to Data Logger via RS 232 Interface;
  - Read Logged Data at predefined intervals;
  - Configuration changes from Control Centre;
  - Alarm data - battery low, battery critical;
  - RSSI (Radio Signal Strength Indication)

- The GSM Logger Modem should initiate the following alarms:

  - Power Supply Low Alarm - this alarm will be initiated approximately when the battery shall operate for one week before require charging; ☐

  - Power Supply Critical Alarm - this alarm will be initiated approximately 1 day prior to the battery requiring charging. ☐
  - ☐
  - The unit should also include 2 digital input points, which can be used for monitoring other systems in the vicinity of the unit. ☐

c. System Configuration:

- The operator should be able to configure various parameters of the system as listed below;
  - Updating of main Call Handling Centre number; ☐
  - Control enable/disable alarm conditions; ☐
  - Set status reporting period and time; ☐
  - Graphical representation of data ; ☐
  - Alarm if data not received within 36 hrs; ☐
  - Export Data in predefined formats; ☐
  - Monitor RSSI signal level; ☐
  - Request the retransmission of data from field units; ☐
- Reliability & Maintainability:
  - The field units should be designed to have a Mean Time between Failure (MTBF) of at least 15 000 hours under normal operating conditions. ☐
  - LED's should be used to indicate the operational status of the electronic module, thus aiding the maintenance technician in diagnosing fault conditions. TX, RX, Power ON and Link Fail functions are displayed on the electronic housing. ☐

d. Current Consumption:

- The design of the system is critical with regard to the current consumption. The system will operate on a 6VDC supply, which should typically be provided via a 6V, 12A/H Sealed Lead Acid Battery. ☐
- The Current Consumption should be as follows:
  - Standby Current: 1.00mA ☐
  - Transmitting Current: 200mA ☐
- With regard to the above information and assuming one transmission every 24 hours, a standard 6V, 12A/H battery should last 120 days. ☐
- Should the frequency of data transmission increase to every 4 hours the battery should last at least 80 days. ☐

e. Antenna Selection:

- Depending on the GSM Network signal strength at the site, several options should exist for obtaining the minimum RSSI value of -90dBm: ☐
- The unit should be offered standard with a 3dBi antenna connected to the unit; ☐
- A 6dBi (bee sting) dipole antenna with a 1m lead should also be offered which could be mounted within the field station to offer a higher sensitivity than the standard integrated antenna. ☐
- In very bad signal strength areas a 12dBi Yagi directional antenna should be offered. This antenna will preferably be mounted external to the station and will be directed to the closest GSM tower. ☐
- A 8dBi Patch antenna should also be offered optional. ☐

25.1.25 Satellite Transmitter:

a. Application:

The satellite transmitter system is required at remote stations (where no GSM signal is available) to transmit data to various Offices in the country. ☐

b. Design and technical details:

- The equipment shall be designed to operate without degradation under dusty conditions experienced at exposed sites. ☐
- The equipment shall function satisfactorily between -5°C to +50°C. ☐
- The equipment must be compact, robust and corrosion-resistant. ☐
- The system shall comprise of the following components: ☐
  - Satellite transmitter integrated inside a flat antenna.
  - Serial interface for data transmission and control.

The Bidder shall offer any or all other additional components necessary to produce a fully operational data collection and transmission system. ☐

c. The transmitter should have the following minimum features:

- Transmitting performance of maximum 10 Watt. ☐
- Power Consumption:
  - Stand-by: < 250 µA ☐
  - Active Mode: < 250 mA ☐
  - During Transmission: < 4 A ☐

d. The flat antenna should preferably not exceed the following dimensions and weight:

- Dimensions: 600 mm x 600 mm x 150 mm thick; ☐
- Weight: 7,5 kg. ☐

e. A commercially available “Yagi” antenna should be offered as an optional extra. ☐

f. The input voltage to the system shall preferably be +12 volt DC. ☐

g. Communication between the data logger and the modem must be via a RS 232 port. ☐

h. The power supply as specified shall be utilised for the system. ☐

25.1.26 Satellite Operator’s Authority:

The Bidder must submit proof from the Satellite Operator of accreditation and authorization to use said satellite system. Proof of satellite and system back-up should also be provided. Failure to submit this certificate will invalidate the Bid. ☐

25.1.27 Data hosting

a. Control Centre:

- The control centre should be based on a standard Intel computer with a GSM modem connected to it; ☐
- One computer/control centre should be capable of recording data ☐

☐

from up to 500 field units, depending on the GSM Network Service;

- Providers ability to handle the influx of SMS messages each day. ☐

- The software will be used to receive the SMS data messages from the field and reconstruct the information for display on the computer and export to other software. ☐

- The tower will be connected to the LAN via an internal network card to provide access to the data received by authorised users. ☐

b. Control Centre Specifications:

- The Control Centre PC tower will be Windows based with the following minimum specifications:

  - Pentium P4
  - 512 Mb RAM
  - 3.0 GHz Processor ☐
  - 2 x 80 GB SATA Hard Drive
  - CD ROM
  - Onboard Video
  - Integral LAN Card (EEPRO or Real tec Chipset)
  - 9-Pin Serial Port for Use with External GSM Modem

SENSORS - DETAIL SPECIFICATIONS:

26. SCOPE

26.1 This part of the specification covers the detail requirements for all the different types of **SENSORS**. These sensors will be connected to the various data loggers as set out in **DATA LOGGERS** and should have an adequate output signal and interfacing. Sensors with separate data loggers could be considered.

26.2 The equipment will also be utilised at remote measuring stations to collect data, mainly hydrological and meteorological data. Operation will be in a totally unattended mode, with inspections by staff on a 7 to 60 day cycle.

26.3 The equipment will be mounted in their respective positions for best results, i.e. On masts, on recorder huts, in streams, etc., and will be subjected to a harsh environment.

26.4 Only high quality equipment capable of offering extended service under arduous conditionson unmanned sites shall be offered.

27. PRESSURE TRANSDUCER FOR WATER LEVEL MEASUREMENT USING THE "CAPACITIVE CERAMIC" METHOD WITH 1 – 5 V OR 4 – 20 MA OUTPUT SIGNAL;

27.1 APPLICATION:

27.1.1 Pressure transducers must be capable of measuring water levels from 0 - 100 m, the range of each transducer being determined by the Employer and pre-set in the factory. Typical ranges could be: 0 - 5 m; 0 - 10,00 m; 0 - 20,00 m, 0 - 40,00 m and >40 m on request. ☐

27.1.2 The pressure transducers must have a high reliability and ensure a large range of application for pressure measurement in all fields of water level measurement. ☐

27.1.3 Transducers must be suitably protected against lightning, and the necessary test results must be available on request of the Engineer. ☐

27.2 DESIGN AND TECHNICAL DETAILS:

27.2.1 Transducer housing:

a. The transducer housing must be robust, corrosion-resistant, insensitive to impact and vibration and watertight up to at least 40 m of water column. (>40 m on request). ☐

b. The transducer housing shall preferably not exceed the following dimensions and weight:

- Length: 150 mm; ☐
- Diameter: 40 mm; ☐
- Weight: 500g. ☐

c. The transducer housing can be fitted with a watertight plug for connection to the transducer cable. ☐

27.2.2 Pressure sensor:

a. The measuring cell must be chemically and thermically resistant. ☐

b. The pressure measuring cell must operate, using the capacitive ceramic method. ☐

c. The pressure sensor shall be designed and calibrated to function satisfactorily under the following:

d. Temperature range: -10°C to +50°C ☐

e. The pressure sensor shall have a built-in temperature compensator. ☐

27.2.3 Transducer cable:

The transducer cable must have the following characteristics:

a. Flexible and have at least a double sheathing with interposed tinned copper- braiding, or better, with an outer diameter of not more than 10 mm; ☐

b.

c. As the transducer cable shall be used as the carrying rope, it shall preferably feature, for longitudinal stability, an internal kevlar core assembly, or equivalent. ☐

d.

e. A polyamide pressure-compensation capillary tube for measuring the reference pressure, with an inside diameter of preferably 3 mm, but not ☐

less than 1,0 mm.

f.

g. End of cable connected by terminal box with additional Teflon coated filters and exchangeable humidity absorber. ☐

h.

i. A fixing clamp for exact positioning of the pressure probe in a stilling well or tube must be available, manufactured of non-corrosive material. ☐

j.

k. The pressure transducer and transducer cable shall be designed to function satisfactorily with a cable length of 250 m. ☐

l.

m. The transducer cable must be provided with a watertight plug for connection to the transducer housing. ☐

27.2.4 Temperature sensor:

a. The pressure transducer should preferably have an integrated temperature sensor, preferably of the platinum resistor type. The sensitivity of the measuring element shall be approximately 0,1 °C between a temperature range of at least -5°C to +40°C. ☐

27.2.5 Output signal:

a. The voltage output signal for each measuring range should be: 4-20mA. ☐

27.2.6 Measuring accuracy:

a. The overall measuring accuracy of the pressure transducer must be better than, or equal to 0,1 % of the full scale. ☐

27.3 HUMIDITY ABSORBER AND PRESSURE COMPENSATION:

27.3.1 The capillary tube in the probe cable is intended to vent the measuring cell to atmospheric pressure. In order to avoid humid air passing along this capillary tube, it is necessary to remove moisture at the vented side. This should preferably be done in a humidity absorber housing using silica gel crystals. The humidity absorber housing should preferably also house the connecting block for the power and signal cables between the data logger and pressure sensor. ☐

27.3.2 The pressure compensation box should be compact, wall mountable, provide easy access for the changing of the desiccant silica gel cartridge. ☐

27.3.3 The pressure compensation box must preferably also consist of the following:

27.3.4 Two screw and clamping connections with core-end sleeves for:

a. Pressure probe cable, and ☐

b. Data line for the transfer of measured values to the data logger. ☐

28. PRESSURE TRANSDUCER FOR WATER LEVEL MEASUREMENT USING THE "CAPACITIVE CERAMIC" METHOD WITH SDI12 INTERFACE OR 4 – 20 MA OR RS485 OUTPUT SIGNAL;

28.1 APPLICATION:

28.1.1 Pressure transducers must be capable of measuring water levels from 0 - 100 m, the range of each transducer being determined by the Employer and pre-set in the factory. Typical ranges could be: 0 - 5 m; 0 - 10,00 m; 0 - 20,00 m, 0 - 40,00 m and >40 m on request. ☐

28.1.2 The pressure transducers must have a high reliability and ensure a large range of application for pressure measurement in all fields of water level measurement. ☐

28.1.3 Transducers must be suitably protected against lightning, and the necessary test results must be available on request of the Engineer. ☐

28.2 DESIGN AND TECHNICAL DETAILS:

28.2.1 Transducer housing:

a. The transducer housing must be robust, corrosion-resistant, insensitive to impact and vibration and watertight up to at least 100 m of water column. ☐

b. The transducer housing shall preferably not exceed the following dimensions and weight:

- Length: 200 mm; ☐
- Diameter: 25 mm; ☐
- Weight: 300g. ☐

c. The transducer housing can be fitted with a watertight plug for connection to the transducer cable. ☐

28.2.2 Pressure sensor:

a. The measuring cell must be chemically and thermically resistant. ☐

b. The pressure measuring cell must operate, using the capacitive ceramic method. ☐

c. The pressure sensor shall be designed and calibrated to function satisfactorily under the following: ☐

- Temperature range: -10°C to +50°C ☐

d. The pressure sensor shall have a built-in temperature compensator. ☐

28.2.3 Transducer cable:

a. The transducer cable must have the following characteristics:

- Flexible and have at least a double sheathing around 6 conductors with interposed tinned copper- braiding, or better, with an outer diameter of not more than 10 mm; ☐
- As the transducer cable shall be used as the carrying rope, it shall preferably feature, for longitudinal stability, an internal Kevlar core assembly, or equivalent. ☐

- Nylon, Etfe extrusion tube, or better should be offered for measuring the reference pressure. The vent tube should preferably have a minimum inner diameter of 1,0 mm and an outer diameter of not more than 2,5 mm. ☐

- End of cable connected by terminal box with additional Teflon coated filters and exchangeable humidity absorber. ☐

- A fixing clamp for exact positioning of the pressure probe in a stilling well or tube must be available, manufactured of non-corrosive material. ☐

- The pressure transducer and transducer cable shall be designed to function satisfactorily with a cable length of 200 m in fresh water with dissolved mineral content or salt water with contaminants. The cable and the connector/s will be 100 % watertight in a water column of 200 m. ☐

28.2.4 Temperature sensor:

a. The pressure transducer should preferably have an integrated temperature sensor, preferably of the platinum resistor type. The sensitivity of the measuring element shall be approximately 0,15 °C between a temperature range of at least -15°C to +60°C. ☐

28.2.5 Output signal:

a. The voltage output signal for each measuring range should be: 4 - 20 mA or SDI 12 Interface. ☐

b. When using the SDI 12 interface, the water temperature should also be able to be recorded. ☐

28.2.6 Measuring accuracy:

a. The overall measuring accuracy of the pressure transducer must be better than, or equal to 0,05 % of the full scale. ☐

28.3 HUMIDITY ABSORBER AND PRESSURE COMPENSATION:

28.3.1 The capillary tube in the probe cable is intended to vent the measuring cell to atmospheric pressure. In order to avoid humid air passing along this capillary tube, it is necessary to remove moisture at the vented side. This should preferably be done in a humidity absorber housing using silica gel crystals. The humidity absorber housing should preferably also house the connecting block for the power and signal cables between the data logger and pressure sensor. ☐

28.3.2 The pressure compensation box should be compact, wall mountable, provide easy access for the changing of the desiccant silica gel cartridge. ☐

28.3.3 The pressure compensation box must preferably also consist of the following:

a. Two screw and clamping connections with core-end sleeves for:

- Pressure probe cable, and ☐

- Data line for the transfer of measured values to the data logger. ☐

b. A transparent sealing cover, to inspect/change the cartridge. ☐

28.3.4 The silica gel must preferably be treated with a colour indicator, which changes when saturation occurs. ☐

28.3.5 The saturated silica gel should preferably be housed such that it can be dried by baking and be re-usable. ☐

28.3.6 The operational system shall be designed to function satisfactorily with a data cable length of 500 m (4 – 20 mA) and 100 m (SDI 12). ☐

29. PRESSURE TRANSDUCER FOR WATER LEVEL MEASUREMENT USING THE "PIEZO-RESISTIVE" METHOD (STAINLESS STEEL SENSOR) WITH 1 – 5 V OR 4 – 20 MA OUTPUT SIGNAL;

29.1 APPLICATION:

29.1.1 Pressure transducers must be capable of measuring water levels from 0 -100 m, the range of each transducer being determined by the Employer and pre-set in the factory. Typical ranges could be: 0 - 5 m; 0 - 10,00 m; 0 - 20,00 m, 0 - 40,00 m and >40 m on request. ☐

29.1.2 The pressure transducers must have a high reliability and ensure a large range of application for pressure measurement in all fields of water level measurement. ☐

29.1.3 Transducers must be suitably protected against lightning, and the necessary test results must be available on request of the Engineer. ☐

29.2 DESIGN AND TECHNICAL DETAILS:

29.2.1 Transducer housing:

a. The transducer housing must be robust, corrosion-resistant, insensitive to impact and vibration and watertight up to at least 40 m of water column. (>40 m on request) ☐

b. The transducer housing shall preferably not exceed the following dimensions and weight:

- Length - 300 mm
- Diameter - 50 mm
- Weight - 1 kg ☐

c. The transducer housing can be fitted with a watertight plug for connection to the transducer cable. ☐

29.2.2 Pressure sensor:

a. The measuring cell must be chemically and thermically resistant. ☐

b. The pressure measuring cell must operate, using the piezo-resistive method. ☐

c. The pressure sensor shall be designed and calibrated to function satisfactorily under the following:

- Temperature range: -5°C to +45°C ☐

d. The pressure sensor shall have a built-in temperature compensator. ☐

29.2.3 Transducer cable:

The transducer cable must have the following characteristics:

a. Flexible and have at least a double sheathing with interposed tinned copper- braiding, or better, with an outer diameter of not more than 12 mm; ☐

b. As the transducer cable shall be used as the carrying rope, it shall preferably feature, for longitudinal stability, an internal kevlar core assembly, or equivalent. ☐

c. A polyamide pressure-compensation capillary tube for measuring the reference pressure, with an inside diameter of preferably 3 ☐

mm, but not less than 1,0 mm.

d. End of cable connected by terminal box with additional Teflon coated filters and exchangeable humidity absorber. ☐

e. A fixing clamp for exact positioning of the pressure probe in a stilling well or tube must be available, manufactured of noncorrosive material. ☐

f. The pressure transducer and transducer cable shall be designed to function satisfactorily with a cable length of 250 m. ☐

g. The transducer cable must be provided with a watertight plug for connection to the transducer housing. ☐

29.2.4 Temperature sensor:

a. The pressure transducer should preferably have an integrated temperature sensor, preferably of the platinum resistor type. The sensitivity of the measuring element shall be approximately 0,1 °C between a temperature range of at least -5°C to +40°C. ☐

29.2.5 Output signal:

a. The voltage output signal for each measuring range should be: 4 - 20 mA. ☐

29.2.6 Measuring accuracy:

a. The overall measuring accuracy of the pressure transducer must be better than, or equal to 0,1 % of the full scale. ☐

29.3 HUMIDITY ABSORBER AND PRESSURE COMPENSATION:

29.3.1 The capillary tube in the probe cable is intended to vent the measuring cell to atmospheric pressure. In order to avoid humid air passing along this capillary tube, it is necessary to remove moisture at the vented side. This should preferably be done in a humidity absorber housing using silica gel crystals. The humidity absorber housing should preferably also house the connecting block for the power and signal cables between the data logger and pressure sensor. ☐

29.3.2 The pressure compensation box should be compact, wall mountable, provide easy access for the changing of the desiccant silica gel cartridge. ☐

29.3.3 The pressure compensation box must preferably also consist of the following:

a. Two screw and clamping connections with core-end sleeves for:

- Pressure probe cable, and ☐
- Data line for the transfer of measured values to the data logger. ☐

b. A transparent sealing cover, to inspect/change the cartridge. ☐

29.3.4 The silica gel must preferably be treated with a colour indicator, which changes when saturation occurs. ☐

29.3.5 The saturated silica gel should preferably be housed such that it can be dried by baking and be re-usable. ☐

29.3.6 The operational system shall be designed to function satisfactorily with a data cable length of 250 m. ☐

30. PRESSURE TRANSDUCER FOR WATER LEVEL MEASUREMENT USING THE "PIEZO-RESISTIVE" METHOD WITH 4 - 20 MA OUTPUT SIGNAL OR SDI 12 INTERFACE;

30.1 APPLICATION:

30.1.1 Pressure transducers must be capable of measuring water levels from 0 - 100 m, the range of each transducer being determined by the Employer and pre-set in the factory. Typical ranges could be: 0 - 5 m; 0 - 10,00 m; 0 - 20,00 m, 0 - 40,00 m and >40 m on request. ☐

30.1.2 The pressure transducers must have a high reliability and ensure a large range of application for pressure measurement in all fields of water level measurement. ☐

30.1.3 Transducers must be suitably protected against lightning, and the necessary test results must be available on request of the Engineer. ☐

30.2 DESIGN AND TECHNICAL DETAILS:

30.2.1 Transducer housing:

a. The transducer housing must be robust, corrosion-resistant, insensitive to impact and vibration and watertight up to at least 100 m of water column. ☐

b. The transducer housing shall preferably not exceed the following dimensions and weight:

- Length: 200 mm; ☐
- Diameter: 25 mm; ☐
- Weight: 300g. ☐

c. The transducer housing can be fitted with a watertight plug for connection to the transducer cable. ☐

30.2.2 Pressure sensor:

a. The measuring cell must be chemically and thermically resistant. ☐

b. The pressure measuring cell must operate, using the piezo-resistive method. ☐

c. The pressure sensor shall be designed and calibrated to function satisfactorily under the following:

- Temperature range: -10°C to +50°C ☐

d. The pressure sensor shall have a built-in temperature compensator. ☐

30.2.3 Transducer cable:

a. The transducer cable must have the following characteristics:

- lexible and have at least a double sheathing around 6 conductors with interposed tinned copper- braiding, or better, with an outer diameter of not more than 10 mm; ☐
- As the transducer cable shall be used as the carrying rope, it shall preferably feature, for longitudinal stability, an internal kevlar core assembly, or equivalent. ☐
- Nylon, Etfe extrusion tube, or better should be offered for measuring the reference pressure. The vent tube should preferably have a minimum inner diameter of 1,0 mm and ☐

an outer diameter of not more than 2,5 mm.

- End of cable connected by terminal box with additional Teflon coated filters and exchangeable humidity absorber. ☐
- A fixing clamp for exact positioning of the pressure probe in a stilling well or tube must be available, manufactured of non-corrosive material. ☐
- The pressure transducer and transducer cable shall be designed to function satisfactorily with a cable length of 200 m in fresh water with dissolved mineral content or salt water with contaminants. The cable and the connector/s will be 100 % watertight in a water column of 200 m. ☐

30.2.4 Temperature sensor:

a. The pressure transducer should preferably have an integrated temperature sensor, preferably of the platinum resistor type. The sensitivity of the measuring element shall be approximately 0,15 °C between a temperature range of at least -15°C to +60°C. ☐

30.2.5 Output signal:

a. The voltage output signal for each measuring range should be: 4 - 20 mA or SDI 12 Interface. ☐

b. When using the SDI 12 interface, the water temperature should also be able to be recorded. ☐

30.2.6 Measuring accuracy:

a. The overall measuring accuracy of the pressure transducer must be better than, or equal to 0,05 % of the full scale. ☐

30.3 HUMIDITY ABSORBER AND PRESSURE COMPENSATION:

30.3.1 The capillary tube in the probe cable is intended to vent the measuring cell to atmospheric pressure. In order to avoid humid air passing along this capillary tube, it is necessary to remove moisture at the vented side. This should preferably be done in a humidity absorber housing using silica gel crystals. The humidity absorber housing should preferably also house the connecting block for the power and signal cables between the data logger and pressure sensor. ☐

30.3.2 The pressure compensation box should be compact, wall mountable, provide easy access for the changing of the desiccant silica gel cartridge. ☐

30.3.3 The pressure compensation box must preferably also consist of the following:

a. Two screw and clamping connections with core-end sleeves for:

- Pressure probe cable, and ☐
- Data line for the transfer of measured values to the data logger. ☐

b. A transparent sealing cover, to inspect/change the cartridge. ☐

30.3.4 The silica gel must preferably be treated with a colour indicator, which changes when saturation occurs. ☐

30.3.5 The saturated silica gel should preferably be housed such that it can be dried by baking and be re-usable. ☐

30.3.6 The operational system shall be designed to function satisfactorily with a data cable length of 500 m (4 – 20 mA) and 100 m (SDI 12). ☐

POWER SUPPLY EQUIPMENT:

31. SCOPE;

31.1 This part of the specifications needs to be completed by all bidders that offer power supply systems together with their equipment. The power supply systems will not be awarded to a single bidder and should the bidder offer a logger and not offer power supply system/s, his/her complete offer could be invalidated.

31.2 All power supply systems offered will comply with the detail specifications in this Section.

31.3 In most cases, no mains power supplies will be available to power the data loggers. Provision shall be made to power the equipment from external rechargeable batteries, equipped with solar panels and regulators. In the case of mains power supplies, a power control unit or mains transformer will be used

31.4 The equipment will also be utilised at remote measuring stations and operation will be in a totally unattended mode, with inspections by staff on a 7 to 60 day cycle.

31.5 Only high quality equipment capable of offering extended service under arduous conditions on unmanned sites shall be offered.

31.6 The offered equipment shall be designed to function satisfactorily under the following conditions:

31.7 Temperature Range: -5º C to +60º C

32. SOLAR PANELS;

32.1 NORMAL/RIGID PANELS:

32.1.1 The solar panel shall preferably meet the following specifications:

a. The solar panel must preferably be of the “crystalline” Photovoltaic Module type or better. ☐

b. The “crystalline” cells must be encapsulated between a tempered glass cover. ☐

c. Adjustable (between 0 and 45 degrees) horizontal mounting brackets for all offered solar panels should be offered as an accessory. ☐

32.1.2 The following solar panels shall be offered:

ELECTRICAL & PHYSICAL CHARACTERISTICS	SOLAR PANEL 1	SOLAR PANEL 2	SOLAR PANEL 3	SOLAR PANEL 4	SOLAR PANEL 5	
Maximum Power (Watts)	20	40	50	60	80	
Maximum Length (mm)	600	600	650	800	1 000	
Maximum Width (mm)	600	700	700	700	700	
Maximum Depth (mm)	50	50	50	50	50	
Maximum Weight (kg)	4	6	7	8	10	
Electrical wire colour code	Positive (+) Red / Negative (-) Black					

32.2 FLEXIBLE PANELS:

32.2.1 The solar panel shall preferably meet the following specifications:

a. The solar cells should be deposited with multi layers of silicon alloy materials onto a thin stainless steel substrate in a roll-to-roll process. ☐

b. The cell assembly need to be laminated in flexible and durable weather resistant polymers that provide long life and high reliability. ☐

32.2.2 A Flexible solar panel must be offered and should not exceed the following power, dimensions and weight:

a.	Maximum Power (Watts)	32 Watts
b.	Maximum Length (mm)	1 500
c.	Maximum Width (mm)	500
d.	Maximum Depth (mm)	50
e.	Maximum Weight (kg)	4

☐

32.3 SOLAR CHARGE CONTROLLER:

32.3.1 The solar charge controller shall meet the following specifications:

a. The controller shall be capable of maintaining the output voltage to the battery within the required limits with a ± 25% fluctuation of the input voltage. This shall apply to the total temperature range specified for the instrument. ☐

b. The controller shall contain suitable circuitry to protect itself, to limit the current supplied to the battery, for in the event of malfunctioning of any of the major modules supplied from the regulator or in the event of what is commonly known as "thermal runaway". ☐

c. No damage shall be caused to either the instrument or the controller if the input voltage polarity to the controller is accidentally or intentionally reversed. ☐

d. The polarity of the supply voltage to the controller shall be clearly marked either on the associated connector or next to it on the instrument's cabinet. ☐

e. To protect the batteries from irreversible damage, a load shedding facility should be incorporated, in case of power supply failure. ☐

f. The controller should preferably display two LED's; one to indicate that the regulator is charging the back-up battery, the other to indicate whether or not the load-shed facility is in operation. ☐

32.3.2 The following two controllers shall be offered:

TECHNICAL CHARACTERISTICS		CONTROLLER 1	CONTROLLER 2	
Nominal Voltage 12 Volt	Maximum Module Current (Amp)	4	8	
	Maximum Load Current (Amp)	4	8	
	Maximum Own Consumption (mAmp)	6	6	
Maximum Dimensions		100 x 150 x 50 mm		
Connection Terminal (Maximum size)		2,5 mm²		

33. BATTERIES;

33.1 LITHIUM BATTERY:

33.1.1 The battery shall preferably meet the following specifications:

a. The battery shall be a corrosion-free sealed lithium-thionyl chloride (Li-SOCI2) type Lithium battery. ☐

b. Maintenance free with a low self-discharge rate, and ability to operate under extreme conditions. ☐

c. Operating temperature range: –60°C to +85°C ☐

d. The bidder will offer batteries and battery packs with correct terminal connections for each instrument as specified by manufacture. ☐

e. Batteries and battery packs needs to carry the approval of the manufacture of the instruments and should not invalidate the guarantee on the instrument. ☐

f. The following batteries must be offered:

- 1.5V LR6/FR6, AA size cells. ☐
- 3.6V LR6/FR6, AA size cell; ☐
- 3.6V LS, D size 26Ah standard 2 cell stick battery pack with connector plug. ☐
- 3.6V LSH, D size cell with connector plug. ☐

33.2 ALKALINE BATTERY:

33.2.1 The battery shall preferably meet the following specifications:

a. The battery shall be an Alkaline Manganese Dioxide Battery. ☐

b. Maintenance free with a low self-discharge rate, and ability to operate under extreme conditions. ☐

c. Temperature range:

- Operating: –20°C up to +50°C;
- Storage: 5°C up to +30°C. ☐

d. The following sizes of Nominal Voltage 1.5V must be offered separately:

- Size AA (LR6); ☐
- Size AAA (LR03); ☐
- Size C (LR 14); ☐
- Size D (LR 20). ☐

e. The following sizes of Nominal Voltage 9.0V must be offered separately:

- Size MN1604 (6LR61). ☐

34. POWER CONTROL UNIT OR MAINS TRANSFORMER;

34.1 The power control unit and/or mains transformer shall meet the following specifications:

34.1.1 The power control unit shall be a combination between a solar charge controller and a mains transformer. ☐

34.1.2 The power control unit shall be able to handle an input range of a maximum of 250 volt, with an output of at least 12 volt. ☐

34.1.3 The power control unit shall have a fuse as well as a LED indicator. ☐

34.1.4 The mains transformer shall be able to handle an input range of a maximum of 250 volt, with an output of at least 12 volt. ☐

34.2 Lightning and surge protection

34.2.1 The mains supply shall be equipped with adequate surge protection to prevent the equipment from damage caused by switching transients and static discharges. The following shall be a minimum requirement: ☐

a. Fine protection:
type VM 280 Dehnblitsductor or similar ☐

NOTE: Course protection should already be provided by the Isolation Transformer ☐

35. PORTABLE POWER BACK-UP;

35.1 APPLICATION:

35.1.1 the portable power back-up shall be a unique portable power back-up system that is designed for any situation when power fails or when power is needed in field work. ☐

35.1.2 This system must supply emergency power in the office as well as in the field where Laptops must be utilized for a whole working day as well as charging of batteries of equipment utilized during field work. This system must have no noise or consume any type of fuel. ☐

35.1.3 This system can be utilized to supply power to the following:

a. Laptop computers; ☐

b. Desktop computers; ☐

c. Printers; ☐

d. Radios; ☐

e. Modems; ☐

f. Routers; ☐

g. Hubs; ☐

h. Lights. ☐

35.2 DESIGN AND TECHNICAL DETAILS:

35.2.1 Design:

a. Fully portable trolley design; ☐

b. Maintenance Free; ☐

c. Silent operation; ☐

d. Microprocessor based design; ☐

e. No Fuel required (Petrol, Diesel, etc.) ☐

f. Excellent protection features ☐

g. Audible alarms / DB9 RS232 and USB output ☐

h. Comprehensive LED status indicators ☐

i. Powerful fully automatic battery charger ☐

j. Up to 10Hr Back-up (With internal batteries) ☐

k. Up to 24Hr Back-up (With additional battery connected) ☐

l. Fully sealed internal batteries. ☐

35.2.2 Output:

a.	Pure Sine wave;	☐
b.	Very fast smooth automatic change over in <5mSec;	☐
c.	Inverter can start without power available;	☐
d.	Powerful Output 1500VA / 1000W continuous;	☐
e.	Fully sealed lead Acid long life battery;	☐
f.	Dual AC output circuit breaker;	☐
g.	Resettable output circuit breaker;	☐
h.	Excellent output regulation;	☐
i.	External fused 2nd battery connector;	☐
j.	Suitable for solar application with external regulator.	☐

36. BATTERY CHARGERS;

36.1 INTELLIGENT AUTOMATIC 8 STAGE 12V BATTERY CHARGER:

36.1.1 Application

a. The charger will be a fully automatic 8 step smart charger and battery support unit, it will be easily portable. The charger should be suitable for all types of lead-acid batteries, and should be able to test whether a battery is able to take and hold a charge. ☐

36.1.2 Design and technical details

a. The charger shall be portable and supplied with not less than 4 meter extended charge cable and a protective rubber bumper for maximum convenience and versatility. ☐

b. The charger shall be portable and supplied with not less than 4 meter extended charge cable and a protective rubber bumper for maximum convenience and versatility. ☐

c. The charger cable will be designed so that additional connector cables may be connected for different applications. ☐

d. The charger should have an automatic diagnostic function that test whether the battery is able to take and hold a charge. ☐

e. The charger should have a supply function that allows it to be used as a power supply to support vehicle electronic during sensitive battery changeovers. ☐

f. The mass of the unit should not exceed 900g ☐

g. The dimensions of the unit should preferably not exceed: 200 mm long x 100 mm wide x 50 mm High ☐

h. The following minimum specifications will apply:

-	Volt:	12V;	☐
-	Rated Voltage AC: 50-60HZ;	220-240VAC,	☐
-	Min battery voltage:	2.0V;	☐
-	Charging current:	10A max;	☐
-	Current, mains: full charging current);	1.0A rms (at	☐
-	Black current drain:	<1Ah/month;	☐
-	Ripple:	<4%;	☐
-	Ambient temperature: +50°C, with automatic reduction in output power at high temperature;	-20°C to	☐
-	Charger type: automatic charging cycle;	8 step, fully	☐
-	Battery types: 12V lead-acid batteries (WET, MF, Ca/Ca, AGM and Gel);	All types of	☐
-	Battery capacity: to 300Ah for	20-200Ah, up maintenance;	☐
-	Insulation class:	IP65	☐

37. BATTERY CHARGERS;

37.1 12 VOLT CHARGER

37.1.1 TECHNOLOGY:

37.1.2 Functions must include the following:

a.	Fully automatic charging cycle;	☐
b.	Power ON indicator;	☐
c.	Error Indicator: Correctly connected;	☐
d.	Temperature sensor and indicator: The sensor will adjust the voltage to ambient temperature;	☐
e.	Charging in cold conditions;	☐
f.	Charging AGM (Absorbed Glass Mat), WET,MF (Maintenance free), Ca and GEL 12	☐
g.	Recondition deeply discharged batteries;	☐
h.	Use the charger as a power supply.	☐

37.2 DESIGN AND TECHNICAL DETAILS:

37.2.1 Specifications:

a.	Rated voltage:	220-240VAC, 50-60Hz	☐
b.	Charging voltage:		
	- Vehicle:	14.4 V	☐
	- AGM:	14.7 V	
	- Reconditioning:	15.8 V	
	- Power supply:	13.6 V	
c.	Start voltage:	2.0 V	☐
d.	Charging current:	10A max	☐
e.	Ripple charge:	Less than 4%	☐
f.	Battery capacity:	20 – 300Ah	☐
g.	Insulation type:	IP65	☐
h.	Ambient temperature:	-20ºC to +50ºC	☐

WATER QUALITY

38. SCOPE

38.1 This part of the specification covers the detail hardware and software requirements for the Data logger equipment.

38.2 The data loggers will be utilised at remote measuring stations to collect data. Operation will be in a totally unattended mode, with inspections by staff on a 30 to 60 day cycle.

38.3 The installed logger shall be designed and built for minimum maintenance and maximum life expectancy of 10 years or more - and shall be completely fit for the intended purpose. The product is intended to be permanently installed and will be designed for long term unattended operation and minimal maintenance. The long term reliability of the product whilst operating in harsh environments and the product battery life will be considered as very significant factors in the product selection.

38.4 The equipment will be mounted in recorder huts, either from mild steel, concrete or brick, with a minimum size of 800 x 800 x 1 800 mm high or mounted in pipes with diameters from 100 mm to 300 mm, and will be subjected to a harsh environment.

38.5 Enclosures, if available, should be offered for this equipment under “Accessories”. These enclosures can be offered in Fibreglass, Robust Plastic, Mild Steel, Stainless Steel, etc.

38.6 Preference shall be given to enclosures that include anti-vandalism systems.

38.7 Each bidder shall offer complete power supply system/s with the logger offered and should be listed under “Accessories” in the Price Schedule.

38.8 Each bidder shall offer a suitable USB converter to enable configuration of the equipment via Laptop. The item should be listed under “Accessories” in the Price Schedule.

38.9 The logger and the associated meter interfaces must be able to be installed in an underground chamber, which could be flooded from time to time.

38.10 All instrumentation, instrumentation housing, cable piping, downpipes and any required accessories will become the property of DWS after installation.

38.11 Where applicable a solar panel of correct size for the battery will be installed.

38.12 The logger modem and sonde must be connected via a fully waterproof cable. The cable must have a water tight connection to the sonde. The cable must be strong enough to allow the pulling of the sonde by a user on the cable without causing damage to the cable or sonde.

38.13 Battery life should last for approximately 3 months unattended, with a data logging period of 15 minutes and data transmission of every 1 hour.

38.14 The sonde should be able to operate unattended as a standalone system if required. The sonde should be capable of being deployed with its own memory and programmability. It must be possible to download data from the sonde via a laptop and calibrations done via a laptop to the sonde.

38.15 The data in any form or content cannot be distributed to any 3rd party but only to the relevant DWS project manager.

38.16 All instrumentation including the sonde must be housed in stainless steel piping and housing with vandal proof locking mechanisms similar to Interlock System vandal proof products. Any installations of pipe work and or instrument housing must be confirmed by the DWS project manager after an initial site visit. The installation of piping and housing must be drawn on an A1 paper to scale with annotation of all relevant details like draw boxes, weir or river section. This installation plan (hard copy) must be signed off by the relevant DWS project manager. The plan should also indicate the cost per item and total costs of the piping, housing and instrumentation. The time required for complete installation should also be indicated on the plan. An electronic copy in pdf should similarly be e-mailed to the DWS official.

38.17 Each plan must be referenced with a unique number. The purpose for this is to generate a quote that refers to these unique numbers.

38.18 The modem logger housing should be constructed above the highest water level observed at the site. This is to ensure continuous logging and transmission of logged data. Copies of access keys to all instrumentation housing must be given to the relevant DWS official.

38.19 The parameters monitored and reported on are: Specific conductivity (ms/m), Dissolved Oxygen (mg/l), Dissolved Oxygen Saturated (%), water level (m), pH and Temperature (°C).

38.20 MINIMUM SPECIFICATION FOR WATER QUALITY VARIABLES ON OFFER:

38.20.1 Dissolved Oxygen: (% Saturation)
- a. Range: 0 to 400 %
- b. Resolution: 0.1 %
- c. Accuracy: 0 – 400 %; ± 6 % air sat.

☐

38.20.2 Dissolved Oxygen: (mg/L)
- a. Range: 0 to 30 mg/L
- b. Resolution: 0.01 mg/L
- c. Accuracy: 0 – 30 mg/L; ± 15 mg/L

☐

38.20.3 Conductivity:
- a. Range: 0 to 100 000 uS/cm (100mS/cm)
- b. Resolution: 0.5 uS/cm
- c. Accuracy: ± 0.5 % of reading

☐

38.20.4 Temperature:
- a. Range: -5ºC to +45ºC
- b. Resolution: 0.02ºC
- c. Accuracy: ± 0.15ºC

☐

38.20.5 pH:
- a. Range: 1 to 13 units
- b. Resolution: 0.01 unit
- c. Accuracy: ± 0.2 unit

☐

38.20.6 Salinity:
- a. Range: 0 to 42 ppt/PSU
- b. Resolution: 0.01 ppt
- c. Accuracy: ± 1 % of reading

☐

39. MULTI-PARAMETER HANDHELD WATER QUALITY SYSTEM (WITH PH-, DISSOLVED OXYGEN-, ELECTRICAL CONDUCTIVITY- AND TEMPERATURE SENSOR);

39.1 APPLICATION:

39.1.1 This multi-parameter handheld system must include as standard a sensor bulkhead, 10m cable, display unit with barometer, laptop communication cable, serial to USB port converter (if necessary), pH sensor, oxygen sensor, electrical conductivity sensor, temperature sensor and protective carry case. ☐

39.2 DESIGN AND TECHNICAL DETAILS:

39.2.1 Must display pH mV during calibration; ☐

39.2.2 Must have a screw-on O2 membrane cap (no O-ring or optical sensor); ☐

39.2.3 Sensor bulkhead guard must be weighted for stability; ☐

39.2.4 Display to be connected to sensors via cable; ☐

39.2.5 Cable connectors must be Mil-spec. ☐

39.2.6 No depth sensor required. ☐

39.2.7 The maximum cable length may not be less than 30 metres. ☐

39.2.8 Extras, spares and additional cable lengths to be listed and priced as sub items ☐

40. HANDHELD CONDUCTIVITY AND TEMPERATURE SYSTEM (WITHOUT PH- AND OXYGEN SENSOR);

40.1 APPLICATION:

40.1.1 This multi-parameter system must include as standard a sensor bulkhead, 10m cable, display unit, laptop communication cable, serial to USB port converter (if necessary), electrical conductivity sensor, temperature sensor and protective carry case. ☐

40.2 DESIGN AND TECHNICAL DETAILS:

40.2.1 May not have pH or O2 sensors as standard or optional; ☐

40.2.2 Must have TDS and Salinity as an output. ☐

40.2.3 Sensor bulkhead guard must be weighted for stability ☐

40.2.4 Cable connectors must be Mil-spec. ☐

40.2.5 No depth sensor required. ☐

40.2.6 The maximum cable length may not be less than 30 metres. ☐

40.2.7 Extras, spares and additional cable lengths to be listed and priced as sub items. ☐

41. HANDHELD pH-, CONDUCTIVITY- and TEMPERATURE SENSOR (WITHOUT OXYGEN SENSOR);

41.1 APPLICATION:

41.1.1 This multi-parameter system must include as standard a sensor bulkhead, 10m cable, display unit, laptop communication cable, serial to USB port converter (if necessary), pH sensor, electrical conductivity sensor, temperature sensor and protective carry case. ☐

41.2 DESIGN AND TECHNICAL DETAILS:

41.2.1 May not have a dissolved oxygen sensor as standard or optional. ☐

41.2.2 Must have TDS and Salinity as an output. ☐

41.2.3 Sensor bulkhead guard must be weighted for stability; ☐

41.2.4 Cable connectors must be Mil-spec; ☐

41.2.5 No depth sensor required. ☐

41.2.6 The maximum cable length may not be less than 30 metres. ☐

41.2.7 Extras, spares and additional cable lengths to be listed and priced as sub items. ☐

42. COMPACT WIRELESS TEMPERATURE, CONDUCTIVITY AND DEPTH PROFILER

42.1 APPLICATION:

42.1.1 The product should be lightweight, easy to use instrument with easy access accurate conductivity, temperature, and depth profiles. The product must have a 6 electrode conductivity cell and thermistor. It should be relatively palm-sized and be deployed from a boat. Whenever the instrument is dropped into the water there should be a built in reference both time and GPS location by means of a built in GPS receiver. The purpose of the instrument is to view immediate plots of conductivity, temperature, salinity and sound speed versus depth must be viewed immediately on the instruments integrated colour LCD screen in the field. The housing should be rugged and non-corrosive. The instrument will be used for live samples in dams, boreholes, rivers and estuaries.

42.2 SPECIFICATIONS:

42.2.1 Built in memory of at least 10 MB;

42.2.2 Bluetooth wireless data download;

42.2.3 Internal batteries with a minimum of 30 hours continuous use;

42.2.4 Data output to laptop should be- ASCII (CSV) /Hypack /Matlab;

42.2.5 Depth range: 0-80 m;

42.2.6 Measuring temperature range: -5° to 40° C;

42.2.7 Point sample (moving the unit back and forth);

42.2.8 Compatible with Windows XP/Vista/7;

42.2.9 GPS-referenced;

42.2.10 Data plots, filtering, import/export;

42.2.11 Rugged plastic storage/shipping case;

42.2.12 Bluetooth dongle;

42.2.13 magnetic stylus pens;

42.2.14 Sampling rate 5 Hz ;

42.2.15 Mass – not more than 600g;

42.2.16 No calibration must be required;

42.2.17 Cleaning tool to clean the instrument.

42.3 PARAMETERS TO BE MEASURED:

42.3.1 Conductivity 0 to 80,000 µS/cm (accuracy ± 0.25% ± 5 µS/cm)

42.3.2 Temperature -5° - 40° C (accuracy ± 0.05° C)

42.3.3 Pressure 0 to 80 dBar (accuracy ± 0.25% FS)

42.3.4

43. HANDHELD WATER QUALITY PROFILING SYSTEM (with DEPTH-, pH-, OXYGEN-, ELECTRICAL CONDUCTIVITY- and TEMPERATURE SENSOR);

43.1 APPLICATION:

43.1.1 This multi-parameter system must include as standard a sensor bulkhead, 10m cable, display unit, smart pH sensor, smart optical oxygen sensor, smart electrical conductivity sensor, temperature sensor, pressure sensor and protective carry case. ☐

43.2 DESIGN AND TECHNICAL DETAILS:

43.2.1 Must display pH mV during calibration; ☐

43.2.2 Calibration data must be stored on individual smart sensors; ☐

43.2.3 Sensor bulkhead guard must have a stackable weighing system; ☐

43.2.4 Sensor bulkhead may not contain a battery compartment or have logging capability. ☐

43.2.5 Display to be connected to sensors via cable; ☐

43.2.6 Cable connectors must be Mil-spec; ☐

43.2.7 The maximum cable length may not be less than 95 metres; ☐

43.2.8 Extras, spares and additional cable lengths to be listed and priced as sub items. ☐

44. MULTI-PARAMETER HANDHELD WATER QUALITY SYSTEM WITH WIRELESS SMART DEVICE DISPLAY

44.1 APPLICATION:

44.1.1 This multi-parameter system must include as standard a sensor bulkhead, 8-10m cable, android display device (including app), battery pack, pH sensor, optical oxygen sensor, electrical conductivity sensor, temperature sensor, level sensor and protective carry case. ☐

44.2 DESIGN AND TECHNICAL DETAILS:

44.2.1 Must have an optical DO sensor; ☐

44.2.2 Must have water level sensor; ☐

44.2.3 Must report on salinity; ☐

44.2.4 Must have Bluetooth communication to android handheld display device; ☐

44.2.5 Communication to handheld device via cable may not be an option; ☐

44.2.6 Maximum cable length must be more than 70m; ☐

44.2.7 Extras, spares and additional cable lengths to be listed and priced as sub items. ☐

45. MULTI-PARAMETER WATER QUALITY SONDE WITH pH-, ELECTRICAL CONDUCTIVITY-, TEMPERATURE-, DEPTH and OPTICAL OXYGEN SENSORS (BLUETOOTH COMMUNICATION CAPABILITY) – DIAMETER LESS THAN FIVE CENTIMETRES;

45.1 APPLICATION:

45.1.1 This sonde will be offered standard with sonde main body, pH sensor, optical DO sensor, temperature sensor, electrical conductivity sensor, operating software, carry case. ☐

45.2 DESIGN AND TECHNICAL DETAILS:

45.2.1 Bluetooth and SDI 12 communication to android handheld device must be standard; ☐

45.2.2 The sonde must have a minimum immersion depth of 145m; ☐

45.2.3 Must have internal memory of at least 10MB and include a user replaceable SD card; ☐

45.2.4 The sonde main body must contain a battery compartment and be fully programmable for unattended deployment with no cables attached; ☐

45.2.5 Sonde diameter must be less than 5cm; ☐

45.2.6 A fixed central sensor wiper must be offered as an additional extra; ☐

45.2.7 Extras, spares and additional cable lengths to be listed and priced as sub items ☐

46. DEEP WATER (MINIMUM 245M) MULTI-PARAMETER WATER QUALITY SONDE WITH OPTICAL AND SMART SENSOR TECHNOLOGY - DIAMETER LESS THAN FIVE CENTIMETRES;

46.1 APPLICATION:

46.1.1 This Sonde will be offered as standard with sonde main body, smart pH sensor, smart optical Oxygen sensor, smart temperature sensor, smart electrical conductivity sensor, depth sensor, laptop communication cable, operating software, carry case. ☐

46.2 DESIGN AND TECHNICAL DETAILS:

46.2.1 All calibration data must be stored on individual smart sensors; ☐

46.2.2 The sonde must have a minimum immersion depth of 245m; ☐

46.2.3 The sonde must have on-board memory to store at least 500 000 readings; ☐

46.2.4 The sonde main body must contain a battery compartment and be fully programmable for unattended deployment with no cables attached; ☐

46.2.5 Sonde diameter must be less than 5cm; ☐

46.2.6 Extras, spares and additional cable lengths to be listed and priced as sub items ☐

47. DEEP WATER (MINIMUM 245M) MULTI-PARAMETER WATER QUALITY SONDE WITH OPTICAL AND SMART SENSOR TECHNOLOGY - DIAMETER LESS THAN NINE CENTIMETRES;

47.1 APPLICATION:

47.1.1 This sonde will be offered standard with sonde main body, smart pH sensor, smart optical DO sensor, smart temperature sensor, smart electrical conductivity sensor, depth sensor, central anti fouling wiper, laptop communication cable, operating software, carry case. ☐

47.2 DESIGN AND TECHNICAL DETAILS:

47.2.1 All calibration data must be stored on individual smart sensors. ☐

47.2.2 The Sonde must contain a central anti-fouling wiper. ☐

47.2.3 The sonde must have a minimum immersion depth of 245m. ☐

47.2.4 The sonde must have onboard memory to store at least 500 000 readings. ☐

47.2.5 The sonde main body must contain a battery compartment and be fully programmable for unattended deployment with no cables attached. ☐

47.2.6 Sonde diameter must be less than 9cm; ☐

47.2.7 Extras, spares and additional cable lengths to be listed and priced as sub items. ☐

48. EXTREME DEPTH PROFILING (MINIMUM 1500M) MULTI PARAMETER ONLINE/MEMORY PROBE WITH CALCULATED DATA OUTPUT – UP TO 16-CHANNELS FOR PHYSICAL, CHEMICAL AND OPTICAL PARAMETERS;

48.1 APPLICATION:

48.1.1 Main Multi Parameter Probe for deep well and mine shaft water quality applications. The probe (sonde) will be offered as standard with pH, temperature, depth and electrical conductivity sensors. ☐

48.2 DESIGN AND TECHNICAL DETAILS:

48.2.1 Probe must weigh less than 3.6kg; ☐

48.2.2 Length of probe must not exceed 1m (1000mm) and diameter not larger than 76mm for core boreholes. ☐

48.2.3 Body material must be made of Titanium in order for the housing to be inert against all chemical compounds and corrosion free. ☐

48.2.4 Must be able to handle depths of not less than 1500m. ☐

48.2.5 Large internal memory for data storing – minimum 128M Bytes for 500 000 readings or more; ☐

48.2.6 Fast readout of data via USB port or communication interface. ☐

48.2.7 Probe must be equipped with an 8-16 Channel data acquisition system with an 8 – 20 bit resolution for fast data recording. ☐

48.2.8 Probe must be provided with minimum 3 fixed measuring channels consisting of a Pressure (depth) sensor (range minimum 1000dBar), Temperature sensor (range -2-36°C) and Conductivity sensor (range 0…70mS/cm (7000µS/cm)). ☐

48.2.9 It must have provision for 4 or more external measuring channels for additional sensors, namely pH, ORP, DO. ☐

48.2.10 Contain internal rechargeable batteries or capable to use Alkaline 1.5V or Lithium non rechargeable batteries and should have an operating time of at least 300hrs. ☐

48.2.11 It must have a maximum sampling rate of 20ms per channel and a minimum of 1 reading/day per channel. ☐

48.2.12 It should be equipped with an automatic self-calibration digital converter. ☐

48.2.13 Calibration coefficients must be stored inside the probes internal memory.

48.3 EXTRAS:

48.3.1 Communication cable for Telemetry operation and suspension rope Memory Mode (un-supervised) offered per 100m; ☐

48.3.2 Operating software, portable readers, interface unit, depth display unit and spares to be listed and priced as sub items; ☐

48.3.3 External power supply interface, cable winch or cable drum and all optional accessories required for field operations to be listed and specified as extras. ☐

49. THREE CHANNEL DATA LOGGER WITH INTEGRATED PRESSURE, TEMPERATURE AND CONDUCTIVITY SENSORS – FOR UNATTENDED DEPLOYMENT WITH NO CABLES ATTACHED

49.1 APPLICATION

49.1.1 This logger will be offered standard with integrated temperature sensor, electrical conductivity sensor, pressure sensor and communication port water proofing cap. ☐

49.2 DESIGN AND TECHNICAL DETAILS:

49.2.1 The logger must have Salinity and TDS as standard data outputs. ☐

49.2.2 The logger must have a factory sealed internal battery with a battery life of at least 5 years. ☐

49.2.3 The logger must be fully programmable for unattended deployment with no cable attached. ☐

49.2.4 The logger may not have a fixed communication cable. ☐

49.2.5 Logger diameter must be less than 2 cm with the length less than 32 cm; ☐

49.2.6 Extras, communication cable, operating software and spares to be listed and priced as sub items. ☐

50. THREE CHANNEL DATA LOGGER WITH INTEGRATED PRESSURE, TEMPERATURE AND CONDUCTIVITY SENSORS – FOR PERMANENT SUBMERGED DEPLOYMENT WITH FIXED (NON REMOVABLE) COMMUNICATION CABLE AND VENTED TUBE.

50.1 APPLICATION:

50.1.1 This logger will be offered as standard with integrated temperature sensor, electrical conductivity sensor, pressure sensor, 5 meters fixed cable. ☐

50.2 DESIGN AND TECHNICAL DETAILS:

50.2.1 The logger must have Salinity and TDS as standard data outputs. ☐

50.2.2 The battery compartment and communication port must be on the non-submersible side of the communication cable. ☐

50.2.3 The logger must be fully programmable to log at a fixed rate or multiple logging intervals from 5 seconds to 24 hours for unattended deployment. ☐

50.2.4 The data logger shall preferably be provided with a EEPROM ring memory (first in, first out) for buffered storage capacity of at least to 500 000 readings. ☐

50.2.5 The logger must have a fixed communication cable with integrated vented tube. ☐

50.2.6 Logger diameter must be less than 2 cm; ☐

50.2.7 Extras, Laptop communication cable, additional cable length, operating software and spares to be listed and priced as sub items. ☐

51. THREE CHANNEL DATA LOGGER WITH INTEGRATED PRESSURE TRANSDUCER, TEMPERATURE- AND CONDUCTIVITY SENSORS – FOR PERMANENT DEPLOYMENT WITH FIXED (NON REMOVABLE) COMMUNICATION CABLE, VENTED TUBE AND BUILT-IN SIM TELEMETRY SYSTEM (GSM STANDARD, GSM QUAD BAND, GPRS).

51.1 APPLICATION:

51.1.1 This logger will be offered as standard with integrated temperature, electrical conductivity, pressure sensors; built-in SIM telemetry system (GSM Standard, GSM Quad band, GPRS) and 5 meters fixed cable. ☐

51.2 DESIGN AND TECHNICAL DETAILS:

51.2.1 The logger must have Salinity and TDS as standard data outputs. ☐

51.2.2 The battery compartment and integrated SIM telemetry system must be on the non-submersible side of the communication cable. ☐

51.2.3 Logger housing must be robust, corrosion-resistant, and insensitive to impact and vibration and watertight up to at least 100 m water pressure depth (10 Bar). ☐

51.2.4 The data logger shall be provided with a EEPROM ring memory (first in, first out) for buffered storage capacity of at least to 500 000 readings. ☐

51.2.5 The logger must be fully programmable to log at a fixed rate or multiple logging intervals from 5 seconds to 24 hours for unattended deployment. ☐

51.2.6 The logger must have a fixed communication cable with integrated vented tube. ☐

51.2.7 Logger/telemetry side of the instrument must be less than 5.3 cm x 53 cm with the probe (sensor) side being less than 2.3 cm x 32 cm. ☐

51.2.8 Extras, Laptop communication cable, additional cable length, operating software and spares to be listed and priced as sub items. ☐

52. SERVICE

52.1 DATA STORAGE, TRANSMISSION AND REPORTING:

52.1.1 The data must be logged every 15 minutes and transmitted every 1 hour via GSM/GPRS.

52.1.2 The service provider must set up a server with a website and if necessary, install their own SIM cards.

52.1.3 All the sites will be visible on the service provider's website and data updated every 2 hours of transmission. This data must be accessible by means of password protection by identified DWS official who will have access to all the data.

52.1.4 No data should be manipulated, edited or changed in any form. The data must be available on the service provider's website for the duration of the contract. The raw data must be available for download from the website in various forms like text files and excel spreadsheets.

52.1.5 The website should also have functions like selection of period, plots of all parameters, plots of single parameters, errors transmitted by logger, station specific folders, export of single or multiple parameters and export of single/ multiple parameters from single/ multiple sites. The data on the service provider's server must be configured to allow for export to DWS head office servers.

52.1.6 Commands must be capable to the modem logger remotely from the command centre. These commands should be able to change logging times and adjust alarms settings.

52.1.7 No data must be deleted from the logger.

52.1.8 The logger should be configured to record in ring memory. No data must be made public.

52.1.9 All original inspection forms will be sent to the relevant DWS official by post and hard copies must be kept by the service provider in a file for the duration of the contract.

52.1.10 A monthly average daily summary report must be compiled and sent to the relevant DWS official via e-mail and hard copies given upon request. (See Annexure A for example of report)

52.2 MAINTENANCE AND CALIBRATION:

52.2.1 Inspections must be done once per month at all sites. This will include reporting information on a standard inspection report (See annexure B).

52.2.2 The inspection reports must scanned and e-mailed to the relevant DWS official within a week after the maintenance route is completed. Instrumentation housings must be cleaned.

52.2.3 When necessary the logger must be upgraded with the latest firmware.

52.2.4 A reference check or control readings must be taken prior to calibration of the sonde. This control reading must be taken with a handheld instrument that has been pre-calibrated.

52.2.5 The handheld instrument must have the same specifications as the sonde but may have a lower memory.

52.2.6 A calibration form must be completed for this handheld instrument prior to

maintenance. The maintenance carried out is cleaning of the probes by means of soft bristle brushes with regular non corrosive cleaning products similar to dishwashing cleaner.

52.2.7 All wiper pads must be replaced with each visit and the pH probe must be cleaned very carefully using a tissue.

52.2.8 The protective cover for the probes of the YSI sonde must be covered with ladies pantyhose to prevent severe fouling.

52.2.9 All maintenance and calibration should be done on line with the relevant sections of the example "WATER QUALITY LOGGERS: A FIELD GUIDE FOR QUALITY CONTROL OF FIELD DEPLOYED LOGGERS" (See Annexure C for an example of maintenance guidelines).

52.2.10 When necessary the batteries should be replaced.

52.2.11 All standards prior to calibration should be sealed in a waterproof bag and placed in the relevant river in order for the solution temperature to increase/decrease to the relevant river temperature.

52.2.12 All calibration files must be e-mailed to the relevant DWS official after every field trip.

52.3 COSTS:

52.3.1 All installed equipment and equipment housing must be fully insured.

52.3.2 Whenever there is a faulty instrument, instrumentation housing, piping, cable or probe, it must be replaced with the same product to ensure uninterrupted data collection.

52.3.3 These replacement costs will be paid for by the supplier via their insurance.

52.3.4 Any component must be replaced within 24 hours once the faulty/ damaged/ vandalised part is identified.

52.3.5 Together with monthly reports and inspections, an invoice must be submitted for the work done.

52.3.6 The invoice should detail the kilometres travelled as well as all work done. All travel costs will be charged per kilometre travelled. Each item must be priced with a final total including VAT.

52.3.7 Payments will be made within 30 days of receiving the invoice.

52.4 TRAINING:

52.4.1 Training on the maintenance and calibration of the sonde and configuration of the logger will be given to the identified DWS officials by the service provider.

52.4.2 These officials will be given initial 1st session training at an agreed venue.

52.4.3 Thereafter the officials (using DWS rented or subsidised vehicles and travelling expenses of officials paid by DWS) could accompany the service provider on site for further training.

Annexure A

EXAMPLE OF MONTHLY SUMMARY:

Monthly Summary: VS1 Vaal River Origin at N17 Bridge (177935)

2015	Temperature °C	Conductivity mS/m	pH pH	DO mg/l	DO SAT %	Level m
July	Average	Average	Average	Average	Average	Average
1	9.57	0.0	6.37	9.71	84.20	0.311
2	8.41	0.0	6.33	10.03	83.93	0.309
3	7.58	0.0	6.31	10.20	83.55	0.304
4	8.38	0.0	6.33	9.98	83.27	0.299
5	8.18	0.0	6.36	10.03	82.98	0.295
6	8.10	0.0	6.41	10.07	83.13	0.289
7	9.19	0.0	6.48	9.68	83.54	0.285
8	9.20	0.0	6.48	9.72	83.34	0.278
9	7.92	0.0	6.44	10.09	83.14	0.271
10	11.25	0.0	6.50	9.24	83.35	0.266
11	9.27	0.0	6.54	9.67	83.06	0.259
12	10.24	0.0	6.44	9.48	82.79	0.255
13	10.44	0.0	6.48	9.48	82.40	0.245
14	11.69	0.0	6.65	9.04	82.71	0.240
15	11.91	0.0	6.52	9.10	83.03	0.234
16	12.49	0.0	6.44	8.97	82.25	0.224
17	7.47	0.0	6.54	9.88	81.23	0.214
18	6.24	0.0	6.52	10.45	81.21	0.202
19	6.76	0.0	6.53	10.37	81.14	0.191
20	9.43	0.0	6.58	9.66	81.20	0.184
21	9.61	0.0	6.58	9.54	81.54	0.177
22	9.58	0.0	6.82	9.41	82.09	0.173
23	10.80	0.0	6.66	9.23	82.07	0.167
24	10.14	0.0	6.94	9.25	82.14	0.165
25	9.10	0.0	6.91	9.59	82.81	0.163
26	5.48	0.0	6.82	10.63	82.96	0.157
27	6.10	0.0	6.69	10.61	82.73	0.147
28	7.59	0.0	6.69	10.14	82.28	0.140
29	9.47	0.0	6.55	9.69	81.93	0.134
30	9.06	0.0	6.54	9.68	81.26	0.123
31	4.65	0.0	6.70	10.74	80.87	0.112
Overall	8.88	0.0	6.55	9.79	82.52	0.220

16c: EXAMPLE OF MONTHLY REPORT:

(EXAMPLE OF MONTHLY REPORT)

FIELD INSTRUMENT QUALITY CONTROL AND MAINTENANCE SHEET

Site Name and Number: _____

Instrument Name and ID number: _____

Date: _____

Time: _____

Calibration and Maintenance performed by:

_____

Logger condition before maintenance (siltation, algae growth etc.):				
Calibration Parameters	**Instrument Reading before calibration**	**Instrument Reading and pH Milivolts* after calibration**	**Maintenance performed on logger:**	**Important notes to be captured on Hydstra: (replacement of sensors, bad fouling or any issues that can potentially explain data anomalies)**
pH7				
pH4				
Turbidity				
Specific EC				
DO %				

River Control Readings	
pH	
Temperature (°C)	
Turbidity	
Specific EC	
Dissolved DO %	

Annexure B

water & sanitation

Department:
Water and Sanitation
REPUBLIC OF SOUTH AFRICA

INSPECTION REPORT - FLOW + WQ GAUGINGSTATION

Version 07/2014 Purpose: Data Collection: ☐ Technical: ☐ Maintenance: ☐ Managerial: ☐

Region: Free State

Gaugings in: | Date: | STATION NUMBER

Place: | Visited by:

1.0 GAUGE PLATES

1 = Replacements 2 = Adjustments 3 = Obstruction removed

Data set	Reading	Time	Range	1	2	3	Date applicable	Which gauge plate	Reading before	Reading after

Remarks w.r.t. 1.0.

2.1 WATER LEVEL DATA LOGGERS

Logger 1	Logger ID		Displayed reading				Data retrieved:		Period retrieved
Data set	Type	Serial No	Height	Time	Date	Adjust	Yes	No	

Range	Cable length	Battery changed?		Volts before	Volts after	Probe cleaned?		
		Yes	No			Yes	No	

Remarks w.r.t. Logger 1

Logger 2	Logger ID		Displayed reading				Data retrieved:		Period retrieved
Data set	Type	Serial No	Height	Time	Date	Adjust	Yes	No	

Range	Cable length	Battery changed?		Volts before	Volts after	Probe cleaned?		
		Yes	No			Yes	No	

Remarks w.r.t. Logger 2

Logger 3	Logger ID		Displayed reading				Data retrieved:		Period retrieved
Data set	Type	Serial No	Height	Time	Date	Adjust	Yes	No	

Range	Cable length	Battery changed?		Volts before	Volts after	Probe cleaned?		
		Yes	No			Yes	No	

Remarks w.r.t. Logger 3

Logger 4	Logger ID		Displayed reading				Data retrieved:		Period retrieved
Data set	Type	Serial No	Height	Time	Date	Adjust	Yes	No	

Range	Cable length	Battery changed?		Volts before	Volts after	Probe cleaned?		
		Yes	No			Yes	No	

Remarks w.r.t. Logger 4

Logger 5	Logger ID		Displayed reading				Data retrieved:		Period retrieved
Data set	Type	Serial No	Height	Time	Date	Adjust	Yes	No	

Range	Cable length	Battery changed?		Volts before	Volts after	Probe cleaned?		
		Yes	No			Yes	No	

Remarks w.r.t. Logger 5

General	Upstream		Downstream		Remarks
	Preferred height range	Sufficient cable length	Preferred height range	Sufficient cable length	

Date:		Visited by:		Station No	

2.2 MECHANICAL RECORDER

Data set	Recorder chart			ADJUSTMENTS					
	Pen line			Pen reversal point		Float stop		Pen line zero	
	Height	Time	Adjust	Before	After	Before	After	Before	After
Remarks w.r.t. 2.2.									

3.0 INLET SYSTEM

Data set	Type of system	Inlet openings			Size of the well	Position w.r.t. control	Flushed
		Size	Elevation w.r.t. pool level				
			Before	After			
Remarks w.r.t. 3.0							

4.0 STRUCTURE

Remarks w.r.t. condition and accuracy of the gauging station and the work done:

5.0 DISCUSS

Downstream conditions						
Banks						
Access						
Flow measurement done	Yes	No	Type		Flow rate obtained	
Survey done	Yes	No	Type			
Photos taken	Yes	No	File names			

6.0 UPSTREAM CONDITIONS

Notch No.	1	2	3	4	5	6	7	8	9	10
Depth before maintenance										
Depth after maintenance										

Notches are numbered from the left bank - encircle the number of the low notch

7.1 GRAB SAMPLE

Grab sample taken?	Yes	No	Time		

7.2 ELECTRONIC HAND-HELD INSTRUMENT SAMPLING

Instrument manufacturer and model								
Instrument sensor calibrations done?	Yes	No	Date:		Sensors:	SpCond	DO	pH

Sample position	Displayed reading							
	Date	Time	Temperature	SpCond	pH	DO	Clorophyll	Turbidity

Remarks w.r.t. 7.2.

7.3 WATER QUALITY LOGGER 1

Instrument manufacturer and model									
Last logged reading								Data retrieved	Period retrieved
Date	Time	Temperature	SpCond	pH	DO	Chlorophyll	Turbidity		
								Yes / No	

Instrument sensor calibrations done?	Yes	No	Date:		Sensors:	SpCond	DO	pH

Batteries changed?	Yes	No	Battery Volts?	Before		After		Battery days remaining		Memory days remaining	

Remarks w.r.t. 7.3.

7.4 WATER QUALITY LOGGER 2

Instrument manufacturer and model									
Last logged reading								Data retrieved	Period retrieved
Date	Time	Temperature	SpCond	pH	DO	Chlorophyll	Turbidity		
								Yes / No	

Instrument sensor calibrations done?	Yes	No	Date:		Sensors:	SpCond	DO	pH

Batteries changed?	Yes	No	Battery Volts?	Before		After		Battery days remaining		Memory days remaining	

Remarks w.r.t. 7.4.

8.1 CIRCULATION - For office use only

Comments - Supervisory Technician

	Name	Date

Comments - Office Manager

	Name	Date

8.2 ADMINISTRATION - For office use only

Comments - Data Checked

	Name	Date

Annexure C

WATER QUALITY LOGGERS: A FIELD GUIDE FOR QUALITY CONTROL OF FIELD DEPLOYED LOGGERS

CONTENT

SECTION ONE: GENERAL QUALITY CONTROL REQUIRMENTS

Special note

Chlorophyll
The ability of the specialized chlorophyll probe to provide accurate chlorophyll concentrations in ug/l is highly dependant on a number of constantly changing variables in the water resource. The type of algal species, nature of algal suspension (lumped together or evenly suspended), turbidity etc. have a major influence on the results. To get close to accurate results, the user has to follow a cumbersome calibration process involving extractive laboratory analyses of actual water samples. Not performing such a calibration can have the effect that the result is out by a significant amount. This was also confirmed by RQIS validation tests.

If there is a need for the detection of changing chlorophyll concentrations, we recommend that results are reported in relative fluorescence units (RFUs) and not in ug/l. This option should be activated during logger parameter selection.

ISE probes for Nitrate and Ammonium measurement
The use of these probes is not recommended for long term deployment due the sensor's tendency to drift. RQS testing and field investigations confirmed this problem.

Record keeping

In order to ensure that water quality data can be seen as representative and of acceptable quality, it is important that records relating to quality control related data (e.g. control reading, calibration and maintenance) are accessible at all times. In ten to fifteen years time it must be possible to access QC data related to WQ logger data. To ensure this, the following steps should be taken.

- All control readings must be stored on Hydstra as control data (.9 variable).
- Each logger should have a calibration & maintenance record sheet.
- All calibration & maintenance related records must be loaded onto Hydstra as notes linked to the WQ data.

Example of record sheet
Calibration, Validation and Maintenance Record Sheet

Site Number: ……..
Logger Type: ……..…
Variables: ……...

Date/Time	Calibrations/Test readings	Maintenance	Officer/Notes
Example for YSI logger	Calibrated pH 7(-11mV), 4(172mV), SpCon, Turb& DO	Cleaned all probes and replaced DO membrane	Name. Low flow, high turb. Replace batteries next visit.

Control readings

Control reading in the form of gauge plate readings at flow gauging stations is a critical part of quality control required by DWA Hydrology. In the same way, continuous water quality logging there is also a requirement for control readings. This should preferably be done for all WQ variables (pH, EC, oxygen etc.) being logged at a specific site. Control readings and instrument calibration are the most important aspect relating to QC and data reliability. **It is, however, crucial that a properly calibrated handheld instrument be used when taking control readings**.

Control readings should not be taken in the casing housing the logger, but rather in the main flow of the river!

NB: All control readings should be taken as regularly as possible and must be loaded onto HYDSTRA as a .9 variable.

SECTION TWO: CALIBRATION AND MAINTENANCE

General Calibration precautions and maintenance that applies to all instruments

Always refer to the instrument's manual for product specific requirements!

Buffers and solutions

- You need to always use fresh buffers (DO NOT pour the buffer back into the bottle after use). Therefore, after calibrating in a buffer it must be thrown out!
- Note the date on which the buffer was opened and check the bottle expiration date.
- During use, close the buffer bottle immediately after pouring out the amount that you need (to prevent carbon dioxide exchange).
- Generally pH 4 and 7 buffers expire within 3 months of being opened and pH 10 buffer within 1 month of opening. The reason for this is that they get bacterial contamination and they absorb carbon dioxide once opened.

Probes

- When not in use, the probes should be stored in a moist condition but NOT in distilled water, make use of storage solution, tap water or the water from the river that you are sampling. It is important that the glass membrane is stored moist in order to maintain hydration, however, the probes should not be submerged in water.
- If the pH probe is stored for more than one month, it should be removed from the instrument and stored in the solution supplied with the probe (normally KCl solution).
- Always have spare pH probes, oxygen membranes, etc. available. Loggers can be out of order for months if spares are not available.

Calibration frequency

- The pH, oxygen and conductivity probes should be calibrated at least once a month if they are permanently deployed.
- Alternatively, if they are used less frequently then they should be calibrated every time before use in the field or in the lab, depending on the circumstances.
- A chlorophyll probe will not reflect accurate concentrations if it is not calibrated for the specific water type, algal composition and algal distribution. If close to actual concentrations are required, the probe should be calibrated each time before use and when algal composition or distribution changes.

What to avoid!

- Storing the electrode/probe dry or in de-ionized water.
- Stirring the sample or buffers using the electrode (to prevent damage to the probe).
- Re-using buffers.
- Polishing a pH bulb (it could BREAK) - if need be you should clean it gently with tissues.
- Assuming that the pH, oxygen and conductivity calibration procedures are simple. They are in fact complex and need to be done properly.
- Leaving LCD screens in direct sunlight or exposed to excessive heat.

Other

- Ensure that the battery life of the instrument is sufficient for the period of intended use and that the batteries are replaced when they're depleted.
- If needed, try and keep spare batteries in the instrument bag.
- WQ probes are highly affected by mud or silt build up. If sufficient recourses are not available to keep logger housings and boxes clean, it is better not to install WQ loggers. An incorrect result can be more problematic than no result at all.

Dissolved Oxygen (membrane sensors and optical sensors)

Calibration precautions

- Before calibration, the oxygen membrane should be visually inspected to make sure that the oxygen membrane has been installed correctly (refer to the *User Manual*), as well as to make sure that the membrane is not damaged. If the membrane has been damaged, it must be replaced.
- If the fluid under the membrane has air bubbles, then the fluid and membrane should be replaced. This does not apply to optical sensors!
- Oxygen is calibrated in moist air. Only approximately 5mm of water should be at the bottom of the calibration cup (NB: the probe should not touch the water).
- If the copper coloured metal of the probe beneath the membrane seems dirty it should be lightly sanded using the sandpaper that comes with the oxygen membrane kit BUT you must be careful not to touch the membrane surface. This does not apply to optical sensors!
- Always ensure that the rotating cleaners on the optical sensors are not parked on the membrane.
- Always ensure that the calibration cup is loosely attached when used during calibration.
- During calibration, the DO sensors should not be in contact with the water.

Maintenance

- If you get an 'out of range' auto response during calibration, check that the membrane is not in contact with the water in the calibration cup. For models using membranes, also check for bubbles, sufficient KCL solution or a torn membrane.
- As a general rule the membrane disk on the optical sensors should be replaced annually to ensure optimum performance.

pH

Calibration precautions

- Always calibrate with at least two buffers, preferably pH 4 and 7.
- Calibration in the pH 7 buffer should be performed first.
- pH 10 buffers absorb carbon dioxide and are, therefore, unless well managed, not recommended for use in field calibration.
- It is recommended that calibration be done with a buffer that is at the same temperature as the water that is to be measured hence field calibration is recommended. Buffer can be put in a plastic bag and submerged for ten minutes in the water to be tested.
- If you get an 'out of range reading', do not accept it. First check for obvious reasons e.g. that the correct value was entered for the pH buffer solution currently being used.
- You can use the pH millivolt readings to determine the health of the probe. Consult the user manual for guidance. As an example, for YSI pH probes the acceptable millivolt readings for each buffer is as follows:

  pH 4 = +180 (±50mv)
  pH 7 = 0 (±-50mv)
  pH 10 + - 180 (±50mv)

  The difference between the two millivolt readings should be between 165 and 180. The probe should be discarded once below 160.

Maintenance

- The probes should be stored in a moist condition or in storage solution if specified. Therefore, after use you should pour some water in the calibration cup (no more than 5-10mm) - NOT distilled water though.
- Used calibration fluids should be discarded.
- If the probe is to be stored on the instrument for longer than 1 month without being used, it should be removed from the instrument and stored in the KCl storage solution provided with the probe.
- The calibration cup and the probes should be rinsed and cleaned after using them.
- Probes generally have a lifespan of two years if used in environmental conditions.
- After installation of a new probe the "out of range" reading can be accepted during the first calibration.
- In cases where the reference electrode junction and electrolyte can be replaced, this should be done when the pH sensor millivolt is out of range or the sensor seems to show slow response times. Follow the manufacturer's guidelines during replacement.
- Sensors must be cleaned regularly as per the manufacturer's recommendations.

Electrical Conductivity

Calibration precautions

- Do not get confused with the EC units. During calibration the specific instrument might require that a different EC unit be used than what is indicated on the calibration solution bottle. For example: YSI requires that the EC value for calibration is in mS/cm although the calibration standards we use are mostly in µS/cm. This means that if the bottle indicates 12 880µS/cm or 1413µS/cm you will have to divide it by 1000 and use 12.88 mS/cm or 1.413 mS/cm respectively for calibration. On the other hand DWS WQ guidelines uses mS/m which requires an additional conversion.
- When filling the calibration vessel before calibration, make sure that there is enough buffer solution in the calibration cup to cover the entire conductivity cell.
- After placing the probe in the calibration solution, agitate the probe to remove any bubbles in the conductivity cell – NB: remember the warning about not stirring with the probe.
- During calibration, the sensors must be allowed time to stabilize - approximately 60 seconds is usually adequate.
- Low concentration conductivity standards are susceptible to contamination and their use is not recommended unless extra care is taken to rinse the calibration vessel and probe compartment with the standard solution to be used prior to calibrating. The two standards that are used in RQS are: 1413µS/cm and 12880µS/cm.

Maintenance

- Clean regularly with a small brush or cloth to avoid fouling. There are no special requirements since EC probes are fairly robust.

Turbidity (optical)

Calibration precautions

- If a lens wiper is fitted to the probe, ensure that it does not come to its rest position on the lens.
- Always perform at least a zero point calibration using "clean" de-ionized water.
- It is also advisable to perform a second point calibration with a standard in the range of the NTU that is expected in the resource.
- Please note that the different types of instruments have different requirements relating to the type of calibration standards used.
- NB! Be very careful when using formazin based calibration standards as there are health risk issues associated with them.

Maintenance

- Always keep the lens clean and replace optical wiper when required.
- The probes are generally low maintenance.
- Installation method and position can have a significant impact on the representativeness of the turbidity data.

Chlorophyll (optical)

Calibration precautions

- If a lens wiper is fitted to the probe, ensure that it does not come to its rest position on the lens.
- Where the probe is used in the recommended ChlRFU (not ug/l) mode, a zero point calibration is sufficient.
- Clean water containing no Chl can be used for zero calibration.
- If there is a requirement for accurate Chl concentrations and the Chlug/l mode is used, a two or three point calibration needs to be followed. Follow instrument manual instructions carefully.
- Two or three point calibration requires that actual water samples (preferably from where the logger is deployed) containing algae be used as calibration standards. The ug/l values for these samples need to be determined by extractive analyses in a laboratory.
- Be sure to follow the instrument's calibration manual for close to accurate results.

Maintenance

- Always keep the lens clean and replace optical wiper when required.
- The probes are generally low maintenance.
- The optical lens normally have to be replaced every one to two years. Always ensure that a spare lens (membrane) is available.