

## TERMS OF REFERENCE

### DRILLING AND REHABILITATION OF BOREHOLES TEN PROVINCES OF ZAMBIA

#### Summary

<b>Title</b>	Drilling and Rehabilitation of Boreholes in Ten Provinces of Zambia
<b>Purpose</b>	To establish Long Term Agreement (LTA) for drilling of boreholes and rehabilitation of non-functional boreholes. The immediate requirement under this LTA is to undertake borehole siting, drilling and installation of handpumps on 1069 boreholes and rehabilitation of 1154 existing non-functional boreholes in 10 provinces of Zambia
<b>Location</b>	Central, Copperbelt, Eastern, Luapula, Lusaka, Muchinga, Northern, North Western, Southern, Western Provinces
<b>Duration</b>	LTA will be for two years with the possible extension for another one year. The immediate works under this LTA are to be completed within six months
<b>Start Date</b>	June 2020

#### 1. Background

UNICEF, under the leadership of the Ministry of Water Development Sanitation and Environmental Protection (MWDSEP) and in collaboration with the Provincial and District Authorities plans to support improvement of water supply services in ten provinces of Zambia during 2020 and 2022. In this regard, it is planned to drill, and equip of the same with handpumps, 1069 boreholes and rehabilitate 1154 existing non-functional boreholes, as per below details:

Lot No	Province	No of boreholes to be drilled/equipped with handpumps	No of boreholes to be rehabilitated
1	Central	50	50
2	Copperbelt	50	50
3	Eastern	76	79
4	Luapula	93	145
5	Luapula	100	110
6	Luapula	150	195
7	Lusaka	60	60
8	Muchinga	90	90
9	Northern	60	60
10	North Western	90	90
11	Southern	80	70
12	Western	90	90
13	Western	80	65
	<b>Total</b>	<b>1069</b>	<b>1154</b>

The district-wise details of the boreholes to be drilled/rehabilitated are attached as Table-1 (Excel sheet). Of the above, approximately 20 per cent of the boreholes are planned to be drilled in institutions including schools/early childhood and health centres and large/densely populated communities. These boreholes will be equipped with submersible pumps/solar systems. Hence this point must be given due consideration during submission of the proposal, as well as planning and

implementation stage and provision should be made for larger diameter drilling and casing, as well as relevant yield requirements.

It may be noted that the number of boreholes to be drilled/rehabilitated is tentative and subject to change, pending the planned site assessments and availability of funds.

The works under this assignment have been divided into 13 lots (as shown in the above table). The Contractor may bid for one or more lots. The contractor, however, has to provide BoQ/rates for each of the district listed in Table 1. Based on the results of the tendering process, UNICEF may decide to decrease or increase the lots, if deemed appropriate.

## **2. Objectives**

The objective of this assignment is to drill and equip 1069 boreholes, including geophysical siting, drilling and installation of handpumps and to rehabilitated 1154 existing non-functional boreholes, in line with the scope of the works and specifications stated in these ToRs. Long Term Arrangement will be established with the above indicated quantity, keeping in view the fact that it allows flexibility of quantity variation and avoid repetitive bidding in future.

## **3. Justification**

The specialised nature of the works planned under this assignment requires the use of experienced drilling contractors with adequate understanding of the local hydrogeological conditions. It is, therefore, planned to engage services of a qualified drilling contractors who have the experience, knowledge and skills for carrying out these works.

## **4. Description of the assignment / scope of works**

The scope of work to be carried out at specified locations under this assignment includes the following:

- (i) Conduct a preliminary site assessment to familiarise with the conditions of the area and identify foreseeable challenges that may be required to be dealt with during implementation and submit an assessment report to the Project Consultant, UNICEF, MWDSEP and District/Provincial Authorities;
- (ii) Participate in a start-up meeting with the respective Provinces and District Councils and Project Consultants to agree on the work schedule; environmental, social, health and safety (ESHS) requirements, supervision/certification requirements, progress reporting and site management meetings;
- (iii) Conduct geophysical investigation (including provision of necessary transport, equipment and materials) for siting of the new boreholes and indicate most suitable site for drilling (keeping in view the findings of the hydrogeological studies, sanitary survey and potential risks of contamination, consultations with community members) and subsequently seek approval from the Project Consultants and the respective Districts on the final sites for borehole drilling;
- (iv) Conduct necessary assessments to identify the boreholes which can be considered appropriate for rehabilitation (e.g. boreholes abandoned due to water quality issues, poor workmanship and low water table may not be appropriate for rehabilitation) and quantify the relevant scope of the works;
- (v) Develop site specific Environmental and Social Management Plan (ESMP) and site specific Health and Safety Management Plan, consistent with the framework for Contractor's ESMP (attached), where applicable;
- (vi) Drill and install boreholes at the approved sites. This will entail provision of all labour, transport, plant, tools, equipment, materials and appurtenances necessary for drilling of boreholes and equipping of the same with handpumps, including lowering of borehole assembly with PVC casing and screen and end cap; provision of gravel pack at appropriate intervals and back filling; closing near surface water table aquifer, cleaning and development;

pump testing; water quality testing both for chemical and biological parameters; construction of apron with drainage and soak away pit installation of hand pump; chlorination of borehole; and provision of basic maintenance tools for the caretaker, in line with the specifications given in Annex-1, Bill of Quantities (BoQ) given in Annex-2 and guidelines/requirements of GRZ and the Zambia Water Resources Management Authority (WARMA). It may be noted all the boreholes to be drilled under this assignment in institutions/health centres and selected communities are planned to be equipped with submersible pumps, once the electricity or solar pumping systems become available at the sites (not as part of this contract). Hence this point must be given due consideration during submission of the proposal, as well as planning and implementation stage and provision should be made for larger diameter drilling and casing, as well as relevant yield requirements; and

- (vii) Rehabilitated the non-functional boreholes at approved sites in line with the specifications given in Annex-3 and BoQ attached As Annex-4; and
- (viii) Ensure compliance with the approved Contractor's site specific ESMP as well as the site specific Health and Safety Management Plans and put in place appropriate mechanism for monitoring performance, reporting, grievance redress, and taking corrective actions as appropriate.

## **5. Expected Deliverables**

The key deliverables of this assignment are as follows:

- (i) Preliminary assessment report;
- (ii) Site investigation/geophysical reports for the new boreholes with recommendations on the most suitable sites for drilling;
- (iii) Site assessment reports for boreholes planned to be rehabilitated along with tentative scope of the works;
- (iv) 1069 completed/ready to use boreholes equipped with Afridev or India mark II handpumps as per specifications given in Annex-1 (Technical Specifications for borehole drilling); and
- (v) 1154 rehabilitated/ready to use boreholes equipped with Afridev or India mark II handpumps as per specifications given in Annex-3 (Technical Specifications for borehole rehabilitation).

## **6. Reporting requirements**

- (i) The contractor shall provide to MWDSEP/UNICEF, through the Project Consultants, a monthly report detailing the progress of the works by the 7<sup>th</sup> of each month. The format for report shall be mutually agreed upon by within ten (10) days after signing of the contract;
- (ii) The contractor shall maintain records and receipts for the purchase of all materials and remuneration of labour used in the works and shall make such records and receipts available for inspection, upon request;
- (iii) The contractor shall keep accurate and systematic records in respect of the works, in accordance with the specifications contained in Annexes-1 and 2. The contractor shall furnish MWDSEP/UNICEF/Districts with one copy each of all such forms/reports up on completion of all boreholes (new and rehabilitated) under this assignment;
- (iv) The contractor must ensure that all supervision forms are signed by both the drilling supervisor from the Project Consultant and the drilling contractor. It is emphasised that no payments will be made unless signed forms are presented where interim payment certificates (IPCs) are submitted, the supervision forms for each drilling and construction phase will be supplied by the Project Consultant;
- (v) The contractor shall allow Project Consultants and MWDSEP/UNICEF/Districts/WARMA access to inspect all forms during progress of the works. Moreover, the contractor shall get the boreholes registered with WARMA in line with relevant statutory instrument (s); and
- (vi) The contractor shall submit to UNICEF/MWDSEP/Districts a final report of the works, with detailed accounts of material utilised, technical data such as lithological logs, drill time logs, well completion details, pump test data and results and on installation of hand pumps, in line with WARMA's Borehole Completion Report (BCR) requirements.

## **7. Project Management**

The contractor will be contracted by and report to UNICEF Zambia. The Project Consultant appointed by UNICEF will supervise the construction works undertaken by the Contractor. The MWDSEP, Provincial and District Authorities will provide oversight and will facilitate access to sites.

## **8. Duration**

The LTA will valid for 24 months with the possible extension of another one year. The works indicated in this TOR are planned to be executed by the Contractor within six months from the commencement date. The contractors are required to propose a realistic work programme based on actual resources and availability capacity in the bidding response to ensure that the planning and execution of works can be relied upon, keeping in view the rainy season and accessibility.

## **9. Payments and securities**

- (i) Payment will be based on actual works done and following approval by the supervising engineer, and an inspection and certification process;
- (ii) For the new boreholes, payments will be made only for wet boreholes which meet the required sustainable yield requirements (ref. Annex-1: Specifications);
- (iii) There will be no payment for boreholes for which water quality does not meet Zambia Bureau of Standards (ZABS) and/or World Health Organisation (WHO) standards. Some allowance, however, may be given in the case of Iron (see Annex-1);
- (iv) UNICEF in principle does not pay cash advances. However, if the contractor needs a mobilization advance, a maximum of 30% may be advanced against presentation of guarantee from a bank approved by UNICEF. This advance paid will be pro-rated for each borehole and recovered from each payment;
- (v) Ten percent (10%) of the total contract value will be withheld and will be deducted from each interim payment certificate. This amount will be paid after one month of completion of the “12 months defect liability period”;
- (vi) As soon as, in the opinion of the contractor, the works on at least 5 sites are completed, the Project Consultant/MWDSEP/UNICEF should be notified in writing. A taking over certificate in respect of the works will be issued by the Project Consultant after inspection/certification. If any uncompleted works are observed, the contractor will complete the outstanding works in a period less than two weeks and inform the Project Consultants/MWDSEP/UNICEF/Districts for the issuance of the taking over certificate;
- (vii) The contractor shall rectify any works deemed to be defective, or requiring repair, and, if deemed necessary, will drill a replacement borehole during the “12 months defect liability period” of the works. If the contractor is unable to complete the works in a four-week period from the date of notification, the cost of the works will be deducted from the retention. Alternately, the contractor shall return to UNICEF the amount of money paid for the said works.
- (viii) Within fifteen (15) days of the receipt of notification of award from UNICEF, the contractor shall furnish the performance security in accordance with the UNICEF General Conditions of Contract using a form, and from a bank/agency, approved by UNICEF; and
- (ix) The Contractor is not permitted to commence works:
  - (a) Without prior submission of a valid and enforceable performance security. The security shall be valid for the entire project period until the completion of the “defects liability period” and
  - (b) Without Consultant’s approval and satisfaction of appropriate measures in place to address ESHS risks and impacts.

## **10. Qualification and equipment/material requirements**

- (i) Legally registered to conduct business and drill boreholes in Zambia;
- (ii) Registration with WARMA;

- (iii) Minimum of five (5) years' experience in drilling and installation of handpumps in Zambia including experience in geophysical investigations for underground water. The experience of drilling in hard and collapsing formations and the use of combination of mud rotary/air percussion will be required, as the wet borehole policy will be applied and no payment will be made for boreholes with insufficient water yield and/or boreholes with water quality not conforming to the specified standards;
- (iv) Proven capacity to deliver. The contractor should possess requisite equipment and adequate human resources capacity, as outlined below:
  - (a) Minimum required equipment: two drilling rigs, (air percussion / mud-rotary combination rig), compressors (min 17 bars), mud pump unit and accessories, development unit to include a small trailer mounted compressor (<7 Bar), pump test unit, support trucks and vehicles, GPS unit, and water quality testing kit (pH, EC, Iron, Nitrate);
  - (b) Minimum staffing requirement:
    - Key Staff
    - K-1: Contract manager
    - K-2: Hydrogeologist
    - K-3: Drilling Engineer in-charge
    - K-4: Foreman for the Drilling Crew(s),
    - K-5: Environmental, Social and Health and Safety Technician
    - Non-Key Staff:
    - NK-1: Plumber/Welder;
    - NK-2: Electrician;
    - NK-3: Building foreman & Bricklayer; and
    - NK-4: Person in charge of logistics and dedicated record keeper.
  - (c) All engaged personnel on site must be able to communicate in English language.
- (v) Sound financial capacity to undertake the works.

## 11. Application Submission – Evaluation Process and Methods

In the preparation of the bids, contractors are required to read and comply with the requirements stipulated in the following documents:

- Terms of Reference (TOR)
- Annex 1: Technical specifications for borehole drilling
- Annex 2: Bills of quantities (BoQs) for borehole rehabilitation
- Annex 3: Technical specifications for borehole rehabilitation
- Annex 4: Bill of quantities for borehole rehabilitation
- Annex 5: Framework for Contractor's Environmental and Social Management Plan
- Annex 6: Book of Drawings
- Annex 7: Code of Conduct: Sexual Exploitation and Abuse
- Annex 8: Technical Proposal Submission Forms
- Annex 9: Financial Proposal Submission Forms
- Annex 10: Other Bidding Forms

Qualified contractors are invited to submit sealed separate technical and financial bids for this assignment as presented below:

### (a) Technical Proposal

The Contractor(s) shall submit a Technical Proposal in line with the forms provided in Annex-6: Technical Proposal Submission Forms that should include, but not limited to:

- (i) Description of the firm - legal status, organizational structure and names of the board of directors;
  - (ii) Copy of registration certificate with GRZ (i.e. company registration and VAT registration);
  - (iii) Copy of registration certificate with WARMA;
  - (iv) Copy of insurance policy;
  - (v) Description of similar works carried out during the last 5 years, as per template provided;
  - (vi) List of current contract commitments and works in progress;
  - (vii) History of litigation/non-performing contracts or declaration of “no pending law suits”, where applicable;
  - (viii) Profiles/CVs of the key professional staff (name, date of birth, years with the firm, total years of experience, nature of experience in this firm and others, education/other trainings and knowledge of English and local languages);
  - (ix) Copy of the audited financial statements for last three (3) years including balance sheet and income statement showing annual turn-over;
- (x) Proposed approach and methodology including the following:
- Details on how the contractor will organize the works, key personnel to be assigned for this assignment, and the proposed time to mobilise to the site after signing of the contract.
  - Proposed approach/methodology for compliance with ESHS/ESMP requirements, where applicable.
  - Proposed work plan for the assignment.

The submission should be clearly labelled/written “*Request for Bids – Drilling and Rehabilitation of Boreholes in Ten Provinces of Zambia - Technical Proposal*”. **No financial/price information should be contained in the technical proposal.**

### **(b) Financial Proposal**

The Financial Proposal must include full costs for delivering all the works to be carried out under this assignment, including costs for insurances and compliance with labour, environmental, social, health and safety regulations. The currency of the Financial Proposal must be in USD.

The Contractors may bid for one or more lots and fill in the unit rates as per details given in Annex-9: Financial Proposal Submission Forms. It is mandatory that Contractors submit all requested rates for all the districts included in the Lots for which they submit the proposal, failure to do so will invalidate the proposal.

Please note that payment will be made only on productive boreholes meeting the specification and terms and conditions as detailed in Annex-2: Technical Specifications. No payment will be made for “Dry,” “Lost” or “Abandoned” boreholes. Payment will be made for the actual quantities of works done for each borehole using the unit rate quoted in the financial proposal.

The submission should be clearly labelled/written “*Request for Bids – Drilling and Rehabilitation of Boreholes in Ten Provinces of Zambia - Financial Proposal*”.

### **(c) Assessment Processes of Submitted Proposals**

After the opening, each proposal will be assessed first on its technical merits and subsequently on its price. Responses deemed not to meet all of the mandatory requirements will be considered non-compliant and rejected at this stage without further consideration. Failure to comply with any of the terms and conditions contained in this ToR, including provision of all required information, may result in a response or proposal being disqualified from further consideration. Final decision on the evaluation/proposal assessment will rest with UNICEF.



#### (d) Technical Evaluation

The Technical Proposals will be evaluated as per the below evaluation criteria:

Technical Proposal		
No.	Criteria	Max. Points
<b>1.0</b>	<b>Overall response</b>	<b>5</b>
	(i) Demonstrated understanding of and responsiveness to the project requirements	2.5
	(ii) Overall clarity and completeness of the proposal	2.5
<b>2.0</b>	<b>Proposed Approach, Methodology and Workplan</b>	<b>30</b>
	(i) Adequacy of the proposed implementation approach/ methodology/workplan	15.0
	(ii) Structure of the team(s) to be deployed for drilling (e.g. siting, drilling, pump testing, pump installation, civil works)	10.0
	(iii) Approach/methodology for compliance with labour laws, Environmental, Social, Health and Safety (ESHS) and Prevention of Sexual Exploitation and Abuse (PSEA) requirements	5.0
<b>3.0</b>	<b>Organizational Capacity</b>	<b>35</b>
	(i) Organizational expertise and experience in works of similar nature and complexity completed over a minimum of five (5) years	10
	(ii) Capacity – personnel resources	5
	(iii) Capacity – equipment resources	5
	(iv) Financial capacity (annual turnover, ability to finance the works upfront)	10
	(v) Litigation/arbitration history or history of non-performing contracts	5
<b>Total</b>		<b>70</b>

It is recommended that the bidders undertake site visits to the target districts, at their own cost, to acquaint themselves with the locations and conditions on the ground. These visits, however, will not be given points while evaluating technical proposals.

#### (e) Evaluation of financial proposals

Only proposals which receive a minimum of 49 points under the technical evaluation will be considered technically compliant and be eligible for the second phase (financial review).

The total amount of points allocated for the price component is thirty [30]. The maximum number of points will be allotted to the lowest price proposal that is opened and compared among those invited firms/institutions which obtain the threshold points in the evaluation of the technical component. All other price proposals will receive points in inverse proportion to the lowest price e.g.:

$$\text{Score for price proposal X} = \frac{\text{Max. Score for price proposal} \times \text{Price of lowest priced proposal}}{\text{Price of proposal X}}$$

**Note:** Minimum qualifying mark for technical proposals is 49. In normal circumstances, only those offers that score minimum and above points on technical proposals will be considered for commercial evaluation. However, UNICEF reserves the right to evaluate all commercial offers and/or shortlist selected suppliers from among those who score minimum and above technical scores.

**(f) Final computing of proposal score**

Total proposal scores will be consolidated as follows:

<b>Evaluation of proposal</b>	<b>Maximum points</b>
Technical evaluation of proposals	70
Cost / Financial proposal	30
<b>Total</b>	<b>100</b>

The proposal with the best overall scoring, composed of technical responsiveness, merit and price, will be recommended for approval. UNICEF will notify the selected firm/institution by email when the evaluation and award process is completed.

**Prepared by:** Douglas Abuuru, WASH Specialist

**Reviewed by:** Murtaza Malik, Chief, WASH Section and Htay Htay, Supply and Logistics Specialist

**Approved by:** Shadrack Omol, Deputy Representative



# Annex-1: Technical Specifications for Borehole Drilling

## 1. General

The Contract is for the drilling and construction of boreholes with related civil works and installation of handpumps for development of the same into fully finished water abstraction points for drinking water supply to the target districts. Thus, the Contractor shall be responsible for geophysical siting, drilling, installation of casings and screen, gravel pack installation, grouting, well development, pumping tests, construction of aprons, drainage and soakaways, installation of hand pumps, training of the pump caretakers and providing maintenance and specialist tools kits for handpump repair.

Access to many drilling sites may involve difficult access conditions. It is expected that the drilling contractor make allowances for this as part of the drilling cost. The contractor should carry out a reconnaissance if they are uncertain of access; no consideration will be given to difficult access after the contract is signed.

## 2. Geophysical Investigation and Siting

The contractor will employ a well experienced hydrogeologist/geophysicist with a proven track record in borehole siting and identification for rural water supply projects. The Contractor is not allowed to start drilling unless the supervision consultant has confirmed that the drilling site is located correctly including community agreement on the final location of the borehole site. Drilling sites will be identified with clear markers labelled with a position reference from the geophysical survey.

A dual approach geophysical method must be employed which comprises electromagnetic traversing or resistivity traversing. In most communities a minimum of 1 km of traversing will be required to generate sufficient sites for investigation. The traversing should be followed by Vertical Electrical Sounding (VES) soundings over anomalous areas identified by the traverses, the VES sounding should investigate to a depth of 80 metres below ground.

The geophysical report will include:

- (i) Name and Date of community visited;
- (ii) Description of the topography and geology of the areas;
- (iii) Assessment of the accessibility of the community for a drilling rig
- (iv) Details of the Vertical Electrical Sounding (VES) for the priority site and the backup site;
- (v) Indication of which VES is the A, priority site and the B, backup site;
- (vi) GPS coordinates for the A and B sites;
- (vii) Interpretation of the VES in terms of the geological layers and estimate depth of the layers;
- (viii) Description of the geophysical activities; and
- (ix) Details of the geophysical traverses with GPS coordinates.

All this data will be described on a single sheet of A4. The geophysical data must also be compiled into an Excel spreadsheet which should list the locations and GPS coordinates for the A and B sites. The coordinates must be recorded in decimal degrees and the datum to be used should be WGS84.

It is expected that no site shall be within 30m metres of a potential contaminants such as latrines or burial areas, in areas with sand formations the distance to potential contaminants should be increased to 50m. The sites must also be assessed in terms of potential vulnerability to damage and/or contamination due to surface water flow. The Project Consultant will visit each site and carry out an independent assessment of the suitability of the site.

The borehole drilling location should also be located with reference to the access to the site, if there are waterlogged “dambos” or other access issues such as heavily wooded areas all issues related to access to the sites identified by the contractor must be recorded so that any access issue can be resolved before the drilling rig mobilises.

Boreholes codes in a prescribed format will be given to the geophysical siting crew; these must be used as a unique reference to coordinates construction activities

### **3. Supply of Hand Pumps, Manual and Tools**

The hand pumps shall be India Mark II or Afridev manufactured to RWSN/HTN specifications Revision-2 2007. The pumps should be suitable for installation in boreholes lined with rigid PVC casing with a minimum nominal diameter of 100 mm.

Each pump to be complete for installation including pump rods and riser pipes. Stainless steel riser pipes and rods shall be of 304 grade stainless steel with AISI 304 or BS304S15. uPVC riser pipes shall be of SKAT-RWSN Specifications Rev. 5:2007

The Afridev or India MK II hand pumps shall be ordered and delivered from a manufacturer/supplier approved by the supervision consultant and UNICEF prior to the placement of orders. Moreover, the contractors will be required to provide material testing certificate before any order is placed. The material for the handpumps will also be tested at the point of manufacture and on arrival in Zambia.

It should be noted that where 5” casing is installed, a telescopic pedestal will need to be procured due to the additional diameter. The stainless-steel components will also need an adapted tool kit designed for working with stainless steel components and adapted “lifters” to prevent damage to rising mains during installation.

### **4. Delivery and transport of pumps, pipes and other construction material and equipment**

Handpump shall be installed on the successful boreholes, after approval by project consultants. All items will be inspected on delivery to the project areas (s) and approved by the project consultant. Components damaged, contaminated with fuel or otherwise soiled during transportation will be rejected.

### **5. Personnel, drilling equipment and safety equipment**

The contractor shall provide capable and experienced personnel to perform this work, while putting in place adequate health and safety measures in line with local regulations and taking all reasonable precautions to prevent any death or injury to persons. The contractor shall ensure that the site is not accessed by any unauthorized persons and a perimeter shall be set up around the site to prevent unauthorized access;

The contractor must get all the requisite insurances. GRZ and UNICEF shall not be liable for any damages or compensation as a result of accident or injury to any workers employed by the contractor, any sub-contractor or any unauthorized persons unless such accidents or injury is caused by an act or default of GRZ and UNICEF or of nominated representatives of GRZ and UNICEF. The contractor shall ensure the site is left clean and tidy with all pits dug to facilitate drilling back-filled and levelled. Abandoned or dry boreholes must also be back-filled; and

All drilling contractor permanent and casual staff are subject to UN rules regarding their behaviour while working and camping close to the communities. It is vital that the contractor clearly understands the UNHCR Codes of Conduct and that in particular the Prevention from Sexual Exploitation and Abuse. The contractor must ensure that prior to mobilisation or when hiring local staff that they understand that any action (suggested, implied or perceived) that would suggest or imply that a sexual act might be demanded as a condition for protection and material assistance or services is a major offence that could lead to the cancellation of the drilling contract. The Contractor must read this section in conjunction with the ESHS requirements in Annex 5.

## **6. Storage and transport of fuel and lubricants**

The contractor shall comply with local authority regulations applicable to the use and storage of diesel, petrol, paraffin fuel and lubricating oil found at the work site or stored at the base camp. He shall ensure that adequate measures are taken to comply with local environmental regulations and precautions are taken against fire and environmental contamination. No fuel or lubricant must be transported with any item to be installed in the borehole, in particular casing, handpump components and screen filter pack.

## **7. Mobilization and demobilization**

The item for mobilisation to the drilling area shall include moving the drilling unit and all other equipment, materials and stores from the point of origin to the base camp(s) and setting up the base camp(s); and movements between drilling sites within the project area. The contractor shall clean up the drill site before demobilization and ensure that any damage to roads or fields made during access to the drill site is restored. The contractor is again urged to visit the sites in order to cost the mobilisations, in particular where there are possible water-logged areas that restrict access to certain areas to the dry season and where there are heavily wooded areas that will require clearing the access roads. It should be noted that the initial mobilisation from return demobilisation to the project area(s) should be included in the individual mobilisation between sites.

## **8. Borehole Drilling**

The drilling is based on a Linear Metre (LM). The drilling meterage will be based on the installed depth and will not account for metres of drilling lost due to collapse. During drilling an additional 2 metres will however be drilled to allow for potential collapse during installation of casing and screen; these extra metres can be included in the depth drilled.

The contractor must only start drilling with explicit approval of the project consultant and drilling should only be conducted in the presence of representative of the supervision consultant, it should be noted that drilling and construction works carried out with an authorised representative will not be countersigned on the supervision forms.

The contract will make no payment for dry boreholes, this includes boreholes where geophysical surveys have been conducted and where boreholes do not have sufficient yield and water quality does not comply with Zambian Bureau of Standards (ZABS) and World Health Organisation (WHO) limits; however, an allowance will be made with regard to Iron, this will be based on the community accepting the water quality.

When the water quality fails ZABS, the contractor will drill a second borehole at their expense. If the second borehole also fails due to water quality the contractor will select the borehole with better quality and propose remedial water quality improvement solutions that can be accepted subject to the recommendations of the Project Consultants/Districts/PDHID.

Final invoices for each borehole will only be certified once a hand pump has been installed and full construction supervision reports/forms are presented that include: siting, drilling, development, yield test, civil works construction, pump installation and water quality reports and forms have been submitted. All supervision paperwork **must** be signed by the contractor and employers' representative. Water analysis must be done at an accredited laboratory in Zambia such as the National Institute for Scientific and Industrial Research (NISIR) or the University of Zambia (UNZA) water quality testing laboratory or another laboratory approved by the project consultant. Bacteriological sampling to test for the presence of faecal coliforms must be done on-site by using testing kits approved by the Project Consultant as well as by a laboratory approved by the project consultant, the onsite testing must be carried out by staff or subcontractors trained in bacteriological testing.

In all formations the diameter of the hole in the screened zone and down to the bottom of the borehole should be a minimum 8" or 203 mm in order to make sufficient annular space for filter pack in the annulus between the hole and the screen (113 mm). Where yields beyond 1.0 litres per second are intersected, based on V notch yield, the drilling diameter is to be increased to 12" or 304.8 mm. The tenderer must be able to drill using mud rotary and air percussion drilling in the same borehole, hereinafter referred to as "combination drilling". Where Kalahari or fine sedimentary formation are intersected with hard formation below combination drilling will be necessary, followed by installation of temporary casing, in these cases the borehole is to be completed at 8" to the end of the borehole, this will necessitate reaming to 12" to allow 10" temporary casing to be installed so that the 8" drilling bit can pass freely. It is expected that mud rotary and combinations drilling will be needed in the Kaoma and Kenani areas however other areas with unstable upper zones may also require combination drilling.

As the boreholes are planned to be mechanised in the long run, they shall be cased with high impact-resistant uPVC plastic casings and screens specifically manufactured for boreholes according to the NRWSSP guidelines. The casings for the boreholes must have an inner diameter of either 100mm (4 inch) or 127 mm (5 inch) and a PVC pipe wall thickness of at least 6mm, i.e. (127/141 mm, Standard DIN 4925). The inner diameter and wall thickness shall be the same as for the plain casings;

The drilling diameter for the completed borehole will be 8" (in hard formations) or 10 inches (in loose formations) for borehole installed with 4" casing and 12" for boreholes to be installed with 5". Please note that the drilling diameter refers to the end of the borehole and not the upper section;

It is essential that the borehole is straight and vertical to allow the installation of the pump without difficulty. If required by the project consultant the contractor shall demonstrate the verticality and alignment using a 3m dummy, if the dummy fails to move freely the contractor will be obliged to correct the verticality or drill a replacement borehole at their own expense.

The following borehole drilling and construction procedures will apply:

Item	Procedure	Yield	Base specifications	Comments
1.	Drilling and equipping with hand pump	Sustainable yield $\geq 0.2\text{l/sec}$	8"/203mm drilling diameter, gravel pack or 10"/254mm in Kalahari or fine sedimentary formations 4"/100 mm Internal Diameter (ID) uPVC casing and screen, end cap	Same as NRWSSP guidelines for hand pumps
2.	Drilling and equipping handpump and for future electric submersible pump installation	Sustainable yield $\geq 1.0\text{l/sec}$	10"/254mm drilling diameter, gravel pack, or 12"/30.48mm in Kalahari or fine sedimentary formations 5"/127mm ID uPVC casing and screen, end cap	The increased diameter is essential to provide pump protection (filter pack) and prolonged life.

Please note that the drilling diameter refers to the End of the Hole (EOH)

Screen casing shall have a slot size of 0.3 mm for Kalahari formation, 0.5mm slot size in alluvial and other sediments. In hard rocks 1 mm slot size shall be used (Standard DIN 4925). The casing and screen must be approved by the project consult prior to mobilisation to site; this must include certification and testing documentation. The casing and screen must also be approved once delivered to the project area. The required characteristics of UPVC casing and screen are as follows:

Reference	Characteristics	Standard
Material	uPVC of quality without lead stabilizer, mass additives maximum 3 %, elasticity module 3,000 N/mm <sup>2</sup> , tensile strength 45-55 N/mm <sup>2</sup> .	DIN 8061
Inner/outer diameter	100/114mm and 127/139mm	DIN 8062 DIN4925
Wall thickness	6 mm (minimum)	DIN 8062
Screen	Screw flush joints, traction resistance 2,000 kg	DIN 4925
Screen slots	0.3, 0.5 and 1 mm openings, open area minimum 9%	DIN 4925
Compressive strength	Minimum 17 bars	DIN 19532

The casing and screen must be approved by the supervising consultant prior to mobilisation and when delivered to the project base camp.

Temporary casing made of steel shall be installed in unstable overburden and sediments before drilling the basement. Temporary steel casing should have screwed flush joints however welded section will be allowed. The Contractor shall ensure that it is of sufficient diameter to enable drilling of the complete borehole at the required diameter, together with installation of permanent borehole casing, screen, and for placing the gravel pack.

For successful boreholes, the temporary casings in the soft formations shall be removed from the hole, as soon as the borehole has been completed, unless the on-site Employer's representative instructs the Contractor to do otherwise, based on the nature of the geological formation.

Temporary casing installation and removal must be priced into the drilling cost. No separate item will be invoiceable. This also includes any temporary casing that cannot be removed from the borehole.

## **9. Joints, Centralizers and Bottom Plugs**

All casings and screens shall have screwed flush joints with sturdy threads, either curved or angular with no eccentricity to allow for easy handling.

Centralizers certified by the project consultant and shall be fitted to casing and screen at 6m intervals, it should be noted that centralizers for 5-inch OD boreholes will also be necessary and may not be easily available in Zambia.

Casings shall be installed under "extension" meaning that once they reach the bottom of the hole the casing and screen string is raised by 300mm above the bottom and held in suspension whilst gravel is inserted.

A bottom plug shall be fitted on the lower end of the screen or casing per NRWSSP guidelines. The use of a concrete plug with uPVC casing is not allowed, the bottom plug should be a dedicated unit glued to the bottom of the first casing.

## **10. Borehole Sampling and Data Collection**

During drilling, samples of unwashed drill cuttings shall be collected at 1 m interval and laid out in rows of ten from left to right. A representative sample of every distinct horizon or change of rock type as directed by the Project Consultants shall be packed and stored in solid polythene bags and accurately labelled with the name of the community, borehole number, date and depth of sampling as per WARMA guidelines.

## **11. Rate of Drilling**

Accurate records of penetration rate per metre shall be maintained. The drilling contractor must nominate a member of staff to record the data and provide a good quality stopwatch to record the penetration rates. A different form is to be used for DTH and Mud rotary drilling, this form should also include mud viscosity based on March funnel readings and when water/drilling polymer is added to the mud reservoir. If Mud rotary drilling is used followed by DTH, the Mud rotary form should be continued. All form format will be provided by the project consultant's representative, it is the responsibility of the contractor to copy the forms and have them available at each site.

## **12. Interim Yield Tests**

Where DTH drilling is carried out the yield should be measured using a V notch weir with a quarter ninety (22.5 Degree V Notch). Interim yield tests shall be carried out at the end of each drilling rod after the first water strike. The borehole should be blown for 5 minutes to accurately measure the yield on the V notch weir.

## **13. Final Drilling Depth**

The representative from the project consultants has the responsibility for determining the final drilling depth according to indications provided by the hydrogeological and geophysical survey and analysis of drill cuttings on site.

The installed depth shall be the depth invoiced plus 1.0 metres to allow for the casing string to be pulled upwards so that it is hanging and also to allow for the cost of the casing above ground. The on-site representative has the right to ask for the casing and screen to be removed if any collapse offsets the depth of the screens in relation to man water strikes.

## **14. Identification of the Drilled Boreholes**

The Contractor shall mark the borehole code given by the on-site Employer's representative on the borehole casing, using a permanent water-proof marker; this should be clearly visible to avoid confusion during subsequent construction activities.

## **15. Filter pack**

Boreholes shall be filter packed with clean, well-rounded quartz gravel, ranging in size from 1mm to 4mm for both the alluvial areas and the harder rocks, were Kalahari formation or loose sediments are intercepted finer filter pack must be installed with a grain size range from 0.5mm to 2mm. Filter pack consisting of any type of crushed stone, weathered material or aggregate will not be accepted. Depth of gravel installed must be accurately measured and recorded on the formwork.

The size of the filter pack for Kalahari and fine sedimentary formations is an essential element in the design; it must be emphasized that contractors must procure sieves of the correct size (0.4mm and 2mm) prior to mobilization and locate suitable gravel pack sites at the earliest opportunity. The installation cost will be per borehole, the cost of installation in relation to the volume of gravel pack must be estimated and costed by the contractor, it must be emphasised that installation of gravel pack in 10" and 12" is significantly more than for 8" boreholes. Where temporary casing has been used, the filter pack must be inserted into the annulus between the temporary casing and the borehole casing. The installation of the pack should be done at 3m intervals, then the temporary casing pulled out, this will prevent the collapse of the formation directly onto the borehole casing and screen.

The location and transport of the gravel pack is the responsibility of the contractor, it is highly recommended that during the site visits that the location and the cost of sieving/transport is factored into the unit cost for gravel pack installation.



## 16. Sanitary Seal

The sanitary seal shall be made of cement-bentonite grout. Quick-hardening cement is NOT allowed for sanitary seal of the uPVC casing since the heat production is increased and may cause damage on uPVC.

Bentonite shall comprise 4% by weight of the cement. First, bentonite shall be mixed with water, then cement shall be added and the grout mixed thoroughly until it forms thick slurry free of lumps. The grout shall be placed outside the casing, using a grout pump and pipe, in one continuous operation, from the bottom and upwards.

The grout seal shall be installed to a depth of 6 – 8 metres below ground level. It is essential that when the filter pack is installed that the level is measured during installation so that when the filter pack reaches 8 metres below ground level the annular space can be grouted.

## 17. Backfilling and Borehole Capping

All permanent borehole linings should be completed 600 mm above ground level, capped and protected with a borehole chamber with a lockable metal lid. It must be underlined that it is the contractors' responsibility to protect the borehole from vandalism until it is handed over. Any permanent damage resulting from the borehole not being safely secured will result in the contractor having to replace the borehole at their expense.

Unsuccessful boreholes due to non-compliance with the Technical Specifications, loss of tools, accidents or any other cause shall be backfilled and the site restored to its previous state. This is the responsibility of the Contractor and will be carried out at their own expense.

## 18. Borehole Development

Borehole development shall be carried out using the jetting method, it is essential that the jetting tool is moved continuously against the screened section of the installed borehole. Any damage caused by development procedures shall be rectified to the satisfaction of the supervision consultant.

The jetting tool which can be fabricated on site using a 1.5" pipe, which should have a stopper attached to the base and 4 holes of 8 – 10mm diameter drilled into the metal pipe at 90 degree angles around the jetting pipe. It is essential that the driller user high quality class 6 polypipe and NOT hydraulic pipe so that the jetting tool and pipe is not too heavy and can be raised and lowered against the screens. The jetting tool must be approved by the supervising consultant before mobilisation to site.

The minimum development time shall be three hours. Sediments and other materials falling to the bottom of the borehole during the development shall be removed by airlifting or bailing after the completion of the development. Development shall only be considered complete when the water is clear and free of sand. **NOTE** – There is no maximum development time, the end of development will be based on water clarity and no visible sand or silt. It should be noted that installation of unwashed gravel pack will result in increased development time especially where the screen slot width is 0.5mm and 0.3mm.

## 19. Yield Testing

A Six-hour uninterrupted Constant Rate Test (CRT) shall be carried out with a suitable submersible pump which can abstract water at a 50 metre head at 1.0 litres per second (l/s), this shall be followed by a recovery test to 90% of original Static Water Level (SWL). It must be noted that a constant rate test requires a constant rate of plus or minus 10% of the pumping rate, as the water levels falls adjustment of the pumping rate will be necessary but restricting the water flow. Where the flow rate falls or is greater than 10% of the required rate the supervising consultant can order to test stopped and the test to be repeated after the water levels recover.

If the CRT fails at 0.5 litres per second the test shall be repeated at 0.2 litres per second. This will then be followed by a recovery test to 90% or available drawdown. The minimum duration for the recovery test shall be 30 minutes even if 90% recovery is reached;

For high yielding boreholes, a more powerful submersible pump should be available to carry out yield test of up to 2 l/s based on instruction from the consultant. The number of higher yield tests is estimated in the BoQ but will vary based on the drilling results. In order to carry out higher yield pumping tests at the correct yield, it will also be necessary to carry out a calibration test where the yield will be gradually increased from 0.5l/s to 3l/s, the point at which the drawdown start to increase rapidly will indicate the yield for the CRT. After the calibration test, the aquifer must be allowed to recover to 90% of available drawdown.

In order to carry out higher yield pumping tests at the correct yield it will also be necessary to carry out a calibration test where the yield will be gradually increased from 0.5l/s to 3l/s, the point at which the drawdown start to increase rapidly will indicate the yield for the CRT. After the calibration test the aquifer must be allowed to recover to 90% of available drawdown.

The higher yield test procedure for the will be the same as 4.4.2 CRT pumping test. The decision to use a higher yield pumping test will be based wither on the v notch weir flow measurement or if the pumping test at 0.5l/s creates very little drawdown, then the supervisor will instruct the contractor to use a higher yield;

For handpumps, 0.2 litres per second test will be accepted as minimum yield followed by a recovery test to 90%. Lower yields will only be accepted based on the condition listed below for successful borehole.

If after drilling two boreholes one of the boreholes has a yield below 0.2l/s there will be exceptions. The exceptions will be based on the following criteria:

- (a) The only protected water source for the community is over 1,000m away,
- (b) The 0.2 litres per second pump test shall last at least 60 minutes,
- (c) The water level shall recover 5 metres in the first 10 minutes of the pumping test,
- (d) The main water strike is below 25metres below ground level,
- (e) The water quality must conform to ZABS and WHO standards,

- (f) The conductivity of the water of the borehole shall be less than 2,500  $\mu\text{S}/\text{cm}$ . On site measurements of total iron shall indicate values within Zambian National guidelines.

## **20. Water quality testing**

The Contractor shall provide portable equipment to test for: pH, Total Dissolved Solids (TDS) and test strips for Iron and Nitrate for onsite water quality measurements at the end of each drilling phase. The equipment should be approved prior to purchase and before mobilisation. It is essential that the equipment is also calibrated there the necessary calibration solutions should be also available.

Water samples for laboratory analysis and on-site tests shall be taken at the end of the 4 hours of pumping test. One sample shall be used for onsite analysis for pH, conductivity, Iron and Nitrate.

The other samples shall be tested for the required parameters for drinking water according to the standard examination methods described in the national water quality testing guidelines.

The sample for Ca, Mg, Fe and Mn shall be conserved with  $\text{HNO}_3$  to pH <2. The pH shall be checked without contaminating the sample.

The TDS should be ascertained by measuring the conductivity of the water in the borehole. The maximum allowable conductivity shall be less than 2,500  $\mu\text{S}/\text{cm}$ . On site measurements of Iron and Nitrate shall be within the acceptable values of Zambia Bureau of Standards (ZABS), however allowances for Iron will be made based on community acceptability.

For the testing for faecal coliforms the Contractor should send an experienced technician. The tests for faecal coliforms should be done using a mobile testing incubator kit, such as those supplied by Del Agua; the testing equipment and technician must be approved by the project consultant.

## **21. Onsite data reporting data collection**

After completion of each construction activity the Contractor must ensure that the supervision forms are signed correctly. A record summarizing the data from the drilling of each borehole, including the GPS coordinates, and subsequent activities must be made.

Reporting guidelines/templates will be supplied by the supervising consultant. Borehole Completion reports must also be completed for successful and unsuccessful boreholes and submitted to WARMA. Registration of completed borehole is the drilling contractors' responsibility; this will includes the registration fee which as of May 2019 was K250 per borehole.

## **22. Civil Works Construction**

The successful borehole must be completed with a wellhead constructed around the casing and the installed hand pump pedestal. The pit for a concrete wellhead and pedestal will be 76cmx765cmx60cm deep concrete constructed according to the specification provided by supervision consultant. The concrete used in these headworks shall be B25 mixed in the proportion 3 wheel barrow stone, 2 wheel barrows river sand and 1 wheelbarrow of cement. It should be noted that the cement content is the volume of cement to fill a wheelbarrow and NOT a single 50kg sack.

The substructure shall comprise appropriate concrete foundation footings, aprons, drain channels and soak away boxes. The surfaces of aprons shall be provided with sufficient slopes to channel spilled water towards the soak-away as indicated in the drawings in Annex 4.

The foundation will be constructed from compacted stone mixed with 1 bag of cement and sand (base course screed or “blinding”). This layer will be watered and allowed to harden overnight before the concrete works begin.

Any blocks used in the construction will be tested by being soaked overnight then dropped from shoulder height; if the block breaks the batch will be rejected. Please refer to Annex 4 for details of the civil works construction.

### **23. Drainage works**

At the standpoint or where a handpumps shall be provided, the substructure shall comprise appropriate concrete foundation footings or apron, drain channel and soak away boxes. The surfaces of aprons shall be provided with sufficient slopes to channel spilled water towards the soak-away boxes as indicated in the drawings in Annex 4. It is essential that the end of the slope where the drain enters the soak-away is above ground; drains will be rejected and will be replaced at the contractors' expense if the level is below the ground;

The soak-away for both the hand pump and stand tap shall consist of a 1000x1000x800mm pit with sidewalls lined with 100mm (4") sand-concrete blocks with weep holes. The depth of the pit shall be 800 -1000mm deep filled in with hard stones of 50-75mm diameter.

### **24. Iron Filters**

Where the level of Iron is above acceptable levels an Iron Filter is to be constructed. The construction of the Iron filter can be modified in order for the main elements to be constructed off site. Modifications and construction methods for the Iron filter will need approval by the project consultant. Construction details are provided in Drawings 5 to 8 in Annex 4. It must be noted that the Iron filter relies on clean rounded quartz sand which must be free of weathered material and other minerals, especially mica.

A key element in the sustainability of the Iron filter is the operation and maintenance. It is the contractors' responsibility to also provide each community where an Iron filter is constructed with 2mm sieves for cleaning the sand. It is also the contractors responsibility to train the pump caretaker and local area pump minders in the operation and maintenance of the filter.

### **25. Quality of Works and Workmanship**

Formwork; shall have a maximum deviation from straightness of 10 mm, measured over a length of 2m. Formwork shall be made in such a way that surfaces will present smooth and clean. Sharp edges should be chamfered.

The concrete for the superstructure shall be mixed, using the following criteria:

- Fine aggregate (sand); 0.15mm to 9.5mm

- Coarse aggregate (gravel); 9.5 mm to 20.0mm
- Minimum cement content; 400 kg/m<sup>3</sup> for the pump foundation + platform + dwarf wall + drainage channel
- Compressive strength at 28 days; 25 MPa
- Ratio of cement: sand: gravel; Well pad - 1:2:4, Platform - 1:2:4; Dwarf wall - 1:2:4; Drain channel -1:2:4

The compressive strength of the cement will be tested by the project consultant using an impact hammer or “Schmidt hammer”, any civil works found to be below the standard after the curing period shall be removed at the contractor’s expense and new civil works constructed with the required strength at the contractors expense.

The concrete works shall be protected from rapid drying for fourteen (14) days by covering with polyethylene sheets or similar and watered daily. It is the contractor’s responsibility to ensure adequate water is available for curing the concrete daily for 14 days.

## **26. Handpump Installation, sterilisation and training**

The borehole installation depth will be based on the pumping test. The number of pump rods will depend on the Dynamic Water Level (DWL). The pump shall be set 4 - 6 m or a full riser pipe (3m) below the DWL.

The pump rods shall be of stainless steel 304 grade. All hand pump sets must come with a set of caretaker tool, for the standard and specialised tool kits the number to be supplied is detailed in the BoQ (Annex 2), the order will also include fast moving spares (2 of each). The fast moving spares will include all bolts, nuts and washers; all cylinder rubber seals and seats; chain assembly, bolt nut and spacer, bearings, handle axle, axle nut for India Mark II or Afridev handpumps..

After installation, each pump shall be subjected to one hour continuously pumping during which time a yield test shall be conducted. The borehole should then be left to rest for 20 minutes. A leakage test shall immediately follow where the water must start to flow after less than 3 strokes of the handpump.

The Contractor will sterilise each borehole using a chlorine solution to produce a minimum concentration of 200mg/l of active chlorine within the borehole. Care must be taken to ensure that the chlorine solution is evenly distributed throughout the borehole. The disinfection will take place immediately prior to the pump installation so that the disinfecting solution is removed from the borehole during the handpump leakage test and the hand pump components are sterilised.

## Annex-2: Bills of Quantities (BoQs) for Borehole Drilling

### **PREAMBLE AND NOTES**

#### **General**

1. The Bills of Quantities for each LOT are as follows:

Bill No.1	Preliminary and General
Bill No.2	Supple of Handpumps Manuals and Tools
Bill No 3	Provisional Sums
Bill No. 4	Drilling, Construction and Installation

2. The Bills of Quantities do not generally give a full description of the plant and equipment to be supplied and the services to be performed under each item. Tenderers shall be deemed to have read the Technical Specifications (Annex 1) and other sections of the tender documents and reviewed the Drawings and carried out site visits to ascertain the full scope of the requirements included in each item prior to filling in the rates and prices.

Rates and prices inserted in the Schedules shall be deemed to cover the work, finished and complete in all respects. The Contractor shall take full account in his rates and prices of all requirements and obligations, expressed or implied in all parts of the Contract, together with all incidental and contingent expenses, and risks of every kind involved in the proper construction of the Works. No claim for additional payment will be allowed for any error or misunderstanding in this respect.

The entered rates and prices shall be deemed to include for the full scope as aforesaid, including overheads and profit.

3. If Tenderers are unclear or uncertain as to the scope of any item, they shall seek clarification in accordance with the Instructions to Tenderers in the tender documents prior to submitting their tender.
4. The permanent Works shall be measured net notwithstanding any general or local customs except where otherwise specifically described or prescribed in the Contract and no allowance shall be made for waste, tolerance, prevention, working space or overbreak.
5. The method of measurement of the completed work for payment shall be in accordance with "Civil Engineering Standard method of measurement" CESMM3 third edition, 1995, published by the Institution of Civil Engineers of United Kingdom.

#### **Pricing**

6. Prices shall be filled in indelible ink, and any alterations necessary due to errors, etc., shall be initialed by the Tenderer. The tenderer may use the XL sheet version of the BOQ quantities which will be provided by the client.

Prices shall be fixed and firm for the duration of the Contract.

7. For each item, tenderers shall complete each appropriate column in the respective Bills, giving the price breakdown as indicated in the Bills.  

Prices given in the Bills against each item shall be for the scope covered by that item as detailed in the Technical Specifications, Drawings or elsewhere in the tender documents.
8. Where there are errors between the total of the amounts given under the column for the unit rates and the amount given under the Total, the former shall prevail and the latter will be corrected accordingly.  

Where there are errors between the total of the amounts of Bill Nos. 1 to 3 and the amount given in Grand Summary, the former shall prevail and the latter will be corrected accordingly.

Where there are discrepancies between amounts stated in figures and amounts stated in words, the amounts stated in words shall prevail.
9. Payments will be made to the Contractor in the currency or currencies indicated. Payments will only be made on completion of each borehole, this is to include installation. Currency fluctuations during the contract term are at the risk of the contractor.
10. Items left blank will be deemed to have been included in other items. The TOTAL for each Schedule and the TOTAL of the Grand Summary shall be deemed to be the total price for executing the Facilities and sections thereof in complete accordance with the Contract, whether or not each individual item has been priced.
11. When requested by the Employer for the purposes of making payments or part payments, valuing variations or evaluating claims, or for such other purposes as the Employer may reasonably require, the Contractor shall provide the Employer with a breakdown of any composite or lump sum items included in the Schedules.
12. The Tenderer shall be deemed to have taken into account all of the following in his tender prices and his construction programme:
  - (a) All recognised holidays, festivals, religious and other customs.
  - (b) Normal weather conditions.
13. No claim will be considered for further payment in respect of any work or method of execution which may be described in the Contract or is inherent in the construction of the Work as detailed on the drawings on account of:
  - (a) items having been omitted from the Bills of Quantities;
  - (b) any omission from the wording of the items or from clauses in the Preamble;
  - (c) no mention or such work or method of execution having been made in the Preamble.
  - (d) No presentation of signed supervision for each activity
14. The accuracy of the quantities given in the Schedules is not guaranteed and quantities given should not be taken as a guide for ordering materials. All quantities given in the Schedules may be subject to re-measurement, to the unit of measurement shown and at the rate inserted against each item and payment made of the re-measured items.



15. The Contractor shall execute all works in good weather conditions, and the whole cost thereof will be deemed to be included in the rates and prices.
16. Unless expressly stated otherwise, all rates and prices entered in the Bills of Quantities will be deemed to have included the following:
- (a) Labour and all costs in connection with the execution of the Works and the correction of defects until the expiry of the defects liability period.
  - (b) Construction plant, equipment and all costs in connection therewith.
  - (c) Sampling and testing materials and goods, testing workmanship, providing, storing, packing and transporting samples to and from the place of testing in accordance with the Specifications.
  - (d) Fixing, erecting, installing or placing of materials and goods in position.
  - (e) Disposing of surplus and unsuitable materials and goods and excavated materials, including stacking, storing, loading, transporting and unloading.
  - (f) All general obligations, liabilities and risks involved in the execution and maintenance of the Works set forth or reasonably implied in the documents on which the Tender is based.
  - (g) Establishment charges, overheads and profit.
  - (h) Complying with all the requirements of the Contract Documents.
  - (i) Compliance with WARMA borehole registration requirements
17. The rates and prices inserted by the Tenderer shall apply throughout the Contract to any location within the Contract and to any additional work ordered by the Employer.
18. The total quantity included in the final measurement of each item shall be measured to the nearest integer relative to that item, or to one decimal place if so indicated in the Bills of Quantities.
19. The sums inserted in the Bills of Quantities shall include for leveling; removing surplus material; providing and maintaining signaling, fencing and removal on completion, and access and drainage and de-watering where specified; and for reinstating the Works Areas to their original condition upon completion.
20. The Tenderer is deemed to have included in his price personnel to help the on-site Employer's representative (the supervising engineer) to fulfill his duties like level checking, checking quantities etc.
- He shall also provide to the on-site Employer's representative all equipment necessary, like measuring tape, leveling instrument and camping equipment (Tent and Bedroll. The details of the equipment are available from the supervision consultant.
21. The Tenderer shall include in his rates the preparation of as-built drawings for the works carried out based on the design drawings.
22. The Tenderer shall be permitted to execute project works during normal working hours from Monday to Friday between 08:00h and 17:00h and on Saturday from 08:00 to 12:00h.

Working during any other periods requires the approval of the Supervising Engineer and will require the Tenderer to reimburse the Supervising Engineer for the costs generated by the extended working hours at the rate agreed between the Client and the Supervising Engineer.

23. Abbreviations used herein shall have the following meanings:

mm = millimeter

cm = centimeter

m = metre

km = kilometre

m<sup>2</sup> = square metre

m<sup>3</sup> = cubic metre

kg = kilogram

l = litre

hrs = hour

Nos = Number

DWL = Dynamic Water Level

LS = lump sum

LM = linear meter

BH = per borehole

### **Bill Items Details**

#### ***Bill Item No. 1.1 Preliminary and Material Testing Expenses***

The contractor calculate a Lump Sum (LS) cost all sureties and insurance cover; site establishment (Including time-related costs); offices; workshops; storage sheds; living accommodation; compliance with labour regulations; ablution facilities; water supplies, power and communication; site notice boards etc.

#### ***Bill No. 1.2 Environmental and Social Safeguards (EP)***

All works under this bill shall be carried out in accordance with the Contractor's site specific Environmental and Social Management Plan which shall be consistent with the framework attached as Annex-5.

#### ***Bill No. 1.3 Labour and Health and Safety Safeguards (LHS)***

All works under this bill shall be carried out in accordance with the Contractor's site specific Health and Safety Management Plans which shall be consistent the framework attached as Annex-5.

### **Bill No. 2 Supply of Hand Pump, Manuals and Tools**

#### ***Bill Items No. 2.1 to 2.4. India Mark II or Afridev Hand-Pumps***

The hand pumps shall be India Mark II or Afridev manufactured to RWSN/HTN specifications Revision-2 2007. The pumps should be suitable for installation in boreholes lined with rigid PVC casing with a minimum nominal diameter of 100 mm. Each pump to be complete for installation including pump rods, riser pipes and stainless-steel cylinder. The Riser pipes, rods and cylinder shall be of Grade 304 Stainless Steel.

**The India MK II or Afridev shall be ordered and delivered from a manufacturer/supplier approved by the Employer prior to placement of orders. Cost to include delivery to site and installation.**

***Bill Item No. 2.5 Special Tool Kit***

India Mark II Special Tool Kit consists of the tools listed in the table below for each set:

	Item	Quantity
1	Self-Locking Clamp/ Heavy Duty Pipe Vice (32 mm GI	1
2	Water Tank Lifter	1
3	Coupling Spanner	1
4	Handle Axle Punch	1
5	Connecting Rod Lifter	1
6	Crank Spanner (M17 X M19)	2
7	Pipe Lifters –Set	3
8	Connecting Rod Vice	1
9	Chain Coupling Supporting Tool	1
1	Bearing Pressing/ Mounting Tool	1
1	Tool Box	1

***Bill Item No. 2.6 Standard Tool Kit***

The Standard Tool Kit consists of the tools listed in the table below for each set:

	Item	Quantity
1	Rod Die with Holder for(M12 X 1.75 Threads)	1
2	Die set (for 32 mm GI Riser Pipe)	1
3	300 mm Pipe Wrench	1
4	450 mm Pipe Wrench	1
5	600 mm Pipe Wrench	1
6	M17 XM19 Double Open-ended Jaw Spanners (17& 19 mm)	1
7	Screw Driver 300 mm Long	1
8	1 Kg. Ball Pein Hammer	1
9	Hacksaw Frame with 300 mm blade & 6 Spare Blades	1
10	Pressure type oil can (1/2 pint with oil)	1
11	Flat File 250 mm with (Wooden) Handle	1
12	Half Round File 250 mm with (Wooden) Handle	1

Item		Quantity
13	Multipurpose Grease	1
14	Glazed/ Graphite Grease	1
15	0-9 Number Punch 6 mm (for locking Valves)	1
16	Nylon Rope 3 mm thick (75 Metre)	1
17	Adjustable Spanner 250 mm	1
18	Wire Brush (may be found in Special Tool Kit)	1

**Bill Item No. 2.7 Tools for Caretaker**

The following tools are to be supplied in each set for the pump caretakers:

Item		Quantity
1	M17 XM19 Double Open-ended Jaw Spanners (17&19 mm)	1
2	Pressure type oil can (1/2 pint with oil)	1
3	Multipurpose Grease (1kg)	1
4	Adjustable Spanner 250 mm	1
5	Wire Brush	1

**Bill No. 3: Provisional Sums**

**Bill Item No. 3.1 Provisional Sum for Construction of Iron Filter and Supervision**

The number of iron filters to be constructed cannot be quantified exactly therefore a provisional sum will be paid for the construction iron filters based on a 10% estimate. The design and specification are per detailed drawings 5 to 6. The construction of the Iron filter must include the cost of supplying the community with a sieve to enable the community to clean the filter pack; this should have a 0.5mm mesh.

It is essential that the Iron filter be constructed to a high standard since the continued operation of the filter is integral the acceptance by the community of the water from the handpump which contains levels of Iron above acceptable levels. The main technical issues are detailed in the drawing 6, 7 and 8.

**Bill Item No. 3.2 Material Testing**

The contractor will provide a provisional sum cost for the material testing for the Stainless Steel handpump components or other materials. The testing will be done in the country of manufacture by a testing agency approved by UNICEF and the supervision consultant. The testing will be done on a representative sample of the stainless steel components.

When the handpumps are shipped to Zambia a representative sample of the components shall be tested to ensure that the tested samples in the country of manufacture are the same quality as the components shipped to Zambia.

Where a local supplier in Zambia is used testing of samples from the location of manufacture will also need to be carried out by an approved testing agency, this will be combined with testing of the stock held in Zambia to ascertain that they are the same material quality.

## **Bill No. 4 Drilling, Construction and Installation of Boreholes**

### **Bill Items 4.1.1 and 4.1.2. Mobilisation, Siting and Demobilisation**

This cost also covers the cost of the mobilisation from the place of origin of the contractor to the drilling area and demobilisation back to the same.

The cost of mobilization between the sites will be based on actual mileage.

### ***Bill Item 4.1.3 Geophysical Surveys***

The contractor will employ an experienced geophysicist or hydrogeologist to carry out geophysical surveys to locate two drilling sites at each location, a priority and a backup site. The methods used should NOT include water divining, the recommended methods are electromagnetic or resistivity traversing followed by resistivity soundings to locate a site with increase groundwater potential.

The contractor must complete a one page report detailing the results of the survey and the GPS locations for the (A) Priority Site and the (B) Backup site. It should be noted that geophysical surveys are a billed item and the survey must be carried out and reported in the format to be supplied by the Project Consultant.

### **Bill Item 4.2 Borehole Drilling**

The drilling diameter refers to the end of the borehole, not the upper section. The drilling is cost should be priced based on Linear Meter (LM) for the drilled boreholes, the invoiced quantity will be based on the installation depth of the casing and screen and will NOT account for collapsed metres. An additional 2 metres per borehole will be drilled at each borehole to allow for collapse during installation, these metres can be added to the drilled meters. The drilling diameter can only reduce below 10" where the formation is very unstable and temporary casing is needed, in these cases the borehole will need to be reamed to allow completion at the required diameters listed above. The contractor is advised to estimate the cost of installation, removal and possible lost temporary casing in the drilling cost.

### ***Bill Item No. 4.2.1 and 4.2.2 Drilling 8" or 10"***

The main drilling completion diameter for boreholes will be 8" for hard formations and 10" for loose formations; this will require a combination of DTH and Mud rotary techniques. It is expected that the contractor will be able to use both drilling techniques.

The estimated drilling depth ranges from 40 to 80 metres. The drilling meters for 10" are based on the linear meters of drilling for an average of 60m drilling depth, the BoQ item cost is based

on the estimated quantities of boreholes to be drilled per Lot. The drilling linear metre estimate in the BoQ item should be based on drilling to 60 metres at each site.

***Bill Item No. 4.2.3 Drilling 304.8mm (12")***

Where yields are intersected above 1.0l/s the contractor will be requested to install 5 inch casing, the contractor will then have to ream the borehole to 12" diameter. The drilling meters for 12" are based on the an reaming or drilling to 60m drilling depth, the BoQ item cost is based on the estimated quantities of boreholes to be drilled per Lot. This may also occur where collapsing formations are intersected. Drilling at 12" may be necessary for both mud rotary and air percussion.

**Bill Item 4.3 Borehole Lining and Installation**

The PVC casing and screens installed shall be new and unused. The casing and screens shall comply with the given specifications. Manufacturer's certificates of compliance to the given standard and norms shall be submitted to the Supervising consultant prior to supply of materials to site. No materials are permitted to be used for the works without the prior inspection and written approval of the Supervising consultant. The contractor can only invoice for casing and screen installed where the water quality and/or quantity is sufficient.

**Note - All boreholes will require a 3m sump made from plain casing. In sedimentary formations the sump must be increased to 6m this will be part of the 60 - 80m depth estimate**

***Bill Item No. 4.3.1 Supply and install 4 inch or 100/113mm casing***

The price covers supply and installation per meter of 100/113 mm PVC casing with flush threaded joints in compliance with and certified by the manufacturer as per DIN 4925. It is estimated that 70% of the installation metres will be plain casing. The BoQ estimate should be based on an installation depth of 80 meters. The BoQ is based on the estimated numbers of 4" boreholes per lot with 70% of the 60m installation depth comprising solid casing.

***Bill Item No. 4.3.2 Supply and install 100/113 mm PVC screens. Slot 0.3mm and 1 mm***

The price covers supply and installation per meter of 4", 112/125 mm screens, slots 0.3 mm and 1 mm with flush threaded joints in compliance with and certified by the manufacturer as per DIN 4925. It is estimated that 30% of the installation metres will be screen casing. The BoQ is based on the estimated numbers of 4" boreholes per lot with 30% of the 60m installation depth comprising screened casing; the exact number of casing with each slot width will vary per Lot.

The main slot width will be 1mm, however in Lot 2, Kaoma and parts of Nchelenge where fine sediments are intercepted this will reduce to 0.3mm due to fine Kalahari formations.

***Bill Item No. 4.3.3 Supply and install 5" or 127/140 mm PVC casing***

The price covers supply and installation per meter of 100/113 mm PVC casing with flush threaded joints in compliance with and certified by the manufacturer as per DIN 4925. It is estimated that 70% of the installation meters will be plain casing. The estimate should be

based on an installation depth is 80 meters. The BoQ is based on the estimated numbers of 4" boreholes per lot with 70% of the 60m installation depth comprising solid casing.

***Bill Item No. 4.3.4 Supply and install 5" or 127/140 mm PVC screens. Slot 0.5mm and 1 mm***

The price covers supply and installation per meter of 4", 112/125 mm or 5" 125/137mm screens, slots width 0.5 mm and 1 mm with flush threaded joints in compliance with and certified by the manufacturer as per DIN 4925. The main slot width will be 1mm; however in Kaoma and parts of Nchelenge where fine sediments are intercepted this will reduce to 0.5mm. The BoQ is based on the estimated numbers of 5" boreholes per lot with 30% of the 60m installation depth comprising screened casing; the exact number of casing with each slot width will vary per Lot..

***Bill Item No. 4.3.5 Supply and install centralisers screens for 4 inch casing***

The price covers supply and installation of non-corrosive centralizers suitable for 4 inch casing and screens. Centralizers shall be installed for every 6 meters in the sections with casing and screens.

***Bill Item No. 4.3.6 Supply and install centralisers screens for 5 inch casing***

The price covers supply and installation of non-corrosive centralizers suitable for 5 inch casing and screens. Centralizers shall be installed for every 6 meters in the sections with casing and screens.

***Bill Item No. 4.3.7 Supply and install bottom plug***

The price covers supply and installations of bottom plugs of PVC at the bottom of the borehole. Cement plugs poured into plain casing are not to be used.

***Bill Item No 4.3.8 Installation of gravel pack***

The price covers supply and installation of well sorted, well washed gravel with grain size 1-4 mm and 0.5mm to 2mm for Kalahari and fine sedimentary formations. The price is per borehole. The contractor should make estimates based on filling the annulus of the borehole with gravel pack to within 4m of the surface. The gravel pack must be composed of 90% quartz with less than 5% mica and no weather material or laterite.

**Note - It is strongly advised that the contractor makes every effort at an early stage to locate riverbeds and other deposits in the Provinces to abstract and sieve gravel pack. The contractor must also procure sieves of the correct size so that the correct size fraction can be obtained from source. The gravel pack can also be used during the civil works construction.**

***Bill Item No 4.3.9 Sanitary Seal and Grouting***

The sanitary seal and grouting must be installed using a mixture of cement and bentonite to prevent contamination from the surface water.

**Bill Item 4.4 Development and Test Pumping and Hydrochemical Tests**

***Bill Item 4.4.1 Cleaning and Development by jetting***



Borehole development shall be limited to jetting and airlifting methods only. Any damage caused by development procedures shall be rectified by the Contractor to the on-site Employer's representative satisfaction.

The minimum development time shall be three hours. Sediments and other materials falling to the bottom of the borehole during the development shall be removed by airlifting or bailing after the completion of the development. Development shall be considered complete when the water is clean and free of sand.

NO MAXIMUM DEVELOPMENT TIME IS SET AS THE DEVELOPMENT WILL ONLY BE CONSIDERED COMPLETE WHEN THE WATER IS CLEAR AND FREE OF FINE SAND.

#### ***Bill Item 4.4.2 Pumping Tests***

A six hour uninterrupted Constant Rate Test (CRT) shall be carried out with a suitable submersible pump approved by the on-site Employer's representative at 0.5 litres per second, this shall be followed by a recovery test to 90% of original Static Water Level (SWL). If the CRT fails at 0.5 litres per second the test shall be repeated at 0.2 litres per second followed by a recovery test to 90%.

The pump rate shall not fluctuate more than +/- 10% during pumping. In case of a breakdown of the equipment during the pumping test the borehole shall be allowed to recover to its static water level and for at least 6 hours or to the previous SWL.

#### ***Bill Item 4.4.3 High Yield Pumping Tests***

Where yields are intersected above 0.5 litres per second, the contractor will carry out higher rate pumping test to a maximum of 2 litres per second, the quantity estimate for this is 20% of the boreholes. The test procedure will be the same as 4.4.2 CRT pumping test. However, there will be a need to carry out a calibration test first to identify the CRT yield which will be done by gradually opening a valve to increase flow rate until the drawdown rate starts to increase significantly.. The decision to use a higher yield pumping test will be based wither on the v notch weir estimate or if the pumping test at 0.5l/s creates very little drawdown then the supervisor will instruct the contractor to use a higher yield.

#### ***Bill Item 4.4.4 Hydrochemical Tests***

This cost per borehole should cover the cost of the onsite measures of pH, EC, Nitrate and Iron; it should also cover the field bacteriological test and the Laboratory analysis.

### **Bill Item 4.5 Civil Works**

#### ***Bill 4.5.1 Construction of Civil Works***

The construction of civil works superstructure is to be carried out as specified in the technical specifications; the drawings of the civil works are detailed in drawing 1 - 4. The price covers all construction and curing activities. It should be noted that where 5" casing is installed a modified telescopic pedestal will need to be installed.

#### ***Bill 4.5.2 Carry out sterilisation***

The boreholes will be sterilised prior to handpump installation using granulated chlorine to the concentration and method detailed in the Technical Specifications.

***Bill 4.5.3 Installation of Handpumps***

The installation must be carried where the nominated pump caretaker is present. The sterilisation of the borehole will also take place during installation. See Technical Specification for details.

## Bill of Quantities Per Lot

See attached excel sheets

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### Summary of Prices per Lot

Description	Amount in USD
Lot 1	
Lot 2	
Lot 3	
Lot 4	
Lot 5	
Lot 6	
Lot 7	
Lot 8	
Lot 9	
Lot 10	
Lot 11	
Lot 12	
Lot 13	
<b>Total USD (figure)</b>	

## Annex-3: Technical Specifications for Borehole Rehabilitation

### 1. General

Generally, the supplied items shall be of durable material manufactured according to the ISO standard system or systems of similar or stronger requirements.

Wherever reference is made in the Technical Specifications to specific standards and codes to be met by the goods and materials to be furnished or tested, the provisions of the latest current edition or revision of the relevant standards or codes in effect shall apply, unless otherwise expressly stated in the Specifications. Where such standards and codes are national or related to a particular country or region, other authoritative standards that ensure substantial equivalence to the standards and codes specified will be acceptable. Indications of physical sizes and measurements shall be considered as minimum sizes, unless otherwise specified.

The Contractor shall ensure that the specifications and all documentation relating to procurement and installation of goods for the programme are prepared on an impartial basis so as to promote competitive tendering.

### 2. Specification of Works

#### 2.1 General

##### 2.1.1 Scope of Works

The Contract is for rehabilitation of boreholes equipped with and hand pumps (India Mark II or Afridev hand pumps, removing pump equipment, removal of dropped handpump components, re-development of the boreholes and re-equipping the same with Afridev or India Mark II hand pumps equipped with Stainless Steel downhole components from approved supplier. The borehole surround apron, drainage and soakaway will be rehabilitated/reconstructed where necessary to improved standard in order to ensure that the water abstraction points are protected for the purpose of drinking water supplies to rural communities, schools, health facilities and other institutions in the district.

***The definition of borehole rehabilitation is the correction of major defects and the replacement of equipment to enable a facility to function as originally intended. In Western Province the definition can be extended to include improvements on the original water point by the installation of anti-siltation measures and more complete development.***

**NOTE – The bills of quantities will be costed based on all works being carried out at each water point. It is assumed that NOT all works will be necessary at each water point and the rehabilitation forms need to reflect the actual amount of work. The client will decide on where any excess left within the contract sum is spent on other works or a lesser final payment for the total contract sum is agreed.**

The Contractor shall be responsible for removing the hand pump installation, well re-development, removal of dropped handpump components, pumping test, re-construction of aprons, drainage and soakaways, and re-installation of hand pumps.

Access to villages may involve difficult access conditions, it is essential that the contractor has a good 4x4 or 6x6 truck available to transport plant and construction supplies. It is expected that the contractor will make allowances for this as part of the rehabilitation cost.

The types of rehabilitation of boreholes can be classified into four scopes of works:

1. Rehabilitation where boreholes are blocked due to siltation/encrustation
2. Recovery of dropped handpump component
3. Repair or reconstruction of civil works
4. Major repair of handpump and installation
5. All of the above.

**Note – Combination of the above will occur frequently**

#### 2.1.2 Siltation

This type of rehabilitation will involve de-silting by use of an air compressor and replacing any worn handpump components.

Borehole rehabilitation due to siltation will comprise six stages:

- The blowing of compressed air using a jetting tool to dislodge accumulated silt from the borehole screen and surrounding gravel pack
- Flushing of the borehole to re-establish normal groundwater flow and to remove silt particles and sand/silt accumulation in the sump of the borehole dislodged during the final stage.
- Test pumping of the borehole at a constant rate of 0.5l/s or 0.2l/s, depending on borehole performance to establish the dynamic water level for hand pump installation
- Installation of measures to decrease vulnerability of the rubber seals within the handpump to damage due to silt.
- Possible installation of in situ gravel pack where siltation is a major issue.
- Reinstallation of handpump components with new parts where necessary

The complete scope of the rehabilitation of works shall include: removing the complete existing hand pump together with all pipes and pump cylinder; redevelopment of borehole; flush the borehole to remove silt sediments in the borehole; test pumping; water sampling; chlorinate the borehole and equip hand pump with new components where necessary.

Methods to decrease the problems due to siltation will be employed such as in situ gravel pack and geotextile screen attached to the cylinder. The methods will be agreed on depending on the location. All methods to be agreed with the project hydrogeologist.

#### 2.1.3 Recovery of Dropped Handpump Components

Dropped handpump component need to be recovered, the recovery techniques should be documented as a parallel project will be to increase awareness and technical ability for recovery in each District. The type of operation will almost certainly involve the installation of some new handpump components.

The complete scope of the rehabilitation of works shall include: removal of handpump components; recovery of dropped components, redevelopment of borehole; flush the borehole to remove silt sediments in the borehole; test pumping; water sampling; chlorinate the borehole and equip hand pump with new head assembly, riser pipes, cylinder and anti-siltation measures followed by rehabilitation of the concrete works on apron, drainage and soakaway.

#### 2.1.4 Civil Works

Many well-constructed boreholes which are reliable are no longer safe sources of water due to the civil works being broken or inadequate. Part of the contract will be to either repair or completely reconstruct the civil works according to the attached technical standards and drawings.

The rebuilding will follow the technical specifications and drawings provided in the contract. Any repairs should be made using the materials described in the BoQ and following the same technical specification detailed below for concrete and reinforcement.

In some cases the existing borehole has an existing garden at the end of the soakaway, if this is closer than ten metres but at least 3 metres from the borehole the length of the drain can be reduced and no soakaway installed; this will enable the excess water to flow onto the garden. In all cases this needs to be agreed with the client's representative.

### **LIST OF ATTACHMENTS**

<b><u>No.</u></b>	<b><u>DESCRIPTION</u></b>
ATTACHMENT NO. 1	BOREHOLE DEVELOPMENT FORM
ATTACHMENT NO. 2	PUMP TESTING FORM
ATTACHMENT NO 3	CIVIL WORKS RECONSTRUCTION FORM

## Attachment No. 1 Borehole Development

District:

Borehole Number:

Community:

Depth at start of Development:

m

Static Water Level:

m

Depth at end of Development:

m

Date:

Screen One:

GPS Location (Decimal Degrees/WGS84)

Screen Two:

E:

Casing Stick Up:

S:

### AIRS-JETTING

Cycle	Start time	End time	Cycle time (min)	BH depth (m)	Observations
1					
2					
3					
4					
5					
6					
Total cycle time (min)					

### OVER PUMPING

Cycle	Start time	End time	Cycle time (min)	Observations
1				
2				
3				
4				
5				
Total cycle time (min)				

.....

Contractor Representative

.....

District Representative

## Attachment No. 2 Borehole Pump Test Form

### BOREHOLE PUMP TEST FORM

Attachment No. 3

Name of Site: \_\_\_\_\_  
 Constituency: \_\_\_\_\_  
 Chief: \_\_\_\_\_  
 Borehole No.: \_\_\_\_\_  
 Drilled by : \_\_\_\_\_  
 Pump Tested by: \_\_\_\_\_  
 Grid Ref.: \_\_\_\_\_

Ward: \_\_\_\_\_  
 Province: \_\_\_\_\_  
 Date: \_\_\_\_\_  
 Total Depth: \_\_\_\_\_ Meters  
 S.W.L \_\_\_\_\_ Meters

Clock Time (hrs)	Elapsed time (mins)	Yield (pumping rate) litres/sec	Depth from surface to water (m)	Quality of water		Recovery level after Pumping		
				Clear	Turbid	Clock Time (hrs)	Elapsed time when pump stops (mins)	Water level (m)
	0						0	
	1						1	
	2						2	
	3						3	
	4						4	
	5						5	
	10						6	
	15						7	
	20						8	
	25						9	
	30						10	
	35						12	
	40						14	
	45						16	
	50						18	
	60						20	
	70						25	
	80						30	
	90						35	
	100						40	
	110						45	
	120						50	
	150						55	
	180						60	
	210						70	
	240						80	
	270						90	
	300						105	
	330						120	
	360							
	400							

Remarks:



## Attachment No. 3 Borehole Rehabilitation and Civil Works Construction Form

LOCATION:

Borehole Code:

District:

Ward:

Date:

### SUPERVISION ITEMS

The orientation of the drain is correct?

The foundation is at least 100mm deep and well compacted?

The aggregate is correct for the concrete (19mm)?

The correct reinforcement mesh is being used?

The cement is unopened and of approved quality?

The concrete mixing is being done correctly?

The concrete mix is 1:2:4?

The sand to be used does not contain fines or organic material?

Blocks for drain are of sufficient strength?

Rubble for soakaway is of the correct material?

The total amount of bags of cement used in the civil works?

Provision is made with the community to water the civil works?  
(It is the job of the contractor to provide water)

.....  
**CONTRACTOR**

.....  
**COMMUNITY**

.....  
**PLEASE PRINT NAME BELOW SIGNATURE AND DESCIBE POSITION IN COMMUNITY e.g.  
HEADMAN, CHAIRMAN OF WATER POINT COMMITTEE**

## Annex-4: Bills of Quantities (BoQs) for Borehole Rehabilitation

### PREAMBLE

1. The Bills of Quantities are for each of the twelve lots, and the District where works are to be carried out are detailed at the beginning of each lots. Each Bill is categorized as follows:

Bill No. 1	Supply of Hand pump spares, Manuals and Tools
Bill No. 2	Borehole Assessment; Dismantling of Borehole and Borehole Re-Development
Bill No. 3	Repair of Borehole Superstructure (apron, drain and soakaway) and Pump Installation.
Bill No. 4	Summary – Grand Total

2. The Bills of Quantities do not generally give a full description of the plant and equipment to be supplied and the services to be performed under each item. Tenderers shall be deemed to have read the Technical Specifications and other sections of the tender documents and reviewed the Drawings to ascertain the full scope of the requirements included in each item prior to filling in the rates and prices.

Rates and prices inserted in the Schedules shall be deemed to cover the work, finished and complete in all respects. The Contractor shall take full account in his rates and prices of all requirements and obligations, expressed or implied in all parts of the Contract, together with all incidental and contingent expenses, and risks of every kind involved in the proper construction of the Works. No claim for additional payment will be allowed for any error or misunderstanding in this respect.

The entered rates and prices shall be deemed to include for the full scope as aforesaid, including overheads and profit.

3. If Tenderers are unclear or uncertain as to the scope of any item, they shall seek clarification in accordance with the Instructions to Tenderers in the tender documents prior to submitting their tender.
4. The permanent Works shall be measured net notwithstanding any general or local customs except where otherwise specifically described or prescribed in the Contract and no allowance shall be made for waste, tolerance, prevention, working space or over break.
5. The method of measurement of the completed work for payment shall be in accordance with "Civil Engineering Standard method of measurement" CESMM3 third edition, 1995, published by the Institution of Civil Engineers of United Kingdom.
6. Prices shall be filled in indelible ink, and any alterations necessary due to errors, etc., shall be initialed by the Tenderer.
7. Prices shall be quoted in the manner indicated and, in the currency, specified, USD, in the tender documents.

For each item, tenderers shall complete each appropriate column in the respective Bills, giving the price breakdown as indicated in the Bills.

Prices given in the Bills against each item shall be for the scope covered by that item as detailed in the Technical Specifications, Drawings or elsewhere in the tender documents.

8. Where there are errors between the total of the amounts given under the column for the unit rates and the amount given under the Total, the former shall prevail and the latter will be corrected accordingly.
- Where there are errors between the total of the amounts of Bill Nos. 1 to 3 and the amount given in Bill No.4 (Grand Summary), the former shall prevail and the latter will be corrected accordingly.
- Where there are discrepancies between amounts stated in figures and amounts stated in words, the amounts stated in words shall prevail.
9. Payments will be made to the Contractor in the currency indicated. Payments will only be made on completion rehabilitation activities; this is to include installation of hand pump.
10. Items left blank will be deemed to have been included in other items. The TOTAL for each Schedule and the TOTAL of the Grand Summary shall be deemed to be the total price for executing the Facilities and sections thereof in complete accordance with the Contract, whether or not each individual item has been priced.
11. When requested by the Employer for the purposes of making payments or part payments, valuing variations or evaluating claims, or for such other purposes as the Employer may reasonably require, the Contractor shall provide the Employer with a breakdown of any composite or lump sum items included in the Schedules.
12. The Tenderer shall be deemed to have taken into account all of the following in his tender prices and his construction programme:
- (a) All recognised holidays, festivals, religious and other customs.
  - (b) Normal weather conditions.
13. No claim will be considered for further payment in respect of any work or method of execution which may be described in the Contract or is inherent in the construction of the Work as detailed on the drawings on account of:
- (a) items having been omitted from the Bills of Quantities;
  - (b) any omission from the wording of the items or from clauses in the Preamble;
  - (e) no mention or such work or method of execution having been made in the Preamble.
  - (f) No presentation of signed supervision for each activity
14. The accuracy of the quantities given in the Schedules is not guaranteed and quantities given should not be taken as a guide for ordering materials. All quantities given in the Schedules may be subject to re-measurement, to the unit of measurement shown and at the rate inserted against each item and payment made of the re-measured items.
15. The Contractor shall execute all works in good weather conditions, and the whole cost thereof will be deemed to be included in the rates and prices.
16. Unless expressly stated otherwise, all rates and prices entered in the Bills of Quantities will be deemed to have included the following:
- (a) Labour and all costs in connection with the execution of the Works and the correction of defects until the expiry of the defects liability period.
  - (b) Construction plant, equipment and all costs in connection therewith.
  - (c) Sampling and testing materials and goods, testing workmanship, providing, storing, packing and transporting samples to and from the place of testing in accordance with the Specifications.
  - (d) Fixing, erecting, installing or placing of materials and goods in position.

- (e) Disposing of surplus and unsuitable materials and goods and excavated materials, including stacking, storing, loading, transporting and unloading.
  - (f) All general obligations, liabilities and risks involved in the execution and maintenance of the Works set forth or reasonably implied in the documents on which the Tender is based.
  - (g) Establishment charges, overheads and profit.
  - (h) Complying with all the requirements of the Contract Documents.
- 17 The rates and prices inserted by the Tenderer shall apply throughout the Contract to any location within the Contract and to any additional work ordered by the Employer.
18. The total quantity included in the final measurement of each item shall be measured to the nearest integer relative to that item, or to one decimal place if so indicated in the Bills of Quantities.
- 19 The sums inserted in the Bills of Quantities shall include for levelling; removing surplus material; fencing and removal on completion, and access and drainage where specified; and for reinstating the Works Areas to their original condition upon completion.
20. The Tenderer is deemed to have included in his price personnel to help the on-site Employer's representative (the supervising Consultant) to fulfil his duties like level checking, checking quantities etc.
- He shall also provide to the on-site Employer's representative assistance with logistics and provide a fixed fee detailed in the Bill of Quantities.
- 21 Abbreviations used herein shall have the following meanings:
- mm = millimetre
  - cm = centimetre
  - m = metre
  - mbtc = metres below top of casing
  - km = kilometre
  - m<sup>2</sup> = square metre
  - m<sup>3</sup> = cubic metre
  - kg = kilogram
  - t = tonne (1000 kilograms)
  - l = litre
  - h = hour
  - no. = Number
  - LS = lump sum
  - LM = linear metre
  - BH = per borehole

## **Bill Items Details**

### ***Bill Item No. 1.1 Preliminary and General***

The contractor calculate a Lump Sum (LS) cost all sureties and insurance cover; site establishment (Including time-related costs); offices; workshops; storage sheds; living accommodation; compliance with labour regulations; ablution facilities; water supplies, power and communication; site notice boards etc.

**Bill No. 1.2 Environmental and Social Safeguards (EP)**

All works under this bill shall be carried out in accordance with the Contractor's site specific Environmental and Social Management Plan which shall be consistent with the framework attached as Annex-5.

**Bill No. 1.3 Labour and Health and Safety Safeguards (LHS)**

All works under this bill shall be carried out in accordance with the Contractor's site specific Health and Safety Management Plans which shall be consistent the framework attached as Annex-5.

**Bill No. 2 Supply of Hand Pump, Manuals and Tools****Bill Items No. 2.1 to 2.4. India Mark II or Afridev Hand-Pumps**

The hand pumps shall be India Mark II or Afridev manufactured to RWSN/HTN specifications Revision-2 2007. The pumps should be suitable for installation in boreholes lined with rigid PVC casing with a minimum nominal diameter of 100 mm. Each pump to be complete for installation including pump rods, riser pipes and stainless-steel cylinder. The Riser pipes, rods and cylinder shall be of Grade 304 Stainless Steel.

**The India MK II or Afridev shall be ordered and delivered from a manufacturer/supplier approved by the Employer prior to placement of orders. Cost to include delivery to site and installation.**

**Bill Item No. 2.5 Special Tool Kit**

India Mark II Special Tool Kit consists of the tools listed in the table below for each set:

	Item	Quantity
1	Self-Locking Clamp/ Heavy Duty Pipe Vice (32 mm GI	1
2	Water Tank Lifter	1
3	Coupling Spanner	1
4	Handle Axle Punch	1
5	Connecting Rod Lifter	1
6	Crank Spanner (M17 X M19)	2
7	Pipe Lifters –Set	3
8	Connecting Rod Vice	1
9	Chain Coupling Supporting Tool	1
1	Bearing Pressing/ Mounting Tool	1
1	Tool Box	1

**Bill Item No. 2.6 Standard Tool Kit**

The Standard Tool Kit consists of the tools listed in the table below for each set:

Item		Quantity
1	Rod Die with Holder for(M12 X 1.75 Threads)	1
2	Die set (for 32 mm GI Riser Pipe)	1
3	300 mm Pipe Wrench	1
4	450 mm Pipe Wrench	1
5	600 mm Pipe Wrench	1
6	M17 XM19 Double Open-ended Jaw Spanners (17& 19 mm)	1
7	Screw Driver 300 mm Long	1
8	1 Kg. Ball Pein Hammer	1
9	Hacksaw Frame with 300 mm blade & 6 Spare Blades	1
10	Pressure type oil can (1/2 pint with oil)	1
11	Flat File 250 mm with (Wooden) Handle	1
12	Half Round File 250 mm with (Wooden) Handle	1
13	Multipurpose Grease	1
14	Glazed/ Graphite Grease	1
15	0-9 Number Punch 6 mm (for locking Valves)	1
16	Nylon Rope 3 mm thick (75 Metre)	1
17	Adjustable Spanner 250 mm	1
18	Wire Brush (may be found in Special Tool Kit)	1

**Bill Item No. 2.7 Tools for Caretaker**

The following tools are to be supplied in each set for the pump caretakers:

Item		Quantity
1	M17 XM19 Double Open-ended Jaw Spanners (17&19 mm)	1
2	Pressure type oil can (1/2 pint with oil)	1
3	Multipurpose Grease (1kg)	1
4	Adjustable Spanner 250 mm	1
5	Wire Brush	1

**Bill Item No. 2.8 Supply of hand pump head assembly**

The price covers provision of hand pump head assembly. The contractor shall submit one sample of the hand pump head assembly for approval by the Project Consultant

**Bill Item No. 2.9 Supply of hand pump Cylinder**

The price covers provision of hand pump cylinder. The contractor shall submit one sample of the hand pump cylinder for approval by the Project Manager before placing order for toolkits to be provided for the project.

**Bill Item No. 2.10 Extra GI Pipes (Size 1 ¼ by 3m) and Pump Rod**

The price covers provision and installation of each additional GI Pipe and Rod, this price will apply where installation is below 30m are encountered.

**Bill Item No. 1.11 . Provision of Fishing Tools to District**

Each District is to be provided with a complete set of fishing tools, the tools to be provided will be agreed on by the Project Consultant who will be advising and documenting the rehabilitation programme.

**The contractor will purchase or manufacture a set of fishing tools to be left with each District, the types of tools to be left are:**

***Hook fishing tool attachment to fish out the rods of the hand pumps***

The price covers provision of **hook fishing tool attachment to fish out the rods of the hand pumps**. The contractor shall submit one sample of hook fishing tool attachment for approval by the Project Consultant before placing order for the project.

***Cup shaped fishing tool attachment to fish out broken pump rods***

The price covers provision of **cup shaped fishing tool attachment to fish out broken pump rods**. The contractor shall submit a sample of the cup shaped fishing tool attachment for approval by the Project Consultant before placing order for the project.

***Cup shaped fishing tool attachment to fish out a disconnected or broken riser pipes***

The price covers provision of **cup shaped fishing tool attachment to fish disconnected or broken riser pipes**. The contractor shall submit a sample of the cup shaped fishing tool attachment for approval by the Project Consultant before placing order for the project.

**Bill No. 3: Provisional Sums*****Bill Item No. 3.1 Provisional Sum for Construction of Iron Filter and Supervision***

The number of iron filters to be constructed cannot be quantified exactly therefore a provisional sum will be paid for the construction iron filters based on a 10% estimate. The design and specification are per detailed drawings 5 to 6. The construction of the Iron filter must include the cost of supplying the community with a sieve to enable the community to clean the filter pack; this should have a 0.5mm mesh.

It is essential that the Iron filter be constructed to a high standard since the continued operation of the filter is integral the acceptance by the community of the water from the handpump which contains levels of Iron above acceptable levels. The main technical issues are detailed in the drawing 6, 7 and 8.

### ***Bill Item No. 3.2 Material Testing***

The contractor will provide a provisional sum cost for the material testing for the Stainless Steel handpump components or other materials. The testing will be done in the country of manufacture by a testing agency approved by UNICEF and the supervision consultant. The testing will be done on a representative sample of the stainless steel components.

When the handpumps are shipped to Zambia a representative sample of the components shall be tested to ensure that the tested samples in the country of manufacture are the same quality as the components shipped to Zambia.

Where a local supplier in Zambia is used testing of samples from the location of manufacture will also need to be carried out by an approved testing agency, this will be combined with testing of the stock held in Zambia to ascertain that they are the same material quality.

### ***Bill No. 4: Borehole Assessment; Dismantling of Borehole and Borehole Re-Development***

#### ***Bill Item No. 4.1 and 4.2 Mobilisation from place of origin to borehole rehabilitation and maintenance area***

This cost also covers the cost of the mobilisation from the place of origin of the contractor to the drilling area and demobilisation back to the same.

The cost of mobilization between the sites will be based on actual mileage.

#### ***Bill Item No. 4.3 Dismantle and removing existing hand pump from Borehole***

Where the borehole information or record is not available, the contractor shall be required to measure the depth the overall depth and investigate the material of the lining after dismantling the fitted hand pump riser pipes and cylinder.

The removed pipes and hand pump components shall be cleaned and recorded and signed for on site. The hand pump components are property of the client and shall be surrendered to the client and signed for at the district centre.

#### ***Bill Item 4.4 Assessment of Borehole and Rehabilitation and Maintenance Works***

Once the borehole hand pump components have been removed an assessment of the works to be carried out will be made and agreed with the client's representative. This will include the decision as to works needed to rehabilitate the borehole. The assessment will also include a decision based on the condition of the civil works and hand pump pedestal and components. The decision for the works to be carried out shall be agreed on site.

#### ***Bill Item 4.5 Fishing out Handpump Components from the Borehole***

The contractor shall fish out hand pump components that have fallen into the boreholes and provide a set of fishing tools to the District rural water supply and sanitation units. The number of boreholes to be fished out will vary, as estimate of 20% of water points may have dropped component which



will need to be fished out. It may also be necessary to pull the pump components out which are stuck in the sand, this will require a strong tripod and a chain block or similar.

The contractor shall liaise closely with the Project Consultant and the District representatives and document the fishing procedure. The contractor will work closely with the district representative on the fishing procedure.

Where there are dropped components which are difficult to fish out the Project Consultant will assist with a downhole borehole camera in order to record how the pump components are lying in the borehole, the contractor will work closely and use the information provided and provide assistance to the consultant.

The contractor must complete a one-page report detailing the fishing procedure, describe type of tools used and time taken to recover.

**NOTE – OTHER TOOLS CAN ALSO BE SUGGESTED, THE PROJECT CONSULTANT WILL BE DOCUMENTING THE FISHING PROCEDURE AND WILL MAKE SUGGESTION AS TO THE TOOL NEEDED, ANY REASONABLE ADDITIONAL COSTS WILL BE COVERED BY A VARIATION ORDER**

#### ***Bill Item No. 4.6 Borehole Development / Re-development***

Borehole development is the process in which encrustation on the casing pipes is removed; development also flushes the borehole to remove silt and sediments in the borehole; test pumping; water sampling, sterilization of the borehole with high strength (HTH) chlorine compound, then the installation of agreed measures to retard inflow of silt into the hand pump cylinder and provide final information record. Agreed measures to retard inflow of siltation shall comprise the installation of a 6m pipe which shall be attached to the base of the cylinder, the pipe shall be cut with slots and a geotextile mesh wrapped around the screen.

It will be essential that the function of this filter is explained to the caretaker and the local pump minders so that when the flow rate diminishes the clogging of the filter is understood to be an expected and desired result as it will mean the filter is working to prevent damage to the cylinder.

The contractor shall in locations agreed upon by the District representative re-develop the borehole using the following procedure:

##### ***Step 1 Screen and Plain Casing Flushing (Continue till no sand is present in water)***

- Remove old pump from the borehole
- Fix the injector nozzle to the airline and lower the jetting tool down the borehole
- Move the jetting tool up and down the against the screen casings locations if this is documented. If no borehole design available move up and down again below water level to base of borehole. It is ESSENTIAL that the jetting tool is continuously moved against the screens. The project Consultant can advise on the design of the jetting tool.

##### ***Step 2 Flushing***

- Remove the jetting tool and remove the bottom plug, this will allow the air to be directed directly down.

- Mark the airline so at the depth of the borehole is marked on the airline then push the airline to 4m from bottom of the borehole.
- Open the compressed air and regulate the air pressure. The water will be pumped through the spout of the pump stand.

*Step 3 Blowing and Surging (60 Minutes)*

- Lower the airline to the bottom of the borehole and open the compressed air slowly. Push down to the base of the borehole.
- Regulate the air pressure and flow rate to bring the water just to the top of the pedestal and shut off the air. The water flows back into the borehole. Repeat this process 5 to 10 times. This produces a surging effect or reversal of flow through the screen openings so as to wash out the fines in the screens and the gravel pack.
- Repeat airlift blowing until sand free clear water is obtained.

*Step 4 Final Airlift Pumping (60 Minutes)*

- When the blowing is over, stop the airflow, pull the airline back to the pumping position and start the airflow again to obtain an efficient pumping.
- Finish up the redevelopment with a continuous airlift pumping for a minimum period of 30 minutes or until the water flows clearly.
- Before stopping the airlift pumping:
  - measure and record the final pumping yield of the well (the redevelopment yield)
  - measure and record the pumping water level
  - take a water sample for laboratory tests.

*Step 5 Recovery (Minimum duration 60 Minutes)*

- Once step 4 is completed, shut off the airline. Start up the stopwatch at the moment the airline is shut off.
- Measure and record the recovery of the water level in the well over the period of one hour at intervals of 1 minute for the first 10 minutes, 2 minutes interval for the next 10 minutes and 5 minutes interval for the next 40 minutes.
- Measure the final depth of the borehole.

**NOTE – In some cases where the borehole is drilled on hard formations and there is no risk or evidence of siltation or encrustation, redevelopment will NOT be necessary, this should only happen once the borehole has been assessed and no sediment or encrustation is found within the borehole casing.**

***Bill Item No. 4.7 Test Pumping***

A four-hour uninterrupted Constant Rate Test (CRT) shall be carried out with a suitable submersible pump approved by the on-site Employer's representative at 0.5 litres per second, this shall be followed by a recovery test to 90% of original Static Water Level (SWL). If the CRT fails at 0.5 litres per second, the test shall be repeated at 0.2 litres per second followed by a recovery test to 90%.

The minimum duration for the recovery test shall be 30 minutes even if 90% recovery is reached. The pump rate shall not fluctuate more than +/- 10% during pumping. In case of a breakdown of the equipment during the pumping test the borehole shall be allowed to recover to its static water level and for at least 6 hours or to the previous SWL.

During the pumping test the contractor shall disposal of all water arising from tested borehole by means of an impermeable pipe, flume or lined trench, to a point at least 50 meters downstream from the tested borehole in order to minimize the risk of recharging the well.

**NOTE – In some cases where the borehole has had no reported problem, pumping test will NOT be necessary.**

***Bill Item No. 4.8 Sterilize Borehole***

Before reinstallation of handpump components the borehole shall be sterilised using Chlorine. To ensure even distribution of Chlorine throughout the borehole HTH granules shall be used. The quantity used will create a concentration of 200mg/l of Chlorine in the entire borehole water column.

***Bill Item No. 4.9 Installation of Agreed Measures to Retard Siltation***

In cases where borehole siltation is identified as a reason for problems, agreed measures shall be taken. The measures taken will be based on internal gravel packs and filters attached directly to the cylinder and filtered by geotextile. The details of the procedures will be agreed during contract negotiation. The main cost will be the purchase of dedicate geotextile which may have to be imported, it is advised that the contractor get prices and ask for clarification form the project hydrogeologist in terms of the technical specification.

***Bill Item No. 4.10 Water Quality Testing***

Water samples for laboratory analysis and on-site tests shall be taken 12 hrs after sterilization of the borehole. One sample shall be used for onsite analysis for pH, conductivity, Iron and Nitrate. The other samples shall be tested for the required parameters for drinking water according to the standard examination methods described in the national water quality testing guidelines.

The final information record will document the works, the agreed supervision forms will be provided by the Project Consultant The data will include the redevelopment and test pumping records, overall borehole depth, static and dynamic water level and calculated installation depth.

**NOTE – ONLY DEDICATE GEOTEXTILE MATERIAL TO BE USED**

***Bill No. 5 Repair of Borehole Superstructure and Pump Installation***

***Bill Item No. 5.1 Repair or Reconstruction of Civil Works (apron, drain and soakaway)***

The works to be carried out are defined are repair or construction, construction is defined as the rebuilding of the civil works where repair is not possible. The contractor shall utilize the locally available masons/ artisans and the APM's where available. The prices shall include the wages for the local contractor and/or labourers.

Where the apron, drain and soak away are in disrepair the contractor shall repair the apron, drain and in necessary construct a soakaway. The moulds to be utilized for the new construction shall follow the standard MLGH Civil Works design and specifications. Based on agreement with the project Consultant modified moulds can be used that allow existing civil work to be rebuilt to agreed standards.

The ratio of the concrete to be utilized for the apron and drain is 1:2:4. The concrete shall be reinforced using conforce wire mesh 2mm mild steel, free from loose rust (rust has to be removed

with a steel brush). It must be emphasised that the ratio 1:2:4 equal one wheelbarrow of cement NOT one bag of cement.

The repair of the drain will be after the assessment of the works to be undertaken and the client representative will approve the scope of works.

***Bill Item No. 5.2      Demolish Apron and Drain***

Where repair is not possible the contractor will demolish the Apron and Drain and cart away. Based on agreement with the district representative the concrete can be used for the soakaway and/or for aggregate for the new civil works.

***Bill Item No. 5.3      Construct Concrete Apron***

Where repair of the apron is not possible the Apron will be constructed based on the technical standards included as Appendix II. The moulds to be utilized for the new construction shall follow the standard Civil Works design.

***Bill Item No. 5.4      Repair Existing Drainage***

Where the apron is in good condition and it is just the drain that needs repair the standards and specifications shall follow the standard Civil Works design.

***Bill Item No. 5.5      Construct of Drain and Soakaway***

Where the apron is in good condition but the drain and soakaway needed to be constructed the specifications shall follow the standard Civil Works design.

***Bill Item No. 5.6      Construct of Soakaway***

Where the soakaway is not present or is in poor repair a new soakaway should be constructed following the civil works specifications.

***Bill Item No. 5.7 Installation of Handpump Components***

Reinstallation of handpump components will be based on the assessment and final information record. The use of existing handpump components is to occur only upon agreement with the Clients Representative.

The quantity of rods and riser pipes must be recorded as the invoice amount is per rod and riser pipe. The replacement of the handpump cylinder must only be recorded if a new cylinder is installed, repairs to the existing cylinder must be recorded/

The reinstallation of the handpump components which were previously installed in the borehole or replaced with new stainless-steel downhole components. The installation/reinstallation to be carried out in the presence of the APM under the guidance of the Project Consultant, the contractor shall allow time for the nominated pump caretaker to be trained.

***Bill Item No. 5.8 Installation of New Riser Pipes and Rods***

The installation of the new handpump components to be carried out in the presence of the APM under the guidance of the Project Consultant. The number of rods and risers replaced should be the same as the those removed, additional rods and risers can be added based on the pumping test and with the agreement of the Project Consultant .

***Bill Item No. 5.9 Installation of New Water Tank***

The installation of the new water tank is to be carried out in the presence of the Project Consultant. The decision to replace the water tank must be agreed with the Project Consultant.

***Bill Item No. 5.10 Installation of New Head Assembly***

The installation of the new head assembly is to be carried out in the presence of the Project Consultant. The decision to replace the head must be agreed with the Project Consultant.

***Bill Item No. 5.11 Installation of New Cylinder***

The installation of the new cylinder is to be carried out in the presence of the Project Consultant. The decision to replace the cylinder must be agreed with the Project Consultant. The old cylinder must be returned to the respective authority as instructed by the Project Consultant.

***Bill Item No. 5.12 Installation of New Pedestal***

The installation of the new pedestal will only occur where the existing apron has been repaired or rebuilt. The installation should be carried out in the presence of the Project Consultant. The decision to replace the pedestal must be agreed with the Project Consultant.

***Bill Item No. 5.13 Repair of Cylinder Components***

Where the existing cylinder can be repaired the internal components should be replaced, the price reflects the replacement of all the internal components of the India Mark II cylinder. The installation of the new components should be carried out in the presence of the Project Consultant. The decision to replace the cylinder components must be agreed with the Project Consultant.

***Bill Item No. 5.14 Installation of anti siltation measures***

Installation of anti siltation measures shall comprise the installation of a 6m plastic pipe with screen slots which is wrapped in geotextile material. The plastic pipe which will have a diameter to match the threads at the base of the cylinder will be screwed in to act as an internal filter. Other anti siltation measures will be based on site conditions and may involve the addition of an internal gravel/filter pack installed inside the borehole casing and screen and over the screens with a filter placed on top of the pack.

***Bill Item No. 5.15 Installation of Riser Pipes and Rods over 30m***

Installation is based on the addition of 3 extra riser pipes and rods at each location. The exact number will be based on the pumping test and must be agreed with the Project Consultant. The installed riser pipes shall be stainless steel riser pipes and rods or uPVC riser pipes.

## Bill of Quantities Per Lot (Rehabilitation)

See attached excel sheets

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### Summary of Prices per Lot

Description	Amount in USD
Lot 1	
Lot 2	
Lot 3	
Lot 4	
Lot 5	
Lot 6	
Lot 7	
Lot 8	
Lot 9	
Lot 10	
Lot 11	
Lot 12	
<b><u>Total USD (figure)</u></b>	

Total in words:



## Annex-5: Framework for Contractor's Environmental and Social Management Plan (ESMP)

### Sub-project: Drilling of boreholes and equipping of the same with handpumps

Type of Impact	Mitigation Measures	Responsibility	Means of Verification	Monitoring Procedure
<b>Vegetation disturbance around project area</b>				
1. Vegetation disturbance	Ensure worksite area is properly defined and fenced off with tape to avoid further disturbance of vegetation/crops outside the work area.	Contractor	Minimal vegetation clearance	Random site inspection
2. Flora Protection	The contractor will take reasonable precaution to prevent his/her workmen and employees from removing and damaging any flora (plant/vegetation) from the project area, which will not be in the way of the project drilling site.	Contractor	Flora outside construction site maintained	Inspection of sites
<b>Solid and liquid waste generation and indiscriminate disposal of the same</b>				
3. Increased solid and liquid waste generation	Any remaining waste (paper or polythene containers, cement bags, bentonite, construction debris, etc. will be disposed in designated waste disposal areas before the project is commissioned;	Contractor	Good house keeping	Random site inspection
	Some of the drilled materials will be used in the borehole construction by back filling the annular space. All excavated material from the draining channel will be used to refill it;	Contractor	Good house keeping	Random site inspection
	Construction crew to be encouraged to dump their personal wastes in designated covered dustbins.	Contractor	Zero indiscriminate disposal of solid waste	
	Where no toilets exist, portable toilets and necessary sanitary arrangements must be availed;	Contractor	Toilets or portable toilets in place for both male and female	



Type of Impact	Mitigation Measures	Responsibility	Means of Verification	Monitoring Procedure
	Ensure appropriate containment and disposal of construction wastewater, including sanitary water/sludge in the case of mobile toilets.	Contractor	Wastewater and sanitary water/sludge disposal compliant with the legal requirements	Random site inspection
<b>Damage and pollution to communities road infrastructure</b>				
4. Traffic & Transport	All vehicles delivering construction materials to the site will be covered to avoid spillage of materials thus preventing pollution of environment.	Contractor	Delivery vehicles covered	Random inspection of vehicles carrying material
	The unloading of materials at construction sites close to settlements will be restricted to daytime only	Contractor	Unloading done during day time	Spot checks
<b>Noise pollution during borehole drilling or construction period</b>				
5. Noise and Vibration	The drilling rig (s) must be fitted with appropriate noise suppression equipment such as mufflers;	Contractor	Technical Specification Sheet	Random site inspection
	Proper maintenance of the construction equipment which in essence is the drill rig;	Contractor	Maintenance records	Spot checks
	The workers will be supplied with on ear mask where applicable to control excessive noise;	Contractor	Ear mask provided	Spot check at work site
	No works during the night to prevent disruption of the neighboring community	Contractor	No work during night time	Review of filed grievances, review of timesheets of workers
	Sensitize vehicle drivers and machine operators to switch off engines of vehicles or generators when not in use and to avoid hooting.	Contractor	Machinery switched off when not in use and no hooting	Spot check at work site
<b>Dust and air pollution</b>				
6. Dust and Air Pollution	Ensure that the workers have proper PPEs like dust masks;	Contractor	PPE provided	Random inspection of site

Type of Impact	Mitigation Measures	Responsibility	Means of Verification	Monitoring Procedure
	Ensure strict enforcement of on-site speed limits; and	Contractor	Speed limit signage installed	Random inspection of traffic route
	Ensure dust suppression at the drilling site during drilling of boreholes.	Contractor	Technical Specification Sheet	Random site inspection
<b>Oil spills</b>				
7. Oil Spills	Safety procedures will be enforced to minimise cases of oil spillage. Such procedures may include maintaining the machinery in specific designated areas designed for such purposes;	Contractor	Workers trained. Designated areas for safe keeping of machinery in place	Random site inspection
	Ensure that oil/grease spills and other oils and associated materials (filters, rags and cans) are immediately removed along with all contaminated material and disposed of by ZEMA licensed Hazardous waste handlers or the District Council;	Contractor	Workers trained. Spills removed	Random site inspection
	Ensure that contaminated materials including used/spilled oils/grease as well as other contaminated materials are stored in a bunded area before they are disposed.	Contractor	Storage site appropriately bunded	Random site inspection
<b>Ground water pollution</b>				
8. Ground water pollution	Contractor to obtain relevant permits from WARMA and adhere to the regulations set by WARMA as regards borehole drilling requirements.	Contractor	Permits obtained	Inspect contractor records
	Ensure that the borehole is located within or more than 30 meters distance from potential source of contamination	Contractor	Ensure proper siting keeping in view that radius of 30m around borehole free from any source of contamination	Site inspection of borehole locations
	Conduct water sampling the first 9 months on a quarterly basis, after commissioning, for water	UNICEF	Water quality for the boreholes tested on	Water quality monitoring reports

Type of Impact	Mitigation Measures	Responsibility	Means of Verification	Monitoring Procedure
	quality monitoring on this facility.		quarterly basis	
	Ensure disinfection of the boreholes	Contractor	Contractor records	Inspection of contractor records
<b>Risk of disease vectors due to ponding of water</b>				
9. Increased risk of disease vectors	The waste water drainage channel be constructed to lead water away from the pump pad;	Contractor	Pump pad clear of waste water	Random site inspection
<b>Soil erosion</b>				
10. Soil erosion	Apply soil erosion control measures such as leveling the project site to reduce run-off	Contractor	Project site leveled	Random site inspection
<b>Preservation of Archaeological Property</b>				
11. Chance found archaeological Property	In the event that the contractor finds articles of value of antiquity, structures and other remains or things of geological or archaeological interest during the study of the proposed drilling sites and during actual drilling, that property shall be the property of the Government, and shall be dealt with as per provisions of the National Heritage Conservation Commission Act)	Contractor	Training records, records about chance finds	Random site inspection
	The contractor will take reasonable precaution to prevent his workmen or any other persons from removing and damaging any such article or thing. It shall be the contractor's responsibility to report to National Heritage Commission for further guidance on how to manage the same.	Contractor	Training records, records about chance finds	Random site inspection
<b>Comply with all labour requirements</b>				
12. Labor Rights	Contractor to ensure that workers have access to and are aware about the Grievance Mechanism	Contractor	Grievance mechanism known by all workers	Inspect contractor records and interview some

Type of Impact	Mitigation Measures	Responsibility	Means of Verification	Monitoring Procedure
				workers
	Contractor to provide hygienic, adequate facilities for workers, ensuring toilets and changing rooms are separated to male and female employees.	Contractor	Adequate facilities in place	Inspection of facilities
	Contractor to ensure the workforce has access to first aid kit.	Contractor	First Aid kit available	Inspect contractor records and interview some workers
	Ensure workers are properly accommodated, observing all hygienic conditions.	Contractor	accommodation conditions meeting minimum requirements	Inspect contractor accommodation
<b>Ensure engagement of stakeholders before and during construction works</b>				
13. Stakeholder engagement and grievance mechanism	Contractor to engage/ communicate with local communities on the planned works. Ensure regular consultations with the local authorities and communities regarding the management of construction.	Contractor	Minutes of Meetings with the communities	Review of minutes
	Put in place a Grievance Mechanism to allow potentially affected individuals to voice their concerns on the project	UNICEF	Grievance Mechanism in place	Review of grievance register
<b>Socio Economic Development</b>				
14. Increase in local development and employment	To the extent possible, Contractor to ensure local communities are preferred for the supply of goods and services to the Project and Project personnel, where applicable.	Contractor	Local persons considered	Review of contractor employment register
<b>Minimize health and safety risks</b>				

Type of Impact	Mitigation Measures	Responsibility	Means of Verification	Monitoring Procedure
15. Risk of accidents and health and safety concerns	Provide health and safety training to workers through bi-weekly morning toolbox talks, IEC, etc.	Contractor	Health and safety training for the workers held Morning toolbox talks held at least on bi-weekly basis	Spot check inspection
	Ensure workers are provided with personal protective equipment and first aid kit;	Contractor	All workers in appropriate PPE  First Aid kit is available	Random site inspection
	Ensure all equipment are inspected before use for appropriate safeguards and that the machine operators are trained on machine safety;	Contractor	Technical specifications	Random inspection of equipment before use
	Ensure appropriate road safety signage are near work sites to alert the community and road users about the ongoing works.	Contractor	Road safety signs installed in appropriate locations	Inspection of contractors traffic route
	Provide adequate manual labor to meet the requirements of the tasks;	Contractor	Requirements met	Inspection contractors record and program of works
	Provide appropriate barriers along the excavated trenches, to notify/alert the community to keep away from construction sites	Contractor	Temporary fencing done for all active construction sites	Random site inspections
	Maintain high standard in housekeeping on site.	Contractor	Good house keeping	Spot checks
	Make available first aid box at every work site	Contractor	First Aid in place at all active work sites	Spot checks

Type of Impact	Mitigation Measures	Responsibility	Means of Verification	Monitoring Procedure
16. Work Injuries	Develop an emergency preparedness plan, communicate it to workers, the community and all involved and conduct drills.	Contractor	Requirements met	Availability of emergency plan and implementation of drills
<b>Fire Prevention measures</b>				
17. Fire Prevention	The contractor to provide necessary fire prevention equipment on site in line with applicable regulations. These will especially be required at camp sites, formal meeting place and work sites	Contractor	Fire extinguishers in accessible locations and staff trained on use of same	Inspect contractor records and presence of fire extinguishers
<b>Reduce incidences of HIV/AIDS and STIs</b>				
18. HIV/AIDS	Ensure all contractors implement codes of conduct concerning employment and workforce behavior (including but not limited to safety rules, zero tolerance for substance abuse, environmental sensitivity of the area, dangers of sexually transmissible diseases and HIV/AIDS, gender equality and sexual harassment, respect for the beliefs and customs of the populations and community relations in general).	Contractor	Workers Code of Conduct  Grievance Mechanism records	Worker interviews, Review of grievance register
<b>Disturbance and resettlement</b>				
19. Loss of land and/or involuntary displacement	The Contractor to liaise with the Supervising Consultant and inform the affected communities early of the construction program.  Avoid interfering with private land and the need for resettlement by considering other siting options. Where loss of land and/or resettlement is unavoidable, the Contractor will follow the Land Acquisition, Compensation and Resettlement Procedure developed for the Project.	Contractor	Records in place showing engagement of affected persons (meetings/minutes), agreements and payments made (where applicable)	Inspection of Contractor records
20. Loss of	As much as possible, avoid damage to crops/trees when creating access for drilling rigs by considering	Contractor	Records in place showing engagement of	Inspection of Contractor records

Type of Impact	Mitigation Measures	Responsibility	Means of Verification	Monitoring Procedure
crops/trees	alternative access routes. Where this is not feasible, the Contractor will follow the Land Acquisition, Compensation and Resettlement Procedure developed for the Project.		affected persons (meetings/minutes), agreements and payments made (where applicable)	
21. Temporary occupation	<p>Interference with the access to and use and occupation of roads, footpaths should be minimized.</p> <p>In the event that there is temporary occupation of a private portion of land during drilling, ensure that the necessary engagement process is concluded with the affected person before entering such a premise.</p>	Contractor	Records in place showing engagement of affected persons (meetings/minutes), agreements and payments made (where applicable)	Inspection of Contractor records
<b>Record Keeping</b>				
22. Record keeping of relevant ESHS	Ensure record keeping of environmental, social, health and safety activities discussed in this environmental and social management plan	Contractor	Records available	Inspection of Contractor records

## **Annex- 6: Book of Drawings**

**- See attached Book of Drawings -**



## Annex-7: Code of Conduct: Sexual Exploitation and Abuse

“Name of Contractor” is implementing the project entitled “Name of Project” which is supported by UNICEF that is an integral part of the United Nations. The United Nations have put measures in place to prevent and address sexual exploitation and abuse committed by staff, consultants, workers and volunteers of organizations that they contract to implement aid-related projects. These measures are outlined in the ST/SGB/2003/13 Secretary-General’s Bulletin on Special measures for protection from sexual exploitation and sexual abuse.

All staff and workers of contractors must uphold the highest standard of professional and personal conduct and this includes the prohibition of all forms of Sexual Exploitation and Abuse. Sexual exploitation and abuse causes harm to persons in situations of vulnerability and impacts negatively on their dignity and level of self-respect.

As an employee, consultant, casual laborers, \_\_\_\_\_(Name), I should commit to the following code of conduct:

1. Treat all persons fairly and with respect, courtesy and dignity and be sensitive to local customs.
2. Never commit any act or form of sexual harassment that could result in physical, sexual or psychological harm or suffering to individuals, especially women and children.
3. Never exploit the vulnerability of beneficiaries, especially women and children, or allow them to be put into compromising situations.
4. Never engage in any sexual activity with children. It shall not be a defense that I was mistaken as to the age of the child concerned.
5. Never engage in sexual exploitation or abuse of beneficiaries under any circumstances.
6. Never abuse my authority, position or influence by withholding protection, humanitarian assistance or services, nor give preferential treatment in order to solicit sexual favours, gifts, payments of any kind, or any other advantage.
7. Never exchange money, employment, goods, or services with anyone- including exchange of assistance that is due to beneficiaries for sex or sexual favours.
8. Report cases of sexual exploitation and abuse to management, through established reporting mechanism (through the focal point)

**I confirm that I have attended and completed the “Online PSEA Training (ref. <https://agora.unicef.org/course/info.php?id=7380>) and for proof, I have handed my Certificate of Completion to the Focal Point for PSEA of my company.**

**I confirm that I have attended the orientation on Preventing Sexual Exploitation and Abuse held on \_\_\_\_\_ at \_\_\_\_\_ and organized by \_\_\_\_\_.**

**I certify that I have read and understood the contents above and commit to abide by this Code of Conduct on PSEA at all times.**

Full name	Title	Signature
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\_\_\_\_\_

Date

## INTERPRETATION FOR THE PURPOSE OF THIS CODE OF CONDUCT

**Child** refers to a person under the age of 18 years.

**Power** refers to authority or the decisive ability to materially affect various forms of rights, entitlements or relationships. Power arises most crucially from, among others, position, rank, influence, status or control of resources.

**Unequal power relationships** provide among the most critical settings for sexual exploitation. Once again, it is reiterated that due to their unequal status, women and girls are particularly at risk of sexual exploitation and abuse, although boys and even adult males can likewise be vulnerable.

**Sexual Abuse** is actual or threatened physical intrusion of a sexual nature, by force or under unequal or coercive conditions, and includes inappropriate touching.

Sexual Exploitation means any **actual or attempted** abuse of a position of vulnerability, differential power, or trust, for sexual purposes, including but not limited to, profiting monetarily, socially or politically from the sexual exploitation of another. It includes all situations where a person in a position of power, authority or in control of resources **seeks or accepts** to provide protection, assistance or service in exchange for sexual acts or favours.

**Sexual Exploitation and Abuse:** Irrespective of authority, position, influence or trust, SEA can also occur through pressure, force or manipulation. Survivors who may appear to have consented to these acts have still been exploited if they were led to believe that they had no other choice than to comply.

**Sexual Harassment** Sexual harassment involves any unwelcome sexual advance, request for sexual favour, verbal or physical conduct or gesture of a sexual nature, or any other behaviour of a sexual nature that might reasonably be expected or perceived to cause offence or humiliation to another. Sexual harassment may occur when it interferes with work, is made a condition of employment, or creates an intimidating, hostile or offensive environment. It can include a one-off incident or a series of incidents. Sexual harassment may be

deliberate, unsolicited and coercive. Both male and female colleagues can be either the victim or offender. Sexual harassment may occur outside the workplace and/or outside working hours.

**Beneficiary** means a person to whom UNICEF and contractors provide one or another form of protection, assistance, service or other intervention as well as vulnerable members of affected/host community.

**Sexual relations with beneficiaries:** Development and humanitarian workers or contractors employed by humanitarian organizations occupy positions of authority, power and control of resources and services. There should be concern over sexual relationships between them and beneficiaries, including even those which may be said to be proper and consensual. There should be no room at all for even the perception that abusive and exploitative relations could be taking place.

## Annex-8: Technical Proposal Submission Forms

<b>APPROACH, METHODOLOGY AND WORK PLAN</b>
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The Bidder is required to fill in all the forms under this section with relevant information regarding the allocation of resources and planned execution of the works in order to demonstrate the Bidder's compliance with the requirements of the TOR.

- A.        **Adequacy of implementation approach, methodology, work plan**
- B.        **Structure of team(s) to be deployed**
- C.        **Approach / Methodology for complying with ESHS requirements**
- D.        **Availability to start works immediately**

## **A. Implementation approach, methodology, work plan**

Under this section, the Bidder shall provide relevant information regarding the proposed project implementation approach, methodology and work plan. The Bidder's proposal shall be in line with the following structure:

- A1. Site organisation with organisation chart
- A2. Method statement
- A3. Mobilisation schedule
- A4. Work Plan/ Construction schedule (bar chart)
- A5. Contractor's equipment schedule

## **A1. Site organisation with organisation chart**

Under this section, the Bidder shall provide relevant information regarding the proposed site organisation along with an organisation chart.

## **A2. Method statement**

Under this section, the Bidder shall provide relevant information regarding the method statement to be used in the execution of drilling as well as rehabilitation works.

### **A3. Mobilisation Schedule**

Under this section, the Bidder shall provide relevant information regarding the mobilisation schedule for the project.

## **A4. Work Plan / Construction Schedule**

Under this section, the Bidder shall provide relevant information regarding the work plan (in form of a bar chart) for executing the various project activities.



## A5. Contractor's Equipment Schedule

Under this section, the Bidder shall use the form below and provide detailed information over the equipment it holds and intends to use for carrying out the project works.

Item	Nos.	Make	Year	Capacity	Present Condition	Country of origin	Present location
1. Equipment							
1.1 Drilling rigs (at least two nos.)							
1.2 Compressors							
1.3 Mud pump unit and accessories (state if separate or mounted on drilling rig)							
1.4 Well flushing and pumping units							
1.5 Support trucks and vehicles							

## **B. Structure of team to be deployed**

Under this section, the Bidder shall provide relevant information regarding the proposed team structure to carry out the assignment. The Bidder's proposal shall be in line with the following structure:

- B1. Complete list of proposed key staff
- B2. Complete list of proposed non-key staff
- B3. CVs of proposed key staff

## B1. Complete list of proposed Key staff

Under this section, the Bidder shall use the form below and provide names of suitably qualified personnel for each of the key positions in line with the requirements of the TOR.

### Key Positions:

- K-1: Contract Manager
- K-2: Hydrogeologist or Water Engineer;
- K-3: Drilling Engineer in-charge,
- K-4: Foreman for the Drilling Crew(s),
- K-5: Hydrogeologist/geophysicist in charge of siting,

<b>K-1</b>	<b>Title of position:</b> <i>Contract Manager</i>
	<b>Name</b>
<b>K-2</b>	<b>Title of position:</b> <i>Hydrogeologist or Water Engineer</i>
	<b>Name</b>
<b>K-3</b>	<b>Title of position:</b> <i>Drilling Engineer in-charge</i>
	<b>Name</b>
<b>K-4</b>	<b>Title of position:</b> <i>Foreman for the Drilling Crew(s)</i>
	<b>Name</b>
<b>K-5</b>	<b>Title of position:</b> <i>Hydrogeologist/geophysicist in charge of siting</i>
	<b>Name</b>
<b>K-6</b>	<b>Title of position:</b> <i>Health and Safety Technician</i>
	<b>Name</b>

## **B2. Complete list of proposed Non-Key staff**

Under this section, the Bidder shall use the form below and provide names of suitably qualified personnel for each of the non-key positions in line with the requirements of the TOR.

### **Non-Key Positions:**

NK-1: Plumber/Welder;

NK-2: Electrician;

NK-3: Building foreman & Bricklayer,

NK-4: Person in charge of logistics and dedicated record keeper

<b>NK-1</b>	<b>Title of position:</b> <i>Plumber/Welder</i>
	<b>Name</b>
<b>NK-2</b>	<b>Title of position:</b> <i>Electrician</i>
	<b>Name</b>
<b>NK-3</b>	<b>Title of position:</b> <i>Building foreman &amp; Bricklayer</i>
	<b>Name</b>
<b>NK-4</b>	<b>Title of position:</b> <i>Person in charge of logistics and dedicated record keeper</i>
	<b>Name</b>

<b>B3. CVs of proposed Key staff</b>
--------------------------------------

Under this section, the Bidder shall use the form below and fill in the relevant information for each of the proposed key personnel.

<b>Position*</b>		
<b>Personnel information</b>	<b>Name *</b>	<b>Date of birth</b>
	<b>Professional qualifications</b>	
<b>Present employment</b>	<b>Name of Employer</b>	
	<b>Address of Employer</b>	
	<b>Telephone</b>	<b>Contact (manager / personnel officer)</b>
	<b>Fax</b>	<b>E-mail</b>
	<b>Job title</b>	<b>Years with present Employer</b>

Summarize professional experience in reverse chronological order. Indicate particular technical and managerial experience relevant to the project.

[illegible]

## **C. Approach / Methodology for ESHS requirements**

Under this section, the Bidder shall provide an outline on how he intends to address the Labour, Health and Safety and Environmental and Social requirements of the project in accordance with the provisions of the TOR. The Bidder's proposal shall be in line with the following structure:

- C1. Approach/ Methodology on Environmental requirements
- C2. Approach/ Methodology on Health and Safety requirements
- C3. Approach/ Methodology on labour law requirements
- C4. Approach/ Methodology on PSEA requirements

## **C1. Approach / Methodology on Environmental requirements**

Under this section, the Bidder shall provide relevant information regarding the proposed approach to address the Environmental requirements of the project in accordance with the provisions of the TOR.

## **C2. Approach / Methodology on Health and Safety requirements**

Under this section, the Bidder shall provide relevant information regarding the proposed approach to comply with the Health and Safety requirements of the project in accordance with the provisions of the TOR.



### **C3. Approach / Methodology on Labour law requirements**

Under this section, the Bidder shall provide relevant information regarding the proposed approach to comply with the national Labour Laws in accordance with the provisions of the TOR.

#### **C4. Approach / Methodology on PSEA requirements**

Under this section, the Bidder shall provide relevant information regarding the proposed approach to comply with the CODE OF CONDUCT for Preventing Sexual Exploitation and Abuse (PSEA) in accordance with the provisions of the TOR.

## **D. Availability to start works immediately**

Under this section, the Bidder shall confirm his availability to mobilize and commence the works immediately without any delays in case of contract award.

## **ORGANISATIONAL CAPACITY**

To establish the capacity and qualifications to perform the contract, the Bidder shall provide the information requested in the corresponding forms included hereunder.

- E. Performance and financial situation**
- F. General Experience (over the past 5 years)**
- G. Specific Experience (over the past 5 years)**
- H. Litigation/ arbitration and non-performing history**

## **E. Performance and financial situation**

Under this section, the Bidder shall provide relevant information over the performance and financial situation of his firm. The Bidder's proposal shall be in line with the following structure:

- E1. Bidder Information Sheet
- E2. Historical Contract Non-Performance
- E3. Current Contract Commitments / Works in Progress
- E4. Financial Situation
- E5. Average Annual Turnover
- E6. Financial Resources

## E1. Bidder Information Sheet

Under this section, the Bidder shall fill in the form below and attach the requested documents.

Date: \_\_\_\_\_  
 Bidding No.: \_\_\_\_\_  
 Invitation for Bid No.: \_\_\_\_\_  
 Page \_\_\_\_\_ of \_\_\_\_\_ pages

1. Bidder's Legal Name
2. Bidder's actual or intended Country of Registration:
3. Bidder's Year of Registration:
4. Bidder's Legal Address in Country of Registration:
5. Names and details of Board of Directors: Name: Address: Telephone/Fax numbers: Email Address:
6. Bidder's Authorized Representative Information Name: Address: Telephone/Fax numbers: Email Address:
7. Attached are copies of original documents of: <input type="checkbox"/> Articles of Incorporation or Registration of firm named in 1, above <input type="checkbox"/> Registration of firm with WARMA <input type="checkbox"/> VAT registration certificate from ZRA <input type="checkbox"/> Insurance policy <input type="checkbox"/> In case of government owned entity from the Employer's country, documents establishing legal and financial autonomy and compliance with the principles of commercial law

## E2. Historical Contract Non-Performance

Under this section, the Bidder shall fill in the form below.

Bidder's Legal Name: \_\_\_\_\_

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

Bidding No.: \_\_\_\_\_

Page \_\_\_\_\_ of \_\_\_\_\_ pages

Non-Performing Contracts			
<input type="checkbox"/> Contract non-performance did not occur within the last 10 years <input type="checkbox"/> Contract non-performance occurred within the last 10 years as indicated below			
Year	Outcome as Percentage of Total Assets	Contract Identification	Total Contract Amount (current value, US\$ equivalent)
_____	_____	Contract Identification: Name of Employer: Address of Employer: Matter in dispute:	_____
Pending Litigation			
<input type="checkbox"/> No pending litigation within the last 10 years <input type="checkbox"/> Pending litigation within the last 10 years as indicated below			
Year	Outcome as Percentage of Total Assets	Contract Identification	Total Contract Amount (current value, US\$ equivalent)
_____	_____	Contract Identification: Name of Employer: Address of Employer: Matter in dispute:	_____
_____	_____	Contract Identification: Name of Employer: Address of Employer: Matter in dispute:	_____

### **E3. Current Contract Commitments / Works in Progress**

Under this section, the Bidder shall fill in the form below and provide information on their current commitments on all contracts that have been awarded, or for which a letter of intent or acceptance has been received, or for contracts approaching completion, but for which an unqualified, full completion certificate has yet to be issued.

Name of contract	Employer, contact address/tel/fax	Value of outstanding work (current US\$ equivalent)	Estimated completion date	Average monthly invoicing over last six months (US\$/month)
1.				
2.				
3.				
4.				
5.				
etc.				



## E4. Financial Situation

Under this section, the Bidder shall fill in the form below and attach the requested documents.

Bidder's Legal Name: \_\_\_\_\_

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

Bidding No.: \_\_\_\_\_

Page \_\_\_\_\_ of \_\_\_\_\_ pages

To be filled in by the Bidder for the last 5 financial years.

Financial information in US\$ equivalent	<b>Historic information for last 5 financial years</b> (US\$ equivalent in 000s)						
	Year 1	Year 2	Year 3	Year ...	Year n	Avg.	Avg. Ratio
<b>Information from Balance Sheet</b>							
Total Assets (TA)							
Total Liabilities (TL)							
Net Worth (NW)							
Current Assets (CA)							
Current Liabilities (CL)							
<b>Information from Income Statement</b>							
Total Revenue (TR)							
Profits Before Taxes (PBT)							

Bidders must attach copies of financial statements (balance sheets, including all related notes, and income statements) for the years required above complying with the following conditions:

- Must reflect the financial situation of the Bidder and not sister or parent companies;
- Historic financial statements must be audited by a certified accountant;
- Historic financial statements must be complete, including all notes to the financial statements;
- Historic financial statements must correspond to accounting periods already completed and audited (no statements for partial periods shall be requested or accepted).

## E5. Average Annual Turnover

Under this section, the Bidder shall fill in the form below.

Bidder's Legal Name: \_\_\_\_\_

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

Bidding No.: \_\_\_\_\_

Page \_\_\_\_\_ of \_\_\_\_\_ pages

To be filled in by the Bidder for the last 5 financial years.

Annual turnover data (construction only)		
Year	Amount and Currency	US\$ equivalent
	_____	_____
	_____	_____
	_____	_____
	_____	_____
	_____	_____
*Average Annual Construction Turnover	_____	_____

\*Average annual turnover calculated as total certified payments received for work in progress or completed over the last 5 financial years divided by that same number of years.

## E6. Financial Resources

Under this section, the Bidder shall fill in the form below and specify proposed sources of financing, such as liquid assets, unencumbered real assets, lines of credit, and other financial means, net of current commitments, available to meet the total construction cash flow demands of the contract.

Source of financing	Amount (US\$ equivalent)
1.	
2.	
3.	
4.	

## F. General Experience

Under this section, the Bidder shall fill in the form below and provide relevant information over his general experience as a Works Contractor over the last 5 (five) years.

Bidder's Legal Name: \_\_\_\_\_

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

Bidding No.: \_\_\_\_\_

Page \_\_\_\_\_ of \_\_\_\_\_ pages

Starting Month / Year	Ending Month / Year	Contract Identification	Role of Bidder
_____	_____	Contract name: Brief Description of the Works performed by the Bidder: Name of Employer: Address:	_____
_____	_____	Contract name: Brief Description of the Works performed by the Bidder: Name of Employer: Address:	_____
_____	_____	Contract name: Brief Description of the Works performed by the Bidder: Name of Employer: Address:	_____
_____	_____	Contract name: Brief Description of the Works performed by the Bidder: Name of Employer: Address:	_____
_____	_____	Contract name: Brief Description of the Works performed by the Bidder: Name of Employer: Address:	_____
_____	_____	Contract name: Brief Description of the Works performed by the Bidder: Name of Employer: Address:	_____

## G. General Experience

Under this section, the Bidder shall fill in the form below and provide details regarding specific experience as a Drilling Contractor for works carried out over the last 5 years. Each reference sheets must be accompanied by the certified copy of the Completion Certificate of the respective project.

Bidder's Legal Name: \_\_\_\_\_

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

Bidding No.: \_\_\_\_\_

Page \_\_\_\_\_ of \_\_\_\_\_ pages

<b>Similar Contract Number: ____ [insert specific number] of ____ [insert total number of contracts required].</b>	<b>Information</b>		
Contract Identification	_____		
Award date	_____		
Completion date	_____		
Brief Description of similar activities (as described in the TOR) performed by the Bidder	<i>Insert details related to Physical size, Complexity, Methods used and Physical Production rate of the works</i>		
Role in Contract	<input type="checkbox"/> Contractor	<input type="checkbox"/> Management Contractor	<input type="checkbox"/> Subcontractor
Total contract amount	_____		US\$ _____
If partner in a JVCA or subcontractor, specify participation of total contract amount	_____ %	_____	US\$ _____
Employer's Name:	_____		
Address:	_____ _____ _____		
Telephone/fax number:	_____		
E-mail:	_____		

## **Annex-9: Financial Proposal Submission Forms**

For the purpose of the financial offer, the Bidder is required to price the BOQs provided as separate excel sheets.

## Annex-10: Other Bidding Forms

### Form of Bid-Securing Declaration

Under this section, the Bidder shall fill in the form below.

Date: [insert date (as day, month and year)]

Bid No.: [insert number of bidding process]

Alternative No.: [insert identification No if this is a Bid for an alternative]

To: [insert complete name of Employer]

We, the undersigned, declare that:

We understand that, according to your conditions, bids must be supported by a Bid-Securing Declaration.

We accept that we will automatically be suspended from being eligible for bidding in any contract with the client for the period of time of **10 years** starting the date when this invitation to tender is issued if we are in breach of our obligation(s) under the bid conditions, because we:

- (a) have withdrawn our Bid during the period of bid validity specified in the Letter of Bid; or
- (b) having been notified of the acceptance of our Bid by the Employer during the period of bid validity, (i) fail or refuse to execute the Contract, if required, or (ii) fail or refuse to furnish the Performance Security

We understand this Bid-Securing Declaration shall expire if we are not the successful Bidder, upon the earlier of (i) our receipt of your notification to us of the name of the successful Bidder; or (ii) twenty-eight days after the expiration of our Bid.

Signed: [insert signature of person whose name and capacity are shown] In the capacity of [insert legal capacity of person signing the Bid-Securing Declaration]

Name: [insert complete name of person signing the Bid-Securing Declaration]

Duly authorised to sign the bid for and on behalf of: [insert complete name of Bidder]

Dated on \_\_\_\_\_ day of \_\_\_\_\_, \_\_\_\_\_ [insert date of signing]

Corporate Seal (where appropriate)