EDAL DRILLING COMPANY LTD.
35[A] Clewry's Lane, off Main Motor Road, Congo Cross, Freetown, Sierra Leone
Cell Numbers: 076 204 816/076 601 550 Email: edalltd@gmail.com

GEOPHYSICAL SURVEY REPORT

REF NO. 1

(KORANKO COMPOUND)

SUBMITTED TO:

CONCERN WORLDWIDE-SL

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1 INTRODUCTION

In other to improve the water supply for Koranko compound and it's environs, Concern Worldwide-SL 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 sitting 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 Freetown Basic Complex. The Freetown Complex is formed mainly by basaltic magmatism and outcrops can be found in the west as a result of younger igneous intrusions and erosion. The Freetown Complex is a layered gabbroic anorthosite intrusion, emplaced gneisses and schist of the Kasila Group. It forms part of the Peninsula and Banana Island.

It is thought to have been formed due to multiple injections of magma that occurred intermittently. However most of these formations are obscured and overlain by hard compacted laterites and some sedimentary materials.

Therefore, groundwater potential of the Freetown Basic Complex is found within fractured zones of these igneous (crystalline) rocks. However, groundwater quality and quantity could be high if properly located through the appropriate hydrogeological and geophysical investigations.

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 on high-ground with an elevation of about 116m above sea level. There were no in-situ outcrops in the immediate surroundings.

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

The project area is composed of compacted laterites which were derived from weathering of bedrock. There are no stream running near the project area but Trees closer to the area are green and depicts a possible shallow depth intake of groundwater, thus suggested a possible groundwater occurrence.

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.

Table 1: Schlumberger Array VES Data

Client: **Concern Worldwide-SL**			Community: **Koranko Compound-Allen Town**	
Project: **Geophysical Survey**			Sounding Number: **1**	
District: **Western Area**			GPS Coordinate East: **0702106**	
Date: 11th September,2015			GPS Coordinate North: **0931872**	
Field Operator: Kemoh Alie Bayoh			Elevation: **116m**	
Schlumberger Array VES Field Data				
No.	**AB/2**	**MN**	**Resistance (ohm)**	**Apparent Resistivity (ohm-m)**
1	4	0.8	14.847	923.66
2	5	0.8	10.599	1034.03
3	7	0.8	5.3076	1018.1
4	10	1.5	2.3850	496.77
5	15	1.5	6.5369	2487.74
6	20	1.5	5.3701	4493.1
7	30	1.5	2.0855	3929.13
8	40	1.5	0.1565	524.99
9	50	7.6	0.6370	654.57
10	70	7.6	0.2267	457.88
11	80	14	0.3572	509.19
12	100	14	0.1005	224.44

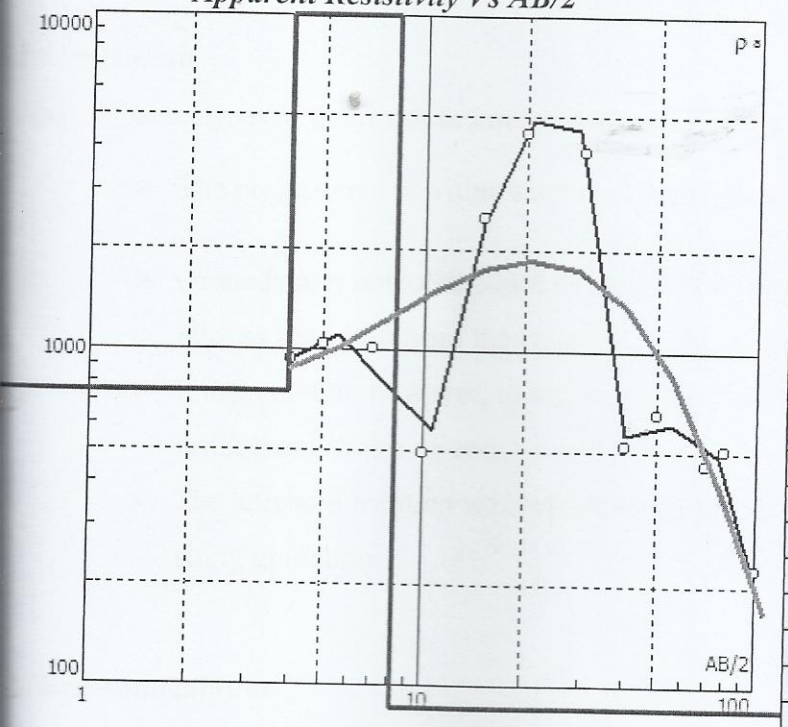
Photo showing Geophysical team at work

Model 1: Schlumberger Array VES Curve and Model

Apparent Resistivity Vs AB/2

Model 1: Schlumberger Array VES Curve and Model

Apparent Resistivity Vs AB/2



N	ρ	h	d	Alt
1	748	3.97	3.97	-3.966
2	10056	4.28	8.24	-8.242
3	85.7			

Table 2: Selection of Promising Points from VES Data

No.	LAYER	THICKNESS (m)	DEPTH (m)	APPARENT RESISTIVITY (Ohm-m)	POSSIBLE WATER ZONES (M)	RANKING	MAX DRILLING DEPTH (M)
1	1 2 3	2 4.28 -	3.97 8.24 -	748 10056 85.7	30-80	High	100

an be deduced from the VES data above that the maximum drilling depth should be 100m to cut through first promising zone of 30-80m and to ensure reliable productivity. However this depth may be exceed ed on other sub-surface conditions.

. CONCLUSION AND RECOMMENDATIONS

.1 Conclusion

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

- The project area is within the Freetown Basic Complex.
- Groundwater potential could be high within the promising zone as shown above at depth of 30-80m 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.

2 Recommendation

n 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 100m to cut across the first and second promising zone of 30-80m 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.

EPORT SUBMITTED BY:

21/10/15

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ologist / Field Operator
moh Alie Bayoh
32-78-711-666