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**GEOPHYSICAL SURVEY REPORT**  
**REF NO. 1**  
**LUNSAR HEALTH CENTER**

**SUBMITTED TO:**  
**INTERNATIONAL MEDICAL CROPS**

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## 1. INTRODUCTION

In order to improve the water supply for the Lunsar Health Center, International Medical Corps contracted EDAL Drilling Company, to explore the possibility of getting ground water in this area. As part of our operations, we therefore carry out a Hydrogeological and Geophysical investigations in siting the borehole position in the project area.

These studies among others provided enough data and information used in assessing the possibility of striking groundwater in the project area. This report documents the work carried out during the investigations at the site.

## 2. BACKGROUND / GEOLOGY OF PROJECT AREA

The project area lies within the Granite Greenstone Terrain (Basement Granites) which covers about 70% of the country's lithology.

This forms the basement on which the supracrustal rocks are resting. The basement rocks are granitoids and migmatite gneisses with ages greater than 2700 million years. MacFarlane et al (1974) recognized three types of granitic rocks: the syn-kinematic granitic migmatites which ranges in composition from quartz diorite to legitimate granites with a predominance of gabbro-diorite. The homogeneous syn-kinematic granites are pale in colour and poor in mafic constituents. These are sporadically distributed throughout the basement with gradational intrusive and frequently distinct contact with a foliated host (Williams, 1978). The late kinematic granites (younger granites) are distinctly discordant bodies formed during the Liberian tectonic event, Ca 2700 Ma.

However, groundwater potential of the Basement Complex is found within weathered and fractured zones of these igneous (crystalline) rocks.

Therefore, proper siting (geological, hydrogeological/geophysical survey) should be conducted to identify possible fractured zones that probably contain groundwater



### **3. FIELD WORK**

The field work was divided into two phases;

- Reconnaissance Survey; and
- Geophysical Survey

#### **3.1 Reconnaissance Survey**

The aim of the reconnaissance survey was to select suitable area (s) for geophysical survey, considering the geological/Hydrogeological, environmental and other physical conditions.

The reconnaissance survey included the following:

##### **3.1.1 Geomorphological Survey of the Area**

This describes the landscape and other physical features on the project area. The project area is generally flat with an elevation of about 76m above sea level. There were no in-situ outcrops in the immediate surroundings. Out crops can only be seen from a distance. The Geomorphology of the area suggested high ground water potentials.

##### **3.1.2 Geological survey to determine the formation of the area and to identify possible hydrogeological features**

The project area is overlain by hard compacted laterites which were derived from underlain weathered bedrock.

There was a hand dug well of about 12m deep at about 15m from the selected area. This suggested a water bearing formation at a near surface and thus there is a high potential of groundwater.

#### **3.2 Geophysical Survey**

The Geophysical survey consisted mainly of Electrical Resistivity i.e. Vertical Electrical Sounding (VES) using ABEM SAS 1000 Terrameter Resistivity meter.

##### **3.2.1 Selection of Traverse Line**

The traverse line was selected on the basis of geomorphologic and physical features as well as Hydrogeological features of the area. There was no visible strike direction of the geologic formation of the area due to weathering and surface erosion. Selected point for the Vertical Electrical Sounding (VES) was marked with a peg for identification.

##### **3.2.2 Selection of VES points**

The Vertical Electrical Sounding (VES) point was selected based on the site location and geological features.

##### **3.2.3 Vertical Electrical Sounding (VES)**

Vertical Electrical Sounding (VES) was carried out with the aim of determining the formation resistivities and the depth to bedrock, as well as finding the possibility of obtaining fractures at depth. The Schlumberger electrode configuration and the required procedures were used for the VES.



#### 4. DATA ANALYSIS AND INTERPRETATION

The Vertical Electrical Sounding (VES) data and the corresponding curve are presented below:

**4.1 Table 1: Schlumberger Array VES Data**

Client: International Medical Crops			Community: Lunsar Health Center	
Project: Geophysical Survey			Sounding Number: 1	
District: Northern Province			GPS Coordinate East: 0771639	
Date: 13 <sup>th</sup> Octoher,2015			GPS Coordinate North: 0960572	
Field Operator: Kemoh Alie Bayoh			Elevation: 77m	
Schlumberger Array VES Field Data				
No.	AB/2	MN	Resistance (ohms)	Apparent Resistivity (ohm-m)
1	4	0.8	4.5417	282.5436
2	5	0.8	4.3537	424.7430
3	7	0.8	1.5294	293.3681
4	10	1.5	0.81397	325.3132
5	15	1.5	0.96349	366.6799
6	20	1.5	0.34052	284.9091
7	30	1.5	0.17210	324.2401
8	40	7.6	0.7414	485.9905
9	50	7.6	0.60024	616.7962
10	70	7.6	0.78996	860.0318
11	80	14	0.54036	770.1998
12	100		0.47452	1059.7401

Photo showing Geophysical team at work





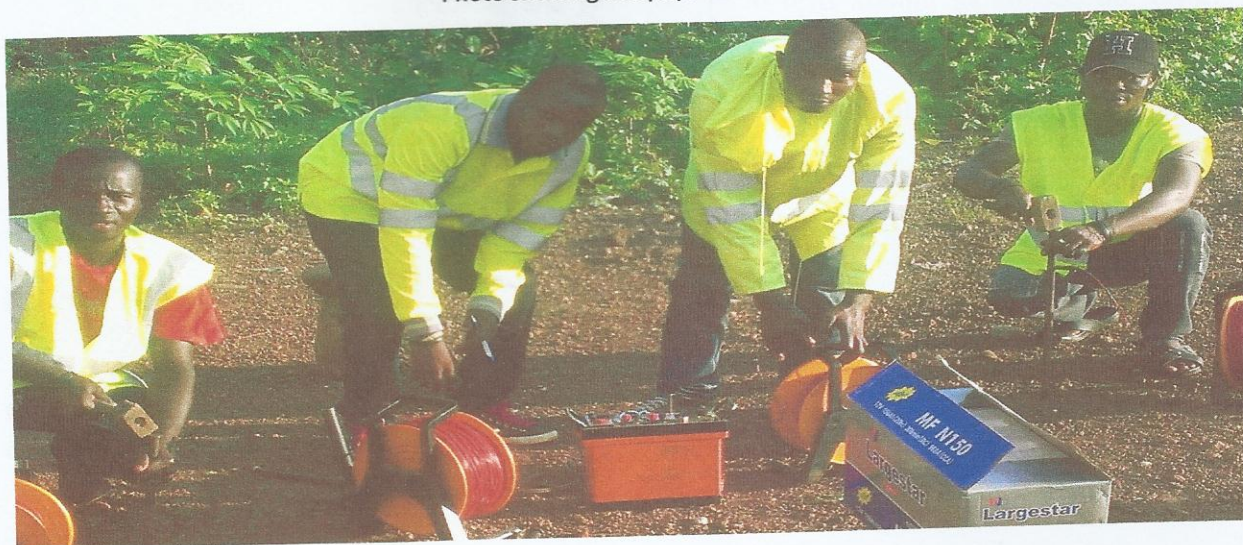
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## 5. CONCLUSION AND RECOMMENDATIONS

### 5.1 Conclusion

Based on the analyses of the result in line with the aims of the study, the drawn conclusions are;

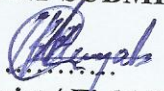
- The project area is within the Granite Greenstone Terrain (Basement Granites).
- Groundwater potential could be high within the promising zones as shown above at depth between 15- 50m as indicated from the resistivity values.
- It is premature however, to estimate quantities/volume which could only be determined during drilling and pumping test.
- The borehole location was selected in accordance with both national and international borehole siting guidelines.

### 5.2 Recommendation

In this regard, it is recommended that;

- Drilling could be carried out at the selected point to confirm the existence of groundwater.
- The maximum drilling depth should be 80m to cut across the promising zones of 15- 50m to ensure reliable productivity. However, the supervisor may exceed this depth based on the field conditions.
- Both physico- chemical and bacteriological tests should be carried out on the borehole water samples from the completed well.
- Borehole must be constructed using the correct and standard materials such as standard uPVC screens and plain casings, well sorted gravels etc. for water quality and high yield.

REPORT SUBMITTED BY:

  
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