



**Terms of Reference: Integrated hydrogeological and geophysical investigation to identify potential locations for borehole drilling in three communities in the Yousuf khil district and four communities in the Urgon district, Paktika province.**

### **Project Introduction:**

International Medical Corps will build (7) solar-powered piped drinking water systems to provide water access to the targeted communities at the communal level. These (7) water supply systems will be able to cover the needs of the population in (7) villages targeted under this project. Additionally, IMC will establish and train 7 water management committees in 7 communities.

International Medical Corps will conduct twice a year community solid waste clean-up and awareness campaigns that will benefit 14,113 individuals (a total of 14 campaigns in 7 villages), distribute culturally sensitive IEC materials (posters, flipcharts, etc.) and provide essential tools for the clean-up and necessary training to the participants on self-protection and safety to ensure that the health facility and community level waste is safely disposed of. International Medical Corps will also improve the IPC protocol already in place in health facilities by ensuring the procedures for cleaning and disinfection environmental surfaces in the health facility are practiced.

International Medical Corps will train 14 Community Hygiene Promoters (CHPs) on key health, hygiene, and sanitation topics. International Medical Corps will organize a 3-day training on general but critical hygiene topics such as hand washing, personal hygiene, environmental hygiene, water handling and storage, water and food hygiene, water treatment (chlorination), and COVID-19.

Through community-level hygiene promotion sessions, International Medical Corps to promote key practices around water collection, storage, and treatment that prevent water contamination at the household level. CHPs will also be trained to monitor water quality at the household level, and International Medical Corps will provide the CHPs with pool testers to test for free residual chlorine in drinking water at the household level. Through this service, the project will reach an estimated 14,113 individuals.

To maximize the impact of this program, International Medical Corps will complement water supply and hygiene promotion with the provision of WASH NFIs to 2,016 households to ensure the safe use of water and disposal of domestic waste in targeted health facilities and catchment communities in targeted areas.

### **Objective:**

The aim of the study is to use a combination of geophysical and hydrogeological methods to find the best locations for drilling wells near communities that will provide enough water based on demand. The study should focus on a 250 square meter area near communities and should identify/confirm the main groundwater sources that are not affected by the surface water of the target communities and the nearby swamp.

### **Scope of work:**

The contractor should carry out the integrated hydrological and geophysical investigations to find out the suitable location for boreholes of 7 water supply systems in Yousuf khil and Urgon districts of Paktika province using the latest instruments of geophysical investigations.

### **Duration of the investigation:**

The entire work of geophysical and hydrological investigations including submitting reporting to be completed in **20 days**.

### **Methodology:**

The contractor shall describe the methodology used to conduct geophysical and hydrological investigations while submitting the bid documents. Here is a general methodology for conducting a geophysical survey for a borehole:

- i. **Desk Study:** Begin with a desk study to collect existing geological and hydrogeological data from the area. This involves analyzing geological maps, past studies, and any information on hydrogeological conditions that is accessible.
- ii. **Environmental Protection:** ecosystems approach to resource management and environmental protection aims to consider the complex.
- iii. **Hydrologic and Geologic Characterizations:** Hydrogeology (hydro- meaning water, and - geology meaning the study of the Earth) is the area of geology that deals with the distribution and movement of groundwater in the soil and rocks of the Earth's crust (commonly in aquifers).
- iv. **Hydrologic Investigations:** A hydrogeological survey is an investigation of the hydrologic and geologic parameters at the subsurface level in a particular area. Hydrogeological maps may be formulated with the data.
- v. **Karst Hydrology:** Karst hydrogeology is typified by a network of interconnected fissures, fractures and conduits emplaced in a relatively low-permeability rock matrix. Most of the groundwater flow and transport occurs through the network of openings, while most of the groundwater storage occurs in the matrix.
- vi. **Photogrammetric Analyses:** Photogrammetry can be used to determine the three-dimensional coordinates of any point in the image. The photogrammetrist uses this information to create base maps in support of other engineering and civilian projects. Examples of maps developed using photogrammetry include highway and topographic maps.
- ii. **Site visit:** Visit the proposed borehole site to analyze accessibility, topography, and any potential obstacles. Design the geophysical survey by selecting appropriate methods and equipment based on this assessment and the project objective.
- iii. **Calibration and ground-truthing:** Before beginning the survey, gather ground-truthing data such as accurate GPS coordinates, elevation measurements, and visual observations. This data is critical for properly understanding the geophysical survey results.
- iv. **Geophysical Data Acquisition:** Carry out the geophysical survey by collecting data using the

methods having chosen. Electrical resistivity, seismic refraction, ground-penetrating radar (GPR), electromagnetic (EM) approaches, and magnetic surveys are all common geophysical techniques used in borehole studies. Follow the precise procedures and safety precautions that are linked with each approach.

- v. **Data Processing:** Utilize the proper software or tools for each approach to process the collected geophysical data. Filtering, leveling, stacking, and integrating data from several survey lines or depths may be required.
- vi. **Interpretation and Analysis of Data:** Interpret and analyze processed geophysical data to detect subsurface features, lithology variations, fractures, and probable aquifer zones. Correlate survey findings with geological and hydrogeological data acquired during the desk research.
- vii. **Borehole Construction Planning:** Create a borehole construction plan based on the geophysical data. Determine the optimum depth, casing requirements, grouting requirements, and other technical aspects to guarantee a safe and efficient borehole construction.
- viii. **Reporting:** In a detailed report, present the survey findings, interpretations, and recommendations. Include information on the geophysical methods utilized, field procedures, data processing, and significant discoveries.

**ix. new well logging, resistivity survey, Designing, Strata classification & recommendations**

**Duties and Responsibilities:**

- Conduct fieldwork by collecting subsurface data using the appropriate geophysical methods. This includes setting up and operating instruments, assuring correct data capture, and adhering to safety rules while on the job.
- Implement and maintain quality control methods during data collecting to guarantee accuracy and correctness. This includes monitoring instrument settings, ensuring data integrity, and responding quickly to any faults or abnormalities.
- The report should confirm/identify a groundwater source that is not connected to the surface water and indicate the location of the wells within a 250 square meter area closest to the proposed wells. The report should also produce a map of the hydrogeology and the groundwater potential.
- The contractor should suggest the size, and depth of the wells that will be as close as possible to IMC proposed wells and that will produce enough water according to design demand.
- The study should confirm/identify the main groundwater sources and understand their characteristics, capacity, and replenishment. The proposed well should be at least 250 meters apart from the other existing wells to avoid tapping into the same resource.
- Follow all safety regulations and instructions during the survey. Identify possible hazards, minimize risks, and put the safety of team members and others on the job site first.
- Maintain coordination with IMC team to ensure that the survey is carried out based on requirement.

**Key Deliverable of Geophysical Investigations:**

**a. Inception report**

The inception report should include the methods and techniques that will be used and the timeline of the work. The report should be submitted within **5 days** after signing the contract.

**b. Progress report**

The contractor shall provide progress reports regularly to the IMC WASH team particularly weekly basis.

### **c. Final report**

The final report shall consist of the following:

- Executive summary
- Introduction, overview of previous studies, and environmental context
- Geology and hydrogeology regarding water resources overall
- The primary properties of aquifers include recharge methods and water balances.
- Productivity estimates for aquifer and borehole standard designs
- The findings of the detailed study
- Proposed priority sites for water supply utilizing groundwater to meet the demand.
- Conclusions and recommendations
- Receiving reports confirm the operational system.

### **Contractor Experience:**

The contractor shall have at least three similar contracts experience in geophysical and hydrological investigations and provide the evidence to prove its experience. The contractor shall provide CVs of the expertise who conduct the studies and provide the instrument details while submitting bid documents.

### **Competencies and qualification of the key staff:**

- University degree in Geology, geophysics hydrology, civil engineering, and any other relevant field. Preference will be given to master and PHD degree.
- Minimum three years' experience in similar field
- The team should consist of at least one hydrogeologist on any other related technician (geophysist).
- Familiar with all geophysics and hydrology equipments.

### **Indicate any surveys and services that are required to complete the tasks:**

The surveying contractor should provide all the necessary equipment, instruments, and materials for the geophysical and hydrogeological studies.

### **How to organize and coordinate the reporting:**

The contractor is expected to study existing sources of information, reports, and assessments, and to clarify or amend these pre-existing documents as needed.

The contractor shall provide information to the WASH Manager in the province and Senior WASH Coordinator in Kabul about any progress. The WASH Manager will regularly supervise the investigation to obtain the appropriate objective of the investigation. The WASH Manager and other technical team will evaluate the contractor's work and certify delivery of work.