TERMS OF REFERENCE

HYDROLOGICAL AND GEOPHYSICAL SURVEY OF NEW BOREHOLES

Organization	Adeso - African Development Solutions, www.adesoafrica.org
Project	Sustainable Access to Clean Water, Hygiene and Sanitation to Drought Affected Communities in Sanaag and Sool Region
Position Type	Short-Term Consultancy
Study/Assessment Topic	Hydrological and Geophysical Survey of New Boreholes in Sool and Sanaag
Position Location	Somalia
Duration	One (1) Month
Reporting To	Deputy Program Manager
Working With	Program Team
Starting Date	Immediately
Application Deadline	11th December, 2018
Contact	Please send your proposals to consultancy@adesoafrica.org – Adeso will only respond to short-listed consultants.

ORGANIZATIONAL BACKGROUND:

Adeso is an expanding and vibrant African based international development and humanitarian organization. At Adeso, we work with African communities who are yet to realize their full potential; working inside these communities to create environments in which Africans can thrive. Our belief that economic, social and environmental security is the bedrock of a healthy community drives the nature and intent of our programming. We work to prevent and overcome situations that adversely affect community well-being by: reinvigorating the economy, developing skills for life and work, providing humanitarian aid, and influencing policy.

For the past 20 years we have strengthened rural livelihoods through environmental awareness, training, technology transfer and innovative humanitarian projects in pursuit of a peaceful, self-reliant, and greener future.

Adeso is an exciting and dynamic organization experiencing managed rapid growth. It offers sound employment conditions with opportunities for personal growth and development.

PROJECT SUMMARY:

As severe drought grips most parts of Sool and Sanaag, lack of access to safe drinking water has contributed to staggering levels of diseases including diarrhea particularly among the young, the immune-compromised and the poor. Unsafe water sources complimented by poor sanitary environment are a major cause of malnutrition throughout Somaliland and Puntland.

The water supply situation in Northern Somalia is very poor, particularly in rural areas where women and children cover long distances during the dry seasons to collect water for domestic and livestock use. Surface water resources are generally scarce because of its dependency on seasonal climatic variations that leave traditional surface water storage facilities either partially filled or empty. Hence, groundwater is the main source of water. Knowledge of groundwater resources is essential for strategic long-term planning. However, there is no hydrogeological map or sound policy for groundwater exploration. In Somaliland and Puntland, data on strategic water sources were collected by SWALIM and UNICEF for 1,600 sources. Despite this wealth of information, the state of knowledge about hydrogeology and quality and quantity of groundwater resources is very poor.

Groundwater drilling projects are unguided and exploration takes place without investigations leading to low success rates, thus wastage of financial resources.

The Information on hydrogeology to facilitate drilling and development of more sources is limited, scattered and does not exist in some cases and need huge resources to get accurate information on potential drilling sites. According to the Somalia pastoral trend track record, it shows that the rural and nomadic populations in Somalia travel on average a distance of up to six kilometers per day to a water source in the dry season. This requires a significant investment in productive and family resources.

To achieve sustainable water supply for these groups there is dear need for Hydrogeological information to guide successful borehole drilling and establishment of strategic boreholes for use during drought periods in order to reduce/eliminate water trucking cost. On the other hand, demand for groundwater is expected to increase due to an increase in population as a result of the relative stable political situation and growing wealth from the diaspora in Somaliland and Puntland. There is already evidence and cases of decline in groundwater levels in Somaliland due to over pumping. Hydrogeological information will spell out the status of groundwater resources. The project will be implemented by Adeso under its SHF-fund.

Adeso will recover lost information and establish monitoring networks on climate and water resources, geology and soils and land cover. Other information will be extracted from satellite imagery in the pact locations of Sool and Sanaag. The information collection includes borehole depth, static water level, water characteristics and use and ownership. The database is managed in a dedicated information management system (SWIMS). The project has two well-equipped field offices, one in Sanaag and one in Sool, with trained staff in water and land information management that work closely with water authorities in the two regions. The Adeso project will be working closely with the WASH cluster and other pertinent stakeholders in addressing information and capacity building needs of water authorities.

The drilling of the two new borehole works will include hydrological and geophysical survey for the identification of borehole sites with sufficient water aquifer, drilling of 8-inch internal diameter borehole through rotary and air percussion to a depth 400M deep, installation of slotted casing with minimum inner diameter of 8 inches, the annular space should be packed for gravel and well backfilled. Providing and Installations of new Submersible water pump Grunfos type with 18KW and 3 phase-380 Voltage Maximum 400 Voltage with output 40 M3/H up to 50 M3/ including 1 piece of panel board 5kw, 350m cable 4x10mm3 with electric cut off 100m cable) complete in all aspect with accessories.

OVERALL OBJECTIVES OF THE HYDRO-GEOLOGICAL SURVEY:

- To conduct hydrological and geophysical survey of underground water in the pact locations of Sanaag & Sool and identify the most suitable location for drilling of the two new boreholes in terms of getting sufficient amount of water with acceptable quality and affordable depths.
- Review of the knowledge that people have with regard to the hydro-geological conditions in the area,
- Review of existing documents with information about the hydro-geological conditions in the area (e.g. information about boreholes and dug wells in the area, topographical maps, etc.),
- Review of existing data, topographical maps, satellite images, existing studies and borehole site investigations in the area, geological reports and maps (if available), borehole and surface water records.

SCOPE OF GEOPHYSICAL SURVERYING:

The Consultant is expected to use both secondary and primary data in the exercise, secondary data will involve desk study of available information/data on existing boreholes, drill logs, reports and maps while primary data will be obtained by carrying out hydro-geophysical measurements within the study area using the necessary hydro-geological

surveying equipment, the new ABEM Terameter SAS 1000 or equivalent instrument, which distinguishes between clays and fresh water by resistivity profiling. Possible use of seismic refraction method is recommended for this assignment.

The outcome of the consultancy will be a detailed hydrogeological survey report giving details of the findings and recommendations.

SURVEY APPROACHES REQUIRED:

The hydrogeological/geophysical investigations will be carried out in a multistep approach:

a. Desk study: Review of existing data, topographical maps, satellite images, existing studies and borehole site investigations in the area, geological reports and maps (if available), borehole and surface water records, etc.
b. Hydrogeological fieldwork: Detailed reconnaissance survey of project area. (GPS coordinates/P codes, water level measurements, condition of these boreholes, usage and performance where applicable) inspection of geological, geomorphological and structural characteristics of the investigated area; verification of existing data and findings.
c. Geophysical measurements: vertical electric sounding resistivity profiling and seismic refraction application to confirm the VES interpretation.
d. Analysis of hydrogeological/geophysical data.
e. Compilation, analysis and evaluation of the gathered data and information.
f. Site selection and reporting.

REPORTING:

The final report to be submitted to Adeso should be approved by the Ministry of Water of Somaliland/PASWEN (Puntland) and the report will be a comprehensive account of the whole of the consultancy; it will review the existing literature and other relevant information, such as drilling logs, satellite images, etc. The report shall include all field data, interpretations and justifications, hydrogeological evaluations, conclusions and recommendations relating to the investigated areas. In addition, appropriate maps, diagrams and data plots shall be presented. Of considerable importance will be an objective assessment of the applicability and success of the methods to be applied.

The outline below bullets of contents of the final report will be as follows:

- Introduction, review of previous studies and environmental background
- Geology and hydrogeology (incl. Inventory of boreholes and other water points)
- Methods of investigations, including Geophysical Techniques
- Detailed resistivity survey (Wenner & VES) and seismic refraction to delineate the productive aquifer
- Aquifer potential; sustainable yield & Water quality
- Proposed drilling site
- proposed drilling method, and its applicability
- Environmental impact and protection
- Conclusion and recommendations

Recommendations will be given on the most suitable site for borehole drilling, the required depth, water quality, design and installation details, and other relevant aspects. Based on the available hydrogeological and geophysical data, an assessment of the anticipated chances of success shall be made for each individual site.

The hydrogeological report will give a detailed map delineating the investigated area, geology, aquifer properties (where known), location of measurements, and recommended drilling site. In addition, pictures taken during the actual field activity shall be included in the report. All geophysical data, including its interpretation will be produced as an appendix to the final report.

EXPECTED DELIVERABLES:

The consultant/firm is expected to deliver:

1. An inception methodology, detailing the secondary and field assessments phases, responding or adapting the present Terms of Reference to the initial findings and available data.
2. A brief note with the recommended sites selected for the geophysical survey in Sool and Sanaag, for Adeso's validation before the field deployment, with technical and social justifications (feasibility of water access provision for local populations).
3. A final report, which will be covering the following:
    - Detailed report on the district's underground and surface water conditions with recommendation for Adeso technical interventions.
    - Summary report on secondary information review and former studies.
    - Water quality problems in the district. Special focus will be on fluorides, brackishness, nitrates (and possibly arsenic in a few areas).

WORK PLAN:

ACTIVITY DESCRIPTION	MONTH 1			
	W1	W2	W3	W4
Secondary data collection				
Review of documents				
Key informant interviews				
Analysis of satellite images and Aerial photos				
Water quality/resource survey				
Hydro-geological survey				
Reporting				

APPLICATION REQUIREMENTS:

Adeso seeks to invite qualified consultants/firms who meet the following requirements to submit their detailed narrative and financial proposal on how to undertake the assignment.

1. Should be a firm/individual consultant with office/operational establishments within Somalia or able to access the area of operation.
2. Technical proposal on how the assignment will be conducted including methodologies, data analyses and interpretation, reports and schedules (List software to be used for analysis).
3. Proven technical and field experience of Lead/proposed Consultant with Master's degree in geology, hydrology, engineering geology, physical, or earth science, or in any related field and having good experience of working in this sector.
4. Must have performed at least 3 similar consultancies in the last 5 years.
5. Proof of availability of all the equipment, personnel and ability to mobilize them on short notice (Include list of equipment, Brand/Manufacturer, CVs of the personnel) to perform the survey.

6. Submit a detailed financial proposal including all professional fees, travel, accommodation & transport, reporting costs and subsistence costs. Please note all costs must be broken down into details (no lump sums, no contingencies etc.)

Consultants who do not meet the above requirement will not be evaluated further. You are therefore asked to submit your best proposal with relevant documents.

The consultant/firm will be responsible for their own security; insurance while in the field and Adeso will not be responsible for any injuries or damages incurred during the assignment. The costs submitted must be inclusive of all anticipated expenses.

Adeso will select the geophysical surveyor together with the ministry of water of Somaliland/PASWEN (Puntland)at level based on their technical competence and experience.

EVALUATION CRITERIA:

- Cost effectiveness & budget
- Work plan
- Technical responsiveness/proposal
- At least 3 Past performed works similar to solicited work with proof of reference or completion letters/contract/ for each hydrogeological survey consultancy
- Overall responsiveness on TOR methodology and analysis

APPLICATION PROCEDURE:

All applications and proposals should be sent to consultancy@adesoafrica.org by **11th December 2018** with "Hydrological and geophysical survey" on the subject line. The selection committee will review submitted proposal as they arrive. All applicants must meet the minimum requirements described above, and those unable to meet these requirements will not be considered.