Enhancing Community Resilience and Local Governance Project

TERMS OF REFERENCE

Drilling 6 new boreholes, construction of 4 water yards and installation of 2 handpumps at Mathiang, Rotriak, Binyang, and Yoanyany Boma in Rubkona Payam, Rubkona County, Unity State.

1. PROJECT INFORMATION

1.1. Background

International Organization for Migration (IOM), South Sudan Mission, is implementing the Enhancing Community Resilience and Local Governance Project (ECRP). ECRP provides training to Boma and Payam level development committees, which have prioritized infrastructure for selected Payams in ten Counties and two Administrative Areas.

The IOM ECRP Program is planning to construct 4 new water yards and drilling and installation of two handpumps as per scope of work in Rubkona Payam, Rubkona County, Unity State. The 4 water yards boreholes will be fitted with submersible pumps, three (3) water point kiosks for two water yards and 2 water point kiosks for the other 2 water yards with six (6) taps and cattle trough, a solar system in a fenced area and elevated water tower with Propylene plastic water tank of storage capacity 20m^3. The four boreholes shall be motorized with a solar system that is adequate to supply approximately 36m^3/day considering six peak sun hours during the least productive month for solar conditions, and drilling of two boreholes to be installed with INDIAN MARK II handpump as per design and specifications in Rubkona County. The water yard, handpump and water points shall be fenced with access gates if not already in existence.

IOM South Sudan therefore seeks a reputable contractor hereinafter referred to as "the Contractor" to carry out the drilling of new six (6) boreholes, supplying and installing four (4) of the boreholes, with UPVC pipes, electric cable, submersible pump with prop sensor, construction of ten (10) water point kiosks, a solar system in a fenced area and elevated water tower with a tank of storage capacity 20m^3, and the 2 boreholes will be installed with India Mark II hand pump as per the ECRP designs and specifications, including construction of the platforms and animal troughs. This work shall include performing hydrogeological surveying, site clearance, drilling of borehole, well construction, performing borehole development, pump testing, well disinfection and water quality testing up to the

required standards as well as constructing water storage towers, water points and construction of platforms, and installing of submersible pump and the Indian Mark II.

IOM requires prompt and immediate action in mobilization of a team for borehole drilling and all other components required for a successful borehole drilling, water yard construction and rehabilitation, submersible pump and handpump installation. As a result, the Contractor must provide a suitable and experienced team that can quickly and efficiently carry out the required drilling and construction/installation work, as well as any required tools and transportation for the team to and from the sites. The Contractor shall furnish all the necessary materials, tools and equipment, labor supervision and other services for the satisfactory and timely completion of the works in accordance with this agreement.

1.2. Project Details.

Project Name	Drilling boreholes and installation of hand pumps, construction of water yards at Rubkona County, Unity State.
Project Site 1	Construction of water yard at Barkuor Village Mathiang Boma, Budang Payam of Rubkona county, Unity State.
	Scope of Work: Dilling of boreholes and Construction of water yard with 20 cubic steel storage, 6 meters high tower-and installation of submersible pump powered by solar system. Construction of chain-link fence, animal trough, spreading and compacting murrum around the water yard tower and the Kiosks/water points.
Project Site 2	Nokpuot Village, Rotriak Boma Budang Payam in Rubkona County, Unity State
	Scope of Work: Drilling of borehole and installation of handpump o with India Mark II hand pump, spreading and compacting murrum at the surrounding of the borehole
Project Site 3	Bilyang Primary School Binyang+Kalabalek Boma Panhiany Payam in Rubkona County, Unity State
	Scope of Work: Drilling of borehole and installation of handpump with India Mark II hand pump, spreading and compacting murrum at the surrounding of the borehole
Project site 4	Construction of water yard at Denjaak primary school Yoanyany Boma, Rubkona Payam Rubkona county, Unity State.
	Scope of Work: Dilling of boreholes and Construction of water yard with 20 cubic steel storage, 6 meters high tower-and installation of submersible pump powered by solar system. Construction of chain-link fence, animal trough, spreading and compacting murrum around the water yard tower and the Kiosks/water points.
Project Site 5	Construction of water yard at Community resource center, Chilak Village Yoanyany Boma, Rubkona Payam Rubkona county, Unity State.

	Scope of Work: Dilling of boreholes and Construction of water yard with 20 cubic steel storage, 6 meters high tower-and installation of submersible pump powered by solar system. Construction of chain-link fence, animal trough, spreading and compacting murrum around the water yard tower and the Kiosks/water points.
Project Site 6	Construction of water yard at Rubkona Primary school, Chilak Village Yoanyany Boma, Rubkona Payam Rubkona county, Unity State.
	Scope of Work: Dilling of boreholes and Construction of water yard with 20 cubic steel storage, 6 meters high tower-and installation of submersible pump powered by solar system. Construction of chain-link fence, animal trough, spreading and compacting murrum around the water yard tower and the Kiosks/water points.
Schedule	The project is expected to commence in **November 2024** and be completed within **6 months** with a twelve-month defect notification period.

2. Supervision

The borehole drilling and water yard site activities will be supervised by the IOM designated Site Engineer and Project Engineer. A Community Site Supervisor will support the team in monitoring the daily work. The Lead Engineer is responsible for the overall project management of the contract work with oversight from the ECRP Programme Coordinator.

IOM will appoint/assign a community site supervisor alongside the Field Engineer with full support of IOM Engineer to supervise the works, hereinafter referred to as the "IOM Project Engineer." Certain decisions must be validated by the IOM ECRP lead Engineer as listed in the following sections of the ToR (Terms of Reference).

Condition and specifications of the equipment and materials utilized will be subject to physical inspection and approval by IOM Project Engineer under overall supervision of Lead Engineer and should be disclosed by the Contractor prior to mobilizing the materials to the site.

The installation of the casing, gravel pack and complete pump testing must be done in the presence of the IOM Project Engineer.

To avoid double reporting, the Contractor is not allowed to report externally to any other platform of coordination.

3. Scope of Work

These General Specifications are to be used with reference to the following documents:

Annex A. Design Drawings
Annex B. BoQ (BILL OF QUANTITIES)
Annex C. Guideline for Standards on Workmanship and Materials
Annex D. ECRP IOM Project Health and Safety Management Plan (HSMP)
Annex E. ECRP IOM Quality Management Plan (QMP)

Annex F. ECRP Environmental and social requirement for Contractors ESRC)
Annex G. ECRP Labour Management Procedure (extract from ESMP)

The selected contractor must perform in a satisfactory manner, the construction/rehabilitation of water yards ;the drilling of six productive boreholes and installation of suitable submersible pumps in accordance with standard specifications and construction of two (10) water points each with six (6) taps attached to a cattle trough, a water tower of six (6)meters high as per the specification in the design and BoQ (BILL OF QUANTITIES), a solar system installation and fencing to protect the solar system. The solar panels shall be mounted on top of the water storage tower and two of the boreholes will be installed with handpumps.

The work shall also include the provision and installation of 6" casing and screens (in uPVC), adequate gravel packing, materials for the construction of the apron, sanitary seal, disinfection of the well and water quality test both bacteriological and physiochemical.

The following detailed scope of work is supplementary to the design drawings. Any discrepancies between the drawings and these specifications shall be brought to the attention of the Site Engineer or Project Engineer for clarification.

The scope of the works will be to:

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3.1. Borehole Sitting and Groundwater Investigation

Borehole locations shall be identified in agreement with the local communities and in consultation with the IOM Project Engineer. Sites selected for the hand pump should preferably be within the communities and not further away than 0.5km from 80% of people of the village. Boreholes should not be sited in or near to places that get flooded during rain. Flood plains should be avoided. Additional measures should be taken to ensure that sites are outside the minimum distances prescribed from sanitation installations, sources of pollution, landfills, graveyards, and animal pastures.

Prior to drilling and installation works commencing, the Contractor must perform a geophysical survey and analysis (hydrogeological survey) in the IOM pre-identified locations using geo-electrical techniques. The purpose of the surveys will be to identify optimal drilling position at each location, as well as two back up drilling positions. The hydrogeologist shall recommend one suitable site 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 (Terms of Reference).

The results of these geophysical surveys will be compiled into a 'Geophysical Survey Report' to be submitted to the IOM Technical Lead Engineer prior to drilling operations commencing. This report will contain all results and locations of all geophysical profiles undertaken, and co-ordinates for the optimal and back up drilling positions.

The IOM Technical Lead Engineer will review this document and agree the proposed drilling positions are suitable prior to commencing.

3.2. Drilling stipulations

Any change in the set specifications for drilling such as: depth of hole, diameter of hole, depth of screen installation, materials for casing, gravel packing, etc., should be agreed by both parties (IOM and the drilling organization) and should be recorded in writing and signed by both parties in a variation order form.

3.2.1. Borehole depth and diameter

Drilling of one (01) borehole in all geologic environments with a minimum borehole diameter of 9", the average/minimum anticipated borehole depth shall be of 90m. Shallower or deeper boreholes may be encountered but the IOM Project Engineer shall formally validate the final depth of the borehole. No additional payment shall be made for meters drilled beyond the stated depth.

3.2.2. Verticality and alignment

It is a requirement to maintain verticality throughout the borehole depth as this will ensure the functionality and longevity of the INDIA Mark II pumping equipment as well as the submersible pumping system.

Good drilling practices must always be maintained to ensure the boreholes achieve acceptable verticality. The wellbore, casing and screens shall be set round, plumb and true to line. If required by the IOM Project Engineer, the Contractor shall make a verticality test during and after drilling by approved methods and at his own expense to demonstrate that the departure from the vertical does not exceed 0.1% between ground level and the bottom of the well. If this departure is exceeded, the Contractor shall make the necessary corrections with approval from IOM Project Engineer, without additional payment. If the error cannot be corrected, then drilling shall cease, and a new borehole shall be drilled. The abandoned borehole shall be backfilled and /or capped. No payment shall be made for re-drilling, the sealing/backfilling of the abandoned borehole, or for moving to a new site. Any materials (i.e., casing, screens, gravel pack, cement, etc.) lost in the abandoned borehole shall be at the Contractor's cost.

The Contractor shall include in their tender submission how they intend to maintain verticality of the boreholes and how they intend to check verticality of the borehole.

3.2.3. Drilling Method

The Contractor may use any motorized drilling technique that will achieve the depth and diameter required of the borehole, provided that the technique used is approved by the IOM. The rig to be deployed must be capable of drilling to at least a depth of 25% beyond the anticipated final depth at the required diameter.

Sufficient drill collars and down-hole stabilizers will be required to ensure that good verticality is maintained throughout the drilling operation. All drill bits used throughout the work will be in good condition with minimal wear to the cutting teeth.

3.2.4. Drilling Fluid

The Contractor should make exclusive use of direct or reverse circulation rotary and down-the-hole hammer drilling techniques, using an appropriate (biodegradable) drilling fluid.

During rotary drilling using air as the circulating fluid, approved surfactants and artificial foam stiffening additives may be used if ground conditions warrant their use. Bentonite based fluid additives will not be accepted. Cellulose based reconstitution powder, or liquid polymeric additives may be required for viscosity enhancement. The Contractor must state the type of polymer to be used and describe how the selected fluid additive will be mixed.

The Contractor shall make his own arrangements for obtaining, storing, transporting, and pumping of the water required for drilling purposes. The IOM shall only supply logistical support, where the Contractor requests this in their response to the call for tender, and then agreed by the IOM Lead Engineer.

3.2.5. Strata sampling and borehole geo data

Representative, continuous samples of 125 grams minimum of the strata penetrated shall be collected for every 2m interval and when required by the IOM Project Engineer. The drilling organization shall take every precaution to guard against cutting contamination. Representative samples from the cuttings shall be preserved in polythene bags or suitable sealable containers and clearly marked in waterproof ink according to Location, borehole reference identification number (supplied by IOM), date taken and depth [from – to] by the Contractor. The samples shall be stored in a position where they will not be contaminated by site conditions or drilling operations. Lithological logging shall be the responsibility of the Contractor. All samples shall be given to the IOM Project Engineer upon completion.

3.2.6. Total Depth of Borehole

The IOM Project Engineer will validate the total depth of the borehole. After the drilling process, the Contractor is required to pull out all the equipment out of hole and then run-in hole, reaming and flushing the borehole to total depth.

Once the borehole has been cleaned, the drilling assembly is pulled out of hole and prior to casing installation, a tagline supplied by the Contractor shall be used to check the true depth of the wellbore. This will ensure that no significant borehole balling, or collapse has occurred. In the event of the borehole bridging or having extensive collapse, the Contractor shall have to perform another borehole flushing run down hole.

3.3. Well Construction

3.3.1. Casings and Screens

The Contractor shall produce a well design, which must be validated by the IOM Project/Field Engineer before the casing is installed. The Contractor may install temporary casings at their discretion as considered necessary to ensure the successful construction of the boreholes. Steel based temporary casings shall be extracted upon completion of the work to avoid groundwater contamination.

The Contractor shall install uPVC, PN10, drinking water standards, non-toxic plain casings with a 6'' nominal diameter and 6.5 mm thickness for the total depth of wellbore except where screen casings are installed, regardless of the formation type.

Flushed or trapezoidal threaded connections are acceptable. Glued connections shall not be accepted. The intended casing joint type should be indicated in the tender submission.

The well design must include at least 3 meters of plain casing, fitted with a screwed on proprietary bottom cap, at the bottom of the casing column, to act as a back-sump for fine material which may enter the casing column during operation. The casing and screens must be centralized in the well so that an annular space. During installation, all casings and screens shall be accurately measured, and their lengths recorded in casing tally. The casing tally shall be part of the borehole report handed upon completion of the works.

The Contractor will supply and install screens with vertical slot size between 0.5mm to 1mm with a minimum of 6% aperture. Hand-slotted casing will be rejected.

The casings and screens shall comply with ISO 9001:2018 and DIN4925 standards.

3.3.2. Gravel Pack

The Contractor will supply and install filter gravel pack, which is washed, well-rounded of uniform grading from riverbeds consisting of particles with a diameter of 1-5mm. The gravel pack shall comprise of at least 95% siliceous material and must contain no clay, shale, silt, fines, excessive amounts of calcareous material or crushed rock. Prior to delivery, the IOM Project Engineer Lead for validation shall subject a sample of gravel pack to inspection.

The volume of the filter pack required must be calculated considering 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 of 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.

3.3.3. Sanitary seal and backfilling

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 ¼" and ½". The bentonite pellets shall be installed in the annular space from the filter pack using Tromie 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 IOM providing the justification and the specifications of an alternative sealing and plugging material for IOM to approve its installation.

3.4. Borehole development

After installing the casing and annulus backfilling, the borehole will be developed through air lifting methods to remove drilling debris and sediment from it.

The boreholes must be developed by airlifting for a minimum of 6 hours until a stabilized satisfactory yield is reached, and the turbidity is less than 5 NTU. The nozzle of the air eductor shall never be placed in front of the casing screens; it may be placed below or above.

3.5. Pumping Test

3.5.1. Step drawdown test

The Contractor shall conduct a step test for a minimum of 8 hours considering four steps with different yield (Qmx/1, Qmx/2, Qmx/3 and Qmax) and a recovery step should conduct a step drawdown-pumping test. Each test should last a minimum of 2.0hr. The recovery test will be for one hour or such time when there is at least a recovery of 90% of the static water level noted at the start of the pump test. The water level for every step shall be measured every 1 min for the first 10min, every 5 min until 60min has elapsed and every 10min to 120min has elapsed.

3.5.2. Constant rate test

The Contractor shall also conduct a 6-hours constant rate test allowing at least 12 hours between the step drawdown test and the constant rate test. The pumping rate for the constant rate test shall be agreed and decided with the IOM Project Engineer. It is recommended to conduct the constant rate test at Qmax or $6m^3$/hr. or whichever is more – this should be discussed and agreed with the IOM Project Engineer. The recovery test will be for one hour or such time when there is at least recovery of 90% of the static water level noted at the start of the pump test. The water level for every step shall be measured every 1 min for the first 10min, every 5 min until 60min has elapsed, every 10min until 120min has elapsed, every 15min until 240min has elapsed 30min until 360min has elapsed 60min until 480min has elapsed.

Step draw down, constant pump test and recovery data should be reported on the IOM Pumping Test Log Sheet and should contain at least: Position of the WL measurement datum, Date of Test (Day, Month, Year), Total Depth of BH (m), Static Water Level (SWL) before test (m). Model of Pump used, Depth of Pump Intake (m), Discharge (Ltrs/Minute), Dynamic/Pumping water level (m).

The procedure should be discussed and agreed to by both parties (IOM Project Engineer and Contractor) before starting the pumping test.

In the event of a breakdown during the tests, the groundwater level must be allowed to recover to the static level and the test must be re-started a minimum of 12hrs later. IOM shall not compensate for any failed pumping test needing repetition.

3.6. Water Quality

3.6.1. Laboratory Testing

Water samples for testing the physical, chemical, and bacteriological properties shall be taken at the end of the test pumping. The Contractor will take two (2) times – one (1) liter samples in clean, properly sealable, sterilized plastic bottles for laboratory analysis. The Contractor shall be responsible for testing the water quality in approved water testing laboratories and as specified, furnish the IOM with the test certificate. The samples should reach the laboratory within 6 hours of the time of collection.

The water quality shall comply with the minimum South Sudanese quality standards. If one, or more, of the requirements are not met, the borehole will be considered unsuccessful and treated as a dry borehole.

3.6.2. Field Testing

The following parameters should be tested on site using portable water quality testing meters. The results of these tests shall be included as part of the final borehole records for each borehole.

- Date of test
- Electrical conductivity (maximum 1400 µS/cm)
- Total dissolved solids TDS (maximum 1000 mg/l)
- Temperature
- PH (6.5 – 8.5)
- Turbidity (maximum 5 NTU)

3.6.3. Borehole Disinfection

After collecting the water sample for 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 borehole for at least 4 hours at the specified concentration, leaving a concentration of residual chlorine of 50 milligrams/liters (as per WHO (World Health Organization) standards). The disinfection procedure shall be discussed with IOM's Project Engineer to seek approval.

3.6.4. Water Yard Construction/Rehabilitation

The contractor shall supply and install a well head/Pedestal stand raised at least 50 cm from the ground, provided of a well cap for the borehole with holes provision for the riser pipe, electric cable and deep meter as shall be agreed by IOM supervisory team. The well head and well cap should be INDIA MK II pedestal. To protect the well head, a concrete platform should be constructed around it to a minimum height of 0.3m with a manhole with a cast iron trap fitted with a lockable system.

The selected contractor shall supply and install a solar system with one submersible pump comprising all the components including cabling and uPVC rising pipe class 10 (min. diameter 50 mm), controller, submersible cable of at least 110m, float switch, and adaptor set, surge protector and lighting arrestor with a minimum of 1 piece of 8-foot copper-plated grounding rod. The submersible pumps and solar system should be able to deliver a yield not less than the critical yield calculated after the pump test at the final installation depth. The solar system should be branded Lorentz or Dayliff designed and approved by IOM supervisor corresponding to the characteristic of the boreholes and providing at least $36m^3$/day total considering 6 peak sunshine hours. The solar panels must be mounted on the water tower, tilted at $5\text{-}7^0$ with the whole area protected by a fence. Mechanical flow meters shall also be installed for monitoring production. The pump specifications and the solar system should be agreed and endorsed by IOM's supervisory team in writing.

The contractor shall supply, fabricate, and install a 6m metallic water tower with a cat hooped ladder welded on it as per the engineering drawing having a capacity to hold a $20m^3$ plastic tank, of water catering for free board of 200mm height. There shall be rail guards of 1m height constructed above the base of the tank mounted with 2 modular all-in-one solar streetlights, attached directly onto the tower, and secured by razor wire. The water tower should be at least 6m high from the ground level to the bottom of the tank, complete with concrete foundations as shown in the drawings. The tank technical specification shall be agreed by the IOM supervisory team in writing.

Supply and installation of a fence to secure the solar system and the borehole (if feasible). The fence shall be constructed using circular steel hollow section tubes of 50mm diameter by 3mm thickness or cast in a concrete (1:2:4) foundation (W: 0.3 X L: 03 X H: 0.55 m). The top of the pole shall be welded with Y beams of 500mm length hollow section tube of 50mm diameter and 3mm thickness and installed with razor wire of 0.9m diameter. The height of the pole above ground shall be determined by the height of the chain link supplied but should be of a minimum 1.9meters. The poles shall be installed 2 meters apart and reinforced using 3 lines of binding wire in tension for the chain link and 2 lines running parallel for razor wire. Corner poles shall be supported by diagonal angle bars.

Installation of a gate frame constructed with 2 pieces of 100mm x 100mm x 3mm (4x4 inch) hollow section, each supported by an additional member placed at 60deg angle from the vertical pole. The gate itself shall be constructed with 60mm x 60mm x 3mm hollow sections and covered with wire mesh. The fence and gate shall be evenly painted with a single layer of anti-oxide paint and overlayed with an additional coating of silver paint.

The contractor shall supply all construction materials and construction of 2 water points as per drawing with 4 Talbot Talflow self-closing taps each in hollow block and concrete masonry including construction of a drainage channel, cattle trough, and a soak away pit (where necessary) and be

located approximately 150 meters from the water tank, in locations that need to be coordinated with IOM in writing as per drawings. All water points shall have a manhole with a lockable cast iron trap.

All construction materials shall be mobilized to the site immediately after the completion of the pump test and shall be of the following quality:

- Aggregates shall be hard, clean, and free of all organic material. Coarse aggregates shall be comprised of clean, un-weathered, hard, well graded material of between 9.5mm and 20mm in size.
- Sand/gravel shall consist of grains with a maximum size of 9.5 mm. It shall be free of soil, clay, organic matter, and other impurities and shall contain no more than 5% silt.
- Water used for mixing concrete and for curing shall be clean and free from injurious amounts of oil, acid, alkali, organic matters, or any other deleterious substance. It shall be equal to potable water in physical and chemical properties.
- Cement shall be normal Portland cement (class 32.5). Bags shall be in perfect condition when delivered to the site. All broken bags or bags showing signs of dampness caking shall be immediately removed from the site. Reuse of spilled cement is not permitted.

3.7. Borehole Acceptance

The IOM shall accept the borehole upon satisfactory completion of all drilling operations, installation of casings and screens, development works, pumping tests, presentation and approval of complete drilling reports and logs and provided the borehole yield is above minimum recommended values and water quality tests are suitable for potable water according to the GOSS standards.

If completion of the borehole is prevented by any failure of equipment, behavior of the ground, jamming of the tools, or casing or any other cause, the well shall be deemed to be abandoned, and no payment shall be made for that borehole or for any materials not recovered.

In case of an unsuccessful borehole, the Contractor shall drill a new borehole. The option of declaring any borehole unsuccessful shall rest with the Contractor, subject to the approval of the IOM Project Engineer.

Reasons for abandonment:

- Yield – the borehole shall meet the minimum requirement as stated in the terms of reference for the work and if not shall be classified as a dry borehole.
- Water quality and Salinity - If the borehole is seen to have a high salinity (EC over 1400 µS/cm) during drilling, airlift or pumping test, the borehole shall be abandoned and re-drilled at an alternative position.

For any borehole abandoned, the Contractor shall retrieve as feasible all materials from the borehole. The materials salvaged remain the property of the Contractor and may be re-used if not damaged.

The abandoned borehole shall be backfilled with soil from the bottom upward using materials clean and free of contamination (organic matter, oils/ fuels, general waste, animal matter etc.). The last 3

meters shall be sealed by concrete, which shall be placed by a method approved by the IOM Project Engineer that will avoid segregation or dilution of material.

3.8. Loss of equipment

Any equipment lost down hole must be removed by the Contractor, or the borehole shall be considered unsuccessful. A replacement borehole shall have to be constructed at the Contractor's expense. In the unfortunate event that the Contractor cannot extract the foreign body, the Contractor shall not be entitled to further payments.

3.9. Defect liability period

The borehole will be guaranteed for 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.

3.10. Reporting

Upon completion of the borehole and the water yard, the selected Contractor shall submit a report of the borehole construction work. The report should include:

- Borehole location details including GPS data in decimal format.
- Daily journal record, capturing the activities performed each day from the day of mobilization, including downtime and failures and if applicable the drilling depth.
- Drilling pipe tally sheet with the start and end times of each drilling rod.
- Lithology log, capturing all the information pertaining to the appearance of water filtrations and aquifer, types of rock found and sampling details including geophysical testing analysis.
- Casing and screen manufacturer, size, positioning, and installation depth.
- Filter pack details: size and depth of installation in the annulus.
- Step drawdown test with details of the pump used, installation depth, date of test, and SWL with analysis and determination of the specific drawdown.
- Constant rate test with details of the pump used testing conditions and an analysis providing an estimation of transmissivity.
- Disinfection procedure followed and concentrations used.
- Submersible pump installation details: parts used, quantity and depth of installation.
- Water quality analysis
- Solar panels installation details: model, watts, dimensions, height of installation, etc.
- Variation orders capturing deviation from ToR and BOQ (BILL OF QUANTITIES) signed by the Contractor and the IOM Project Engineer.

The Contractor shall report the above information using IOM's ECRP reporting template. The Contractor will provide the original copy of Government of South Sudan's (GoSS) Borehole Completion Record Certificate in the approved form, dully completed, and signed by the State Director of Water and Sanitation or Representative at State Level of the State Ministry of Physical Infrastructure.

No payment will be made prior to reception of all the documents described above.

4. 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 documents. All Labor, materials, tools, equipment, transportation, supplies required to complete the work in accordance with the contract's specifications should be well furnished. The Contractor cannot deviate from the construction designs or specifications without seeking permission and approval from IOM.

IOM reserves the right to reject any materials, equipment, or resources and to delete or reduce any work item, whether in whole or in part and update Annexes, as necessary and a reduced contract price shall be agreed.

If the Contractor is not able to finish the construction works or must abandon the works due to loss of tools, accidents or any unforeseeable circumstances, the Contractor should remove all unused materials from the site. IOM will pay **only** for the work done as per rates in the filled Bill of Quantities in the contract document.

The ECRP IOM Project Health and Safety Management Plan (HSMP) outlines the Contractor's roles and responsibilities in the management of activities to prevent dangerous acts that could lead to injuries, illnesses or serious incidents in the workplace and damage or loss of assets.

The ECRP Quality Management Plan (QMP) outlines the Contractor's roles and responsibilities for meeting the quality standards expected of this program and the process and procedure for verifying each step.

To complete the task timely and efficiently the Contractor should:

1. Deploy qualified and well-experienced managers, site engineers and workers to complete the required tasks.
2. Prepare and submit staff deployment plan/organogram for the project implementation assigning the specific people in charge of communication and coordination with the project supervisor.
3. Prepare and submit Work Plans, Emergency Preparedness and Response Plan, Waste Management Plan, Labour Management Plan and Environmental and Social Management Plan as per the HSMP
4. Preparation of "Resource Plan" (materials, machine/tools, work force) in accordance with the submitted Work Plans.
5. Develop Risk Assessments using Form HS05 as per the HSMP
6. Based on the approved work plan, the Contractor shall execute multiple work activities simultaneously to save time.
7. The Contractor shall allow unlimited access to construction sites for the ECRP staff as required.
8. Follow Guideline GHS12 – Site Establishment in the HSMP,
    A. The Contractor should arrange temporary office/accommodation at each site with necessary facilities for the staff and workers (water, toilets, first aid kits etc.)
    B. The Contractor is responsible for maintaining pollution/contamination-free surrounding environment.
    C. The contractor should display both a work plan and resource plan at each site.

D. The debris from any demolition activity and garbage at the construction sites should be removed by the Contractor and disposed of in a safe area away from the site.

9. As per the Quality Management Plan (QMP),
   A. Ensure that materials are properly packed and covered during transportation to ensure that the materials are not damaged.
   B. Ensure that all materials, particularly cement, timber, paints etc. are safely stored on sites to prevent deterioration of strength by water, moisture, or heat.
   C. All drilling and construction work such as casing installation, gravel packing, well development, pump testing, support structures etc. shall be executed in the presence of IOM personnel.

5. Health, Safety and Environment

The Contractor is required to comply with the *ECRP IOM Project Health and Safety Management Plan (HSMP)* and the *Environmental and Social Management Plan (ESMP)*. The following information is provided to guide the Contractor in the key aspects of HSMP only.

The main health and safety legislation and other relevant compliance requirements in South Sudan are described in the *South Sudan Legal Register* (Form HSE03).

Risk assessments for hazard identification and activities are required for safety-critical activities prior to each stage of work commencing. These shall be documented using Form HS05. All IOM personnel have the authority to stop any activity that has the potential to cause injury or damage to property until such times as the works are managed in a safe manner.

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 ensuring the crew wears the protective equipment such as safety helmets, hard-toed boots (safety boots) or gumboots, heavy-duty gloves and ensuring that all tools and equipment are in a safe condition and ensuring that their employees adopt safe working methods as instructed by IOM. No military-looking clothing will be accepted at any time. *Health, Safety, Social and Environmental inspection Site Reports* shall be carried out weekly on Form HSE05.

The project sites The Contractor's team leader has the obligation and responsibility to safeguard the safety and security of its personnel, the construction crew's equipment and other property, and personnel's personal effects and other property. The Contractor's team leader shall develop an *Emergency Preparedness and Response Plan* in consultation with IOM, including detailed procedures to cover evacuation, personnel, equipment, unlawful interference, and prevention of sabotage.

The Contractor is required to hire skilled and unskilled labour from the local project area to execute the contract. The Contractor shall submit their *Labour Management Plan* in accordance with the guidelines in Annex D on the ECRP *Labour Management Procedures*. Justification must be submitted to IOM for approval before the Contractor can recruit non-local skilled labour.

All selected staff to work as part of the construction crew are to abide by the Code of Conduct in the Construction Contract on the prohibition and prevention of sexual exploitation and abuse (SEA). The crew shall undertake a *PSEA (Prevention of Sexual Exploitation and Abuse) (Prevention of Sexual Exploitation and Abuse), 1-day training* with IOM prior to conducting any work.

The Contractor is to ensure that all materials, solid or liquid, are stored so as not to damage or contaminate any surface by spillage. Further guidance is provided in *Guidelines on Environmental*

Management: GEM02 Waste Management & Hazardous Substances, GEM03 Protection of Water, GEM05 Borrow Pit Management, and GEM06 Preservation of Historical, Archaeological and Cultural Remains.

6. Quality Management

The ECRP *Quality Management Plan (QMP)* outlines the Contractor's roles and responsibilities for meeting the quality standards expected of this program and the process and procedure for verifying each step. The following information is provided to guide the Contractor in the key aspects of the QMP only. More detailed guidance on quality of workmanship is provided in Annex B.

Section 5 of the QMP provides the framework for project staff responsibilities during Construction. From IOM, each site will be assigned a Site Engineer and Community Site Supervisor supervised by a Project Engineer whose main task is to monitor and report on the performance of works being implemented. The Lead Engineer is responsible for the overall contract management.

The QA (Quality Assurance) process, in brief, starts with approval from the Lead Engineer for a construction activity to proceed (Form QM06). Once approval is obtained, the work can proceed. During the work phase and upon completion, the Contractor must allow testing of materials, inspection of construction activity and survey compliance checks to be performed. For *material testing*, relevant forms include QM07A Request for Inspection and Testing Results, QM07B Inspection of Materials on Site, and QM09 Inspection and testing plan. For inspection, the Contractor is responsible for submitting *QM10 Daily Logbook*, and *QM11 Weekly/Monthly Progress Report and Summary*.

Any materials or works that do not conform to the technical specifications or BoQ shall be rejected with a *Non-Conformance Report (NCR)*. Rectification of works shall be carried out at the cost of the Contractor prior to continuing with the next phase of work. Refusal of this instruction will lead to immediate termination of the contract.