



## **TERMS OF REFERENCE**

### ***“CONTRACTOR TO DRILL 2 BOREHOLES IN TWIC EAST COUNTY – JONGLEI STATE”***

#### **1. Background**

With funding from SSHF second standard allocation, GBI South Sudan is implementing Integrated Water, Sanitation and Hygiene (WASH) and nutrition response in Twic East County, Jonglei State. Two (2) locations have been identified in Twic East County for drilling boreholes to be fitted with hand pumps. GBI South Sudan therefore, seeks a contractor to carry out the works of mobilizing machinery, drilling boreholes, and provide all the required tools, equipment, materials, labor and ensure that all the necessary requirements of borehole development and testing are up to the required standards as clearly specified on the technical specifications in the Bill of Quantity attached therein.

#### **2. Scope of Work (SOW)**

Under the guidance of the GBI WASH team in Twic East, the selected contractor must perform in a satisfactory manner, the drilling of two (2) boreholes to be installed with hand pumps at locations determined and/or to be determined in Twic East County by GBI.

#### **3. Groundwater Investigation**

The selected contractor should perform geophysical analysis (hydrogeological survey) in the GBI pre-identified locations using geo-electrical techniques to find the best location for borehole siting in coordination with GBI WASH team in Twic East. For each of the two boreholes, the hydrogeologist shall recommend suitable sites with the view that the proposed drilling will take place in the location where the demanded yield shall be attained as described in the TOR.

Upon submission of the hydrogeological survey report and that is acceptable to GBI, then GBI WASH team will validate the start of the drilling works.



#### **4. Drilling Stipulations**

- A.** Drilling of borehole in all geologic possible environments to a minimum internal diameter of 200mm (8") to an average depth of 80 meters below ground level. GBI will consider a borehole successful only if it meets the above stated conditions of depth and a minimum critical yield of 3M<sup>3</sup>/hr. confirmed through a critical yield analysis obtained after 8 hours of step draw down pump test.
- B.** If the borehole doesn't meet the stated condition in the (A) above, GBI will not consider the borehole successful. As such, GBI will neither accept nor pay any of the items in the contract or expenses incurred during the drilling process; mobilization to the next site and commencement of the works will all lie under the contractor's responsibility.
- C.** The contractors applying will quote in the Bill of Quantity taking in consideration that the borehole depth can vary and GBI will not make any payment beyond this quoted amount, independent of the drilling depth beyond 80 meters that the selected contractor need to undertake in order to meet the design specification in terms of yield.
- D.** Borehole drilling and construction will be supervised by the GBI WASH Officer representative in collaboration with State Ministry of Physical Infrastructure (MoPI) and Rural Water Department (RWD) of Twic East County. GBI will have the final authority in making technical decisions to the contractor.
- E.** The contractor shall ensure that the drilling rig to be used must have the capability of drilling beyond the anticipated depth by 30%.



**F.** Cuttings (min. 125 grams) of the strata penetrated shall be collected on site at every 2-meter interval or every drill pipe; whichever gives the smallest interval and when required by GBI supervisor, by whatever method is standard for the drilling technique in use and approved by the Supervisor. The Contractor shall take every possible precaution to guard against cutting contamination. Representative lithological samples shall be packed in sealed containers and with clear marked labels covering the borehole location, number and depth interval. The samples shall be stored in a location where they will not be contaminated by site conditions or drilling operations.

**G.** The contractor shall ensure that the materials supplied are of good quality, adhering to the specifications provided in this ToRs and in the BoQ. GBI will not authorize the installation or utilization of any material that is not in line with the requirements established in the ToR and BoQ.

**H.** The selected contractor will supply and install U-PVC, class 10, drinking water standards, non-toxic plain casings with a 126.6mm (5") internal diameter and 6.7mm thickness for total depth of well except where screen casings are installed. There should be at least 3m of plain casing as well as a sump/plug at the bottom of each well. The contractor should ensure verticality of the casing installed.

**I.** The contractor will supply and install U-PVC, class 10, drinking water standards, and non-toxic plain screen casings with an internal diameter of 126.6mm (5") and 6.7 mm thickness and with a slot size between 0.5mm to 1mm. The quantity/length of screen casings to be installed in the borehole will vary respectively to the soil/aquifer formations.



**J.** The contractor will supply and install filter gravel pack which is clean, uniform and of approved quality collected from river beds consisting of particles with a diameter of 1-5mm. The volume of the filter pack required must be calculated taking into account the length of the screened area and an additional 50% to allow for settlement above screen casings, and the annular space between the borehole and the external diameter of the casing. The installation of the filter pack should be done with the aid of a tremie pipe to ensure an even distribution of materials and to reduce the risk of materials bridging in the annulus. The use a funnel (sheet metal, plastic sheet or pipe) and flowing water shall also be accepted as a method of passing the gravel through the annular space between the casing and the sides of the borehole.

**K.** The contractor should ensure the installation of sanitary seal in the annular space between the screen casing and the borehole above the filter gravel pack to reach a minimum height of 3 meters. The sanitary seal shall consist of bentonite pellets of size between  $\frac{1}{4}$ " and  $\frac{1}{2}$ ". The bentonite pellets shall be installed in the annular space from the filter pack using tremmie pipe system. Above the sanitary seal, the annular space shall be backfilled with cuttings extracted through drilling up to 3 meters deep below the ground level. The sanitary top seal in cement grout, corresponds to the first 3 meters below the surface. Including 2m of bentonite pellets and 1m of grout at the surface. If the contractor cannot supply the bentonite pellets, a written request should be sent to GBI providing the justification and the specifications of an alternative sealing and plugging material in order for GBI to approve its installation.

**L.** The boreholes must be developed by airlifting for a minimum of 4 hours until a stabilized satisfactory yield is reached and the turbidity is less than 5 NTU.

**M.** Step draw down pumping test should be conducted by the contractor for a minimum of 8 hours considering 4 step with different yield ( $Q_{max}/5$ ,  $Q_{max}/3$ ,  $Q_{max}/2$  and  $Q_{max}$ ) and a recovery step. Each test should last a minimum of 1.5hr. In addition, 4 hours' constant pump test should be conducted by the contractor using the optimal yield identified during the step draw down test. Recovery test will be for one hour or such time when there is at least recovery of 80% of the static water level noted at the start of the pump test. Step draw down, constant pump test and recovery data should be reported on the borehole log and should contain at least: Date of Test (Day, Month,



Year); Depth of BH at time of test (m); Static Water Level (SWL) before test (m); Type of Pump used; Depth of Pump Intake (m); Discharge (Ltrs/Minute); Dynamic/Pumping water level (m). GBI's supervisory staff should be informed, in writing (email), at least 24hr before the scheduled time for carrying out of the pumping test. The procedure should be discussed and agreed by both parties (GBI and contractor) before the contractor could initiate the pumping test.

**N.** After a successful completion of drilling and water testing, the borehole should be thoroughly disinfected with a chlorine-rich solution, preferably granular Calcium Hypochlorite (HTH) or Sodium Hypochlorite at a concentration of 500 grams per cubic meter of pack. This will initiate the process of sterilizing the borehole and the chlorine solution should stay in the well for at least 4 hours at the specified concentration, leaving a concentration of residual chlorine of 50 milligrams/liters (as per WHO standards). The disinfection procedure shall be discussed with GBI's supervisory staff in order to seek approval.

**O.** The contractor shall supply and install India Mark II hand-pumps with all the components including GI rising pipe, the handle assembly, the pedestal, the water tank assembly, the pump head assembly, connecting rods and rising mains, pump cylinder. For lifting water beyond 45 m, the contractor must supply an India Mark II Extra Deep-well hand-pump.

**P.** Construction of re-enforced concrete borehole apron, drainage channel with a minimum length of 6m and animals' trough of 1.8 metres long as per GBI drawings.

**Q.** The contractor will coordinate with the GBI WASH Twic East County team for the collection of samples of water from the borehole for full physical, chemical and bacteriological analysis of the water to ascertain its suitability for human consumption. The Results need to be submitted in the GoSS' Drinking Water Quality Monitoring Report Form, dully filled and signed by the authorized authority.



**R.** The contractor will provide the original copy of GoSS' Borehole Completion Record Certificate in the approved form, duly completed and signed by the Twic East County and Jonglei State director of rural water, Ministry of Physical Infrastructure rural department.

**S.** Upon completion of the borehole, the selected contractor should submit a report of the borehole drilling in which all the relevant information and drilling velocity, well casing and other well construction operations will be recorded. The contractor will also annotate all information pertaining to the appearance of water filtrations and aquifer, types of rock found and sampling details including geophysical testing analysis, drilling lithology log, sieve analysis, GPS coordinates, casing details, filter pack details, constant rate testing procedures and results, recovery testing results, yield, draw-down, disinfectant calculations and procedures, pump cylinder installation depth and water quality analysis

and photographs. No payment will be made prior to reception of all the documents described above as per GBI borehole template.

## **5. Role of the contractor**

The contractor will have to provide for the construction and completion in every detail of the work described in the contract and contractual documents such as ToRs and annexes. All labors, materials, tools, equipment, transportation, food and supplies required to complete the work in accordance with the specifications and terms of the contract should have to be well furnished. The contractor cannot deviate from the construction designs or specifications without seeking for permission and approval from GBI.

If the contractor is not able to finish the drilling or has to abandon the borehole due to loss of tools, accidents or any unforeseeable circumstances, the contractor should remove the casings or drive pipes already in the hole and refill it with clay or concrete. All materials extracted from the hole, after refilling it will be the property of the contractor. GBI will not pay for any of the work carried out, and will authorize in advance the drilling of a new hole, at a site near the abandoned one if need be, at the contractor's expenses.



## **6. Health and Safety**

The contractor's team leader shall take all reasonable precautions to prevent any death or injury to persons during said undertaken activities. These precautions shall include but not be limited to providing his crew with safety helmets, hard-toed boots (safety boots) or gumboots, heavy duty gloves, protective glasses and ensuring that all tools and equipment are in a safe condition and ensuring that his employees adopt safe working methods.

The drilling crew will wear a uniform provided by GBI at the site. No military-looking clothing will be accepted at any time.

Under this contract, the contractor's team leader has the obligation and responsibility to safeguard the safety and security of its Personnel, the drilling crew's equipment and other property, GBI-furnished equipment and supplies and Personnel's personal effects and other property.

The contractor's team leader shall develop a security plan in consultation with GBI, including detailed procedures to cover evacuation, personnel, equipment, safeguarding of GBI-furnished equipment and supplies, unlawful interference and prevention of sabotage.

## **7. Requirements of the contractor for the tender**

### **a. Experience:**

For a contractor to be accepted to participate in the tender process, must provide evidence (satisfactory contract completion certificates) of at least 15 boreholes drilled in South Sudan with other NGOs or government amounting to a total value of 180,000 USD during the last 5 years. At least one contract should be for an amount of 12,000 USD. The scope in the certifications should clearly mention drilling and are not valid for this purpose auger manual drilling.

### **b. Equipment and work force:**

Changes are required during the execution of contract, equipment of similar characteristics needs to be put in place and GBI has to be informed in written. The contractor must provide a list of the work force that it intends to use for execution of the project, detailed percentage of females and males.



**c. Time for completion.**

The contractor should perform the activity in a maximum period of 2 months after the signature of the contract. For the tender process, the contractor should submit a work schedule (project Gant chart) aligning activities to match the completion period. Any bid which schedule goes beyond the project estimated completion period of 1 month will not be accepted in the tender process. In the case of delays in the implementation process of the project, penalties will follow with immediate effect and the penalty criteria will be stipulated on the contract document.

**d. Legal documents from the government of South Sudan.**

The contractor must present a copy of the valid drilling certificate; a copy of the company's registry in the South Sudan's Ministry of Legal Affairs and a copy of the trading license.

**e. Bidding amount.**

The companies participating in this tender should present the BoQ in Annex fully completed with the unit prices for each activity. The full amount quoted should cover all expenses for the completion of the activities under the contract, as well any indirect cost and/or administrative costs that the contractor must incur.

**8. Defect liability period.**

The borehole will be guaranteed for a period of 6 months after completion. In an event that there are defects found on the borehole within the 6 months' period, the contractor will be notified and authorized to correct all the said defects before the contractor is paid the retention amount.

**9. Annexes**

Annex A –Schematic layout of the Borehole design with animals' trough

Annex B – BOQ for drilling two (2) boreholes

Annex C – Check list



	List of documents to provide	Submitted(Yes/ No)	Remarks
I.	BoQ template dully filled and with no arithmetical errors.		
II.	3 satisfactory contract completion certificates in South Sudan during the last 5 years		
III.	Detailed list of the drilling equipment (Name; Model; Quantity; Year of manufacturing) List of work forces		
IV.	Work schedule (maximum of 2 months' work in total)		