TERMS OF REFERENCE
CONSULTANT FOR BOREHOLE DRILLING AT LAFOOLE

1. BACKGROUND

Concern Worldwide is a non-governmental, international, humanitarian organization dedicated to the reduction of suffering and working towards the ultimate elimination of extreme poverty in the world's poorest countries. Concern engages in long-term development work, responds to emergency situations, and seeks to address the root causes of poverty through development education and advocacy work.

Concern has been active in Somalia since 1986 despite the political and social instability and constant insecurity that characterize the country. Concern is currently implementing several multi-sectoral emergency and development programmes encompassing livelihood security, nutrition, water sanitation and hygiene, and community education in Somalia.

Concern is implementing the project, Supporting Climate Adaptation and Durable Solutions for Displacement Affected Communities (DACs) in the Shebelle River Basin, Networking with & Enhancing Efforts by Government & Administration in Afgoye District (NEGAAD). Under this project, Concern intends to support to drill a borehole in the Lafoole area, Afgoye District, Lower Shabelle Region, SW State, Somalia.

2. PROJECT INFORMATION

Following geophysical borehole site investigations and Environmental Social Impact (ESIA) Assessment conducted by Tawakal Consultant, a suitable location was identified and successfully drilled to a depth of 194.7m. A submersible pump with a power of 11 kW was installed, resulting in a yield of 24 cubic meters per hour. The borehole pumping test was conducted between 5 and 6 September 2024.

The Lafole borehole has experienced repeated pump failures caused by the accumulation of sediments, mud, and fine sand. Typically, during operation, the borehole discharges heavy sediments for about two hours. However, on 21 August 2025, it discharged sediments continuously for three consecutive hours. This led to clogging of the pump's intake screen and internal components, ultimately causing pump failure. The borehole is drilled in a formation of very fine sand, which infiltrates the borehole by bypassing the casing screen.

The following are the findings and observations made during technical assessments conducted at the BH

- **Sandy water discharge**: The borehole has experienced repeated pump failures caused by the accumulation of sediments, mud, and fine sand. On 21st August 2025, it discharged sediments continuously for three consecutive hours. This led to clogging of the pump's intake screen and internal components, ultimately causing pump failure.
- **Sediment Accumulation**: Significant deposits of dark brown sediment were observed around the borehole. This indicates that fine sediments have accumulated inside the well, reaching up to the pump setting depth.

- **Pump Damage**: According to the borehole caretaker, three submersible pumps have already been replaced due to damage, mainly caused by the abrasive and corrosive nature of the water.

Conclusions have been drawn to the leading cause of borehole failure in the Lafole area is the mismatch between the screen slot size and the **size of the formation sand grains**. The screen size of 0.5mm slots allowed fine sand to enter the boreholes, reducing well efficiency and damaging the pumps. Fine sand intrusion caused **frequent damage to electric submersible pumps**, including clogging, abrasion, and motor burnout. The current casing and screen, constructed from uPVC material, are inadequately designed to retain fine sand particles. Consequently, sand passes through the screen and fills the borehole. UPVC screens are ineffective in preventing fine sand intrusion. A more suitable alternative is mild steel casing fitted with Johnson-type screens. These screens allow higher flow rates while effectively blocking fine sand particles, ensuring efficient water infiltration and sustainable operation.

Remedial rehabilitation options have been suggested and reviewed, and given the uncertainty and complexity of the suggested rehabilitation options, like flushing out the BH, inserting smaller casings, sealing off the fine sand section (158-194.7m), reducing the pump intake, installing a smaller capacity pump. These may only offer a temporary solution, with the possibility of the sand intrusion recurring after some time. Hence a long term sustainable solution is being sort.

The following recommendations are prescribed:

1. Drill a new BH near the existing one to a depth of 155m (to avoid reaching the fine sand deposits, in line with the hydro-geological reports).
2. Install mild steel casings (plain and screens) with 10'' internal diameter. The mild steel casing (as compared to the PVC casings) will possibly provide strength and rigidity required in the underground soil conditions of Lafoole area.
3. Use factory pre-packed stainless steel screens (Johnson type) with outer pre-pack gravel engineered to retain the formation, with equivalent slot opening ≤ 0.25mm. Johnson-type screens, are specifically designed to prevent fine sand intrusion and ensure long-term functionality.
4. Provide a well-compacted, properly graded gravel pack matched to sieve analysis - special, well-known gravel sourced from the Burhakaba area as it has clean, durable, and suitable for groundwater filtration.
5. Complete rigorous development and sand-free acceptance testing before commissioning.
6. The pump design to be based on the tested yield, and the water demand needs. The test pumping to be carried out using variable pumping rates and depths to provide a good basis to determine the right pump sizing.
7. Retrieval/recovery of the pumping equipment (riser down pipes, down cable) – to be re-used in the new BH.
8. Reconnection to the existing water supply network.
9. Drilling process to be supervised by an experienced and qualified Hydro-geologist.

2. OBJECTIVE OF THE ASSIGNMENT

The objective of the consulting services is to manage and supervise the drilling contract of one (1) borehole located in Lafoole on a day-to-day basis on behalf of Concern Worldwide. The aim of the supervisor is to support the client in contract supervision of the drilling works, and contract management for the smooth execution acting as the on-site representative in making decisions for the client. In addition, final certification and verification shall be carried out by the consultant. The supervisor shall carry out quality control and ensure that Works are being carried out as provided for in the contract. The drilling site supervisor shall supervise if the Contractor is following the terms, conditions and specifications as provided for in the drilling contract and make amends only after consulting with the client (Concern Worldwide) if different ground conditions are encountered that were not envisaged.

Boreholes are one of the best means of obtaining clean water in field conditions. However, constructing, or repairing, boreholes requires specialized knowledge and technical expertise, much of which can be gained from the standard literature; but field operations in remote areas or in difficult conditions often require flexibility and imagination in avoiding and solving technical problems.

The supervisor will be able to take prompt decision, that no waiting time is incurred for the driller. The end result should be a cost-effective facility capable of supplying potable water for many years.The drilling supervisor will use check lists for all major steps.

Therefore, Concern Worldwide is seeking the expertise of a Borehole Drilling Supervisor (BDS), who will be responsible for delivering the above outputs.

3. MAIN RESPONSIBILITIES

Concern Worldwide intends to engage the services of a competent drilling supervisor to undertake supervision of the drilling of one (1) borehole at the identified/georeferenced site, next to a collapsed BH site at Lafoole. A production borehole shall be drilled in the recommended site or as may be determined by the client and/or Engineer and instructed to the consultant. Drilling will be supervised by a competent drilling supervisor. Supervision shall include geological logging of drilling samples, reporting on daily progress, borehole design, design for installation of the borehole, supervision of installation of borehole screens and casings, development and test pumping, sampling and analysis of water quality, and quality control of all other work done by the Contractor. Full time availability of the drilling consultant at the site is a must. Invoices submitted by the Contractor are to be certified by the Consultant. The data acquired during drilling and testing shall be analysed and borehole completion report prepared for the production borehole. While overall quality control of the works shall be done by the consultant, attention shall be paid to the following issues pertaining to drilling, installation and test pumping works.
General description to the role

The main responsibilities/tasks can be summarized as follows:

- Drilling supervision
- Preparation of Borehole completion reports for the borehole.
- Certification of contractor's invoices
- Recommendation of production pump

5. SUPERVISER ACTIVITIES /TASKS

Details of these responsibilities/tasks are further detailed below.

5.1 Drilling supervision

5.1.1 Borehole Depth and Diameter

The supervisor shall give instructions on the total depth and at what diameter to drill. Should collapsible formations be encountered, installation of telescopic casing shall be decided upon by the Supervisor.

5.1.2 Drilling Method and Process

The supervisor shall approve or reject all drilling methods and/or any additives to be employed by the Contractor. The site supervisor shall ensure that the contractor follows the standard drilling practice, including making all necessary drilling records correctly and on the spot, and that he/she completes the borehole according to the recommended well design.

- Examine tools, materials, plant and equipment, and approve or reject as appropriate on the basis of the standards. Such instructions shall be provided to the contractor in writing.

- Write instructions to the contractor relating to the management of the contract, the design and development of the water source, or any other relevant matters as and when required. All instructions issued by the drilling supervisor shall be in triplicate and shall be signed by site representatives of both the contractor and site supervisor.
- Ensure that the contractor uses the correct drilling methods, equipment and tools for any site to be drilled as specified. The supervisor shall approve all drilling methods and/or any additives to be employed by the Contractor. Ensuring drilling to recommended depths and diameter; the supervisor shall give instructions on the total depth and at what diameter to drill. Should collapsible formations be encountered, installation of telescopic casing shall be decided upon by the Supervisor.

5.1.3 Sampling

The supervisor shall ensure that representative samples are taken at specified intervals (three - metre) of the strata penetrated and are put into suitable sample bags, labelled with the depth interval, and stored in a position where they will not be contaminated by site conditions or drilling operations. Geological logging will be the responsibility of the Supervisor

5.1.4 Yield estimates during drilling

The supervisor shall continuously monitor air lift yields will be made by the contractor and recorded by the Supervisor. Ensure the borehole driller reads and rates average yields every
3 meters of penetration and as otherwise directed by the supervisor and recorded in the driller's log.

5.1.5 Borehole design

Ensure borehole design is made by the drilling contractor after drilling completion. The design shall ensure that aquifer zones are completely or partially lined with mild steel plain casing and stainless-steel continuous slot screen as decided and approved by the Supervisor or as determined by the client prior to award of the contract. Samples of the installation materials shall be tested by the drilling Contractor. During installation, the supervisor will confirm that the screen open surface area is as specified in the contract with a uniform slot size. In addition, the Supervisor will ensure that the casings and screens are centralized in the borehole so as to leave a uniform annular space between the borehole wall and the casing. Suitable centralizers should be provided to allow the casing and screen to be set correctly in the centre of the drilled borehole.

5.1.6 Temporary Casings

In case the design was predetermined before the actual drilling, reconstruction of the well-design after the drilling, or possible encountering unproductive well (dry) due to unforeseen variations in hydrogeological conditions, the contractor shall be required to make consultations with the site supervisor who, upon a sound technical judgment, for which he/she takes full responsibility, will consult with the employer/client, then issue written approval and instructions to the contractor to go ahead with the necessary changes. All the changes made shall be properly recorded and shall form part of the driller's log.

The supervisor shall direct installation and recommend the diameter of any temporary casing required for the construction of the borehole based on formation penetrated. He shall ensure that the same are retrieved at the end of all drilling and installation activities. Where the contractor is unable to retrieve the casings due to jamming, this shall be confirmed that it has no negative effect to the quality of the water or the installation of the permanent designed borehole, and at no cost to the client.

5.1.7 Verticality

The Supervisor shall decide whether the Drilling Contractor will conduct a verticality test during and after drilling by approved methods to demonstrate that the departure from the vertical does not exceed 3 in 100 between ground level and the base of the borehole. If this departure is exceeded, the Contractor shall make the necessary corrections to the approval of the Supervisor. If the error cannot

be corrected, then drilling shall cease and a new borehole be drilled at a position nearby, indicated by the Supervisor. The abandoned borehole shall be backfilled and/or capped by methods approved by the Supervisor.

5.1.8 Gravel pack

The Supervisor shall ensure that suitable gravel pack is supplied by the Contractor. Prior to delivery, samples of the gravel pack shall be analysed for grain size and approved by the Supervisor. Gravel should consist of washed, well-rounded particles of a uniform grading. The gravel shall contain 90% siliceous material and contain no clay, shales, silt, fines, excessive amounts of calcareous materials or crushed rock.

In terms of grain size, 90% shall conform to the grading specified and the Contractor shall be required to submit samples of the material prior to installation for approval by the Supervisor. Sufficient gravel pack shall be installed to cover completely the uppermost screen, plus an additional 5 m length (to allow for settling). A good supply of water should be introduced with the gravel to prevent bridging. The pack should be capped with a clay seal to prevent contamination. The annular space above this seal can be back filled with inert drill cuttings. The top three meters should be grouted with cement.

5.1.9 Sanitary Seal

To provide an effective seal to the entry of contaminants, the upper 10 meters of the borehole will be grouted using a cement slurry injected into the annulus between the casing and the wall of the hole, by a method to be approved by the Supervisor. Grouting ensures non entry of contaminants to the well.

5.1.10 Water quality and electrical conductivity measurements

Carries out water quality analysis in conformity with specifications. Electrical conductivity (EC) readings shall be carried out whenever required during drilling, development and test pumping. EC measurements and readings shall be taken for each aquifer strike.

5.1.11 Development and cleaning of borehole

Development and cleaning of the borehole shall be carried out by the Contractor upon completion of the drilling and installation of casing and screens. This will remove the native silts, clays and drilling fluid residues deposited on the borehole wall and adjacent portions of the aquifer during the drilling process.

- If organic drilling fluids are used, they shall be broken down chemically according to manufacturer's recommendations before or during development. Cleaning shall be carried out by airlift pumping, surging, backwashing or jetting. Clay disaggregation by means of Sodium Hexametaphosphate ('Calgon') treatment might be necessary in some cases. The Supervisor issue instructions to the contractor for such treatment.

- The method proposed by the Contractor for development of borehole shall be submitted to the Supervisor in writing for his approval. Development of borehole shall be effective from the depth at which water is encountered to the bottom of the borehole. Development shall continue until water is completely free from fine particles, as to be decided by the Supervisor. Upon completion of development, any accumulation of material shall be removed from the bottom of the borehole by airlifting.

- The supervisor shall ensure that all native silts, clays and drilling fluid residues deposited on the borehole wall and adjacent portions of the aquifer during the drilling process are removed. Cleaning shall be procedural starting within the regions of first water strikes systematically and bottom wise.

5.1.2 Well Disinfection

The supervisor will ensure that disinfection of the borehole is carried out by the Contractor before demobilization from the site. This shall be done by placing a chlorine solution into the well so that a concentration of at least 50 mg/l of available chlorine existing in all parts of the borehole at static conditions. All the borehole surfaces above the static water level shall be completely flushed with the solution. The solution shall remain in the borehole a minimum of 2 hours before pumping the borehole to waste.

5.1.3 Test Pumping

- The supervisor shall ensure that the Contractor performs test pumping to establish well performance and yield of the borehole. Test pumping unit shall be provided for the testing of the drilled borehole. Standard test pumping will be for periods of 72 hours, which might be extended at the discretion of the Supervisor if the water level has not stabilized after the 72 hours. The method for varying the discharge rate of the pumps will depend on the type of pumps used. The Contractor shall provide a suitable means of achieving the rate of flows specified and seek approval by the Supervisor.

- Before testing, the borehole will be subject to a short-term testing (calibration) to establish the approximate yield/drawdown characteristics and to decide upon pumping rates for step-drawdown or continuous yield tests. Sufficient time shall be allowed for the recovery of water levels in the borehole between each type of test. This shall be at the discretion of the Supervisor.

- Discharge measurements shall be made by volumetric method or otherwise approved calibrated measuring device. During the test pumping, the discharge water must be handled and disposed off in an appropriate manner to a point of overland drainage sufficiently far from the well to prevent recharge. The water shall be diverted over a distance of at least 100m from the wellhead.

- During all testing operations, once the flow rate has been determined and preliminary adjustments made, the measured discharge rate shall be maintained within 5% of the required rate for the duration of the test. Persistent fluctuations beyond this tolerance will require abortion of the test and repetition at contractor's own cost.

- When continuous pumping at a uniform rate is specified, failure of the pump operation for a period greater than one percent of the elapsed pumping time shall also require the test to be stopped and repeated at the contractor's own cost.

- Any test which is aborted due to the reasons above, shall be repeated after recovery of the water level.

5.1.14 Water level observations

Water level observations shall be made to the nearest 10 mm at pre-determined intervals. The water levels should be measured during calibration test, test pumping and recovery.

5.1.15 Water Sampling

Water samples will be taken at the end of the test pumping for testing the chemical and bacteriological water quality. The samples should be taken to a competent laboratory for analysis.

5.1.16 Capping of the Borehole
Design of the borehole cap and head works shall be made by the Supervisor in such a way as to prevent entrance of foreign matter into the borehole. Any objectionable materials that may fall into the borehole shall be removed in a method as directed by the Supervisor.

5.1.17 Clearing the Site
Ensuring that the site is left in a clean and tidy condition on completion of the work, and the contractor acts in a responsible manner with respect to any environmental or pollution control guidelines or regulations. On completion of each borehole the site must be left clean and free from all debris, hydrocarbons and waste, and all pits filled to the satisfaction of the supervisor.

5.1.18 Health and Safety
The supervisor shall ensure that health and safety and other environmental guidelines are adhered to on the sites.

5.1.19 Standby time
In the event of delays occurring as a result of action or inaction by the Client, for which the Contractor would be entitled to claim Standby Time, the Contractor should notify and seek approval of the Supervisor immediately in writing. The same will be communicated to the client.

5.1.20 Data analysis and preliminary reporting
Daily drilling progress reports shall be made available to the Client. In addition, a borehole completion report shall be compiled at the end of the drilling and installation. Included in this report shall be all drilling data, design and installation details, test pumping data, graphs and analysis. The drilling site supervisor shall be responsible for the correct interpretation of the test-pumping data for each borehole. Soft copies of the data analysis shall be submitted to the Employer as part of the relevant reports.

5.1.21 Records
The Supervisor, during his execution of the contract, shall prepare site records, completion records carefully and accurately for each borehole, and submit promptly to the employer; fortnightly, weekly, monthly reports. Submission shall be made not later than 7 days after the end of the reporting period. The reports shall focus on progress, general performance, finances, issues, lessons learnt and recommendations. Completion records shall be duly signed by the Contractor and site supervisor.

5.1.22 Daily Record
Daily activity records shall be kept by the Supervisor for each borehole and must be included in the final borehole completion report. The records, classified as daily and completion records, shall contain the information as specified below.

The following report must be kept and submitted by the borehole supervisor:

a) Site name, Location, and GPS Coordinates
b) Reference number of boreholes
c) Dates and Time of reporting-Starting and Completion of the Drilling, Development and Pump Test
d) Names of foreman and drillers
e) Method of drilling
f) Diameter of hole, and depth of changes in diameter
g) Depth of hole at start and end of shift or working day
h) Depth and size of casing at start and end of shift
i) Description of rocks drilled with depths of transitions encountered
j) Depth at which water is struck

k) Yield of air lifted water, when drilling or developing with air, and Final Pumping Test yield and Dynamic Water Level.
l) Time log showing rate of penetration in minutes per metre, type of bit, standby time due to breakdown
m) Depth intervals at which each formation samples are taken
n) Records of components and quantities used or added to the drilling fluid or air
o) Water level at the start of each working day
p) Electrical conductivity measurements during drilling and at the end of the pump test
q) Problems encountered during drilling
r) Details on installation in the borehole (if any).
s) Depth and description of well casing
t) Depth and description of well screens
u) Depth of Gravel Pack, Backfill and Grouts
v) Details of work to be invoiced at hourly rates (eg. Test pumping)
w) Pump power, type and depth. (To be recommended by the drilling supervisor)

5.1.23 Borehole Completion Record

The following completion record must be submitted by the borehole supervisor:

a) As per standard borehole completion form.
b) Detailed driller's log.
c) Copy of standard chemical water quality test
d) Borehole design and installation details (as-built drawing)
e) Particulars of contractor and applicant (herein client)
f) Aquifers and formation of aquifer penetrated
g) Summary of test pumping data
h) Remarks

A copy of the **Borehole Completion Record** by contractor shall be made available to and approved by the supervisor on completion of the borehole.

5.2 Final Borehole Completion Report

On completion of all the works, a final report will be prepared with details of all the technical data including but not limited to:

a) All drawings and sketches (borehole design)
b) Installation,
c) Well development,
d) Test pumping and pump test data analysis, and recovery data analysis
e) Conclusion and recommendations on optimal abstractable yields

- In addition, all pertinent data from all the works executed will be provided by the Supervisor. Data on water quality will be similarly evaluated after submission by the contractor, of water samples to competent laboratories for chemical and bacteriological analysis.

- Based on this analysis recommendations will be made by the consultant on the most optimal groundwater abstraction rates and aquifer parameters and performance. It will also recommend any remedial measures for disinfection or water quality improvement.

5.3 Certification of contractor's invoices

All invoices from the Contractor shall be certified by the consultant for payment. The site supervisor shall verify the contractor's certificates of payments and the supporting documents for work completed prior to payment of the Contractor by the client.

5.4 Recommendation of production pump

Based on analysis of drilling results and test pumping of the borehole, the supervisor shall recommend the optimal production pump and appropriate pumping regime for the well.

6 DELIVERABLES

Upon completion of drilling and testing etc. studies the Supervisor will prepare editable electronic copies (in word, excel, AutoCAD, EPANET, WaterCAD) to the Concern Worldwide. PDF alone is not allowed. Deliverables from the assignment are as indicated in the table below:

Report	**Content**
Supervisor's Daily Record with specific details	Summary of week's activities and any problems encountered should be submitted to the Concern Worldwide on the last working day of the week.
Site Records and Borehole logbook	A complete soil borehole logbook classification and characteristics for the borehole for each layer of the borehole shall be submitted to the Concern Worldwide with copies to MoEWR after completion. No certificate of payment to the Contractor shall be honoured until all such records are duly compiled and submitted to the Concern Worldwide.
Progress Updates	This is to be submitted **daily** during the drilling process. This will be submitted to the client, through whatsup group, which will be set-up during the activity implementation. This report will present a daily account of the stage(s) of activities, including data interpretations, water source construction progress and any difficulties encountered. The report should be accompanied by any relevant maps, plots and data and also include a clear indication of actual project progress vis-à-vis anticipated progress, plus details of staff and equipment deployment. The report should also outline forthcoming activities for the next day.
Final Report	This will constitute detailed account of all the activities carried out during the drilling of the borehole, including data interpretations, water source construction progress and the problems encountered. All relevant documents including maps, sketch maps of the sites and any other relevant document supporting the work done. Should have detailed conclusions and recommendations. The outline table of contents of the final report will be as follows: • Executive Summary • Introduction, review of expected performance • Account according to the bullet points under scope of work, above. Include check lists, and Well Completion Form, Handing over forms, etc. • Well construction and installation works (include as built drawings) • As built BoQ • Water quality from contractor's lab or any competent lab • Drilling data and penetration rates • Well development • Test pumping and results interpretations • Daily completion records as annex • Particulars of the client and consultancy • Conclusions. • Recommendations

7. SUPERVISION/RELATIONS

The Borehole Drilling Supervisor will work under the supervision of the WASH Field Engineer and WASH & Construction Manager. The holder of the position will also work closely with relevant MoEWR designated staff.

8 PERFORMANCE EVALUATION AND CONTRACT EXTENSIONS

Key performance targets will be agreed with the supervisors and signed off prior to the commencement of the assignment. If the Borehole Supervisor is not able to meet the expected performance targets, these will be addressed in line with the terms and conditions of service signed with the Concern Worldwide.

9 TIMING AND DURATION

The supervisor is expected to perform his/her tasks in Lafoole District, Lower Shabelle, SW State. The assignment will be expected to for up to **10 Days, being working days during the drilling, casing, well development and Test pumping**.

10 REQUIRED QUALIFICATIONS, SKILLS AND EXPERIENCE

The drilling site supervisor should have with the following qualifications:

10.1 Qualifications and skills

- Minimum of High Diploma or Equivalent in Drilling or Water Supply or related technical field (like Geology).
- Hands-on contract and day-to-day management of drilling contractors
- Demonstrated practical experience in the deep groundwater development from siting up to drilling;
- Demonstrated excellent command of spoken and written English. Fluency in Somali is requested; and
- Excellent interpersonal and diplomatic skills.

10.2 General professional experience

- At least 10 years demonstrated experience in the field of drilling deep boreholes and able to provide evidence and contact references

10.3 Specific professional experience

- Minimum of 5 years conducting borehole drilling supervision in Somalia. The supervisor must demonstrate that they have conducted at least three similar assignments in the last 3 years.

11 PAYMENT

A consultancy fee will be paid to the selected Borehole Drilling Supervisor upon completion of the assignment and submission of time sheets and invoice approved by the Concern Worldwide WASH and Construction Coordinator.

Any other allowance will be in line with the Concern Worldwide terms and conditions of the service contract.

12 HOW TO APPLY

Interested candidates should send their application (cover letter and CV) to the Concern Worldwide through e-mail: **procurement.mogadishu@concern.net** Candidates should indicate in their cover letter how they fit the criteria outlined in the advert. All applications must be received by **29th November 2025 at 11:59Pm East African Standard Time.** Applicants should clearly indicate the position they are applying for in the email subject line.