EDAL DRILLING COMPANY LTD.

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GEOPHYSICAL SURVEY REPORT
REF NO. 3
(11 NICOL TERRACE-KUNTORLON)

SUBMITTED TO:
CONCERN WORLDWIDE-SL

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1. INTRODUCTION

In other to improve the water supply for Nicol Terrace and it's surroundings, 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.

. FIELD WORK

he field work was divided into two phases;

- Reconnaissance Survey; and
- Geophysical Survey.

.1 Reconnaissance Survey

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

.1.1 Geomorphological Survey of the Area

his describes the landscape and other physical features on the project area. The project area is on a lope with an elevation of about 105m above sea level. There were no in-situ outcrops in the immediate rroundings. Out crops can only be seen from a distance.

.1.2 Geological survey to determine the formation of the area and to identify possible ydrogeological features

he project area is made up of compacted laterites derived from weathered bedrock. Trees closer to this ea are green suggesting groundwater at a near surface.

2 Geophysical Survey

he Geophysical survey consisted mainly of Electrical Resistivity i.e. Vertical Electrical Sounding ES) using ABEM SAS 1000 Terrameter Resistivity meter.

2.1 Selection of Traverse Line

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

2.2 Selection of VES points

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

2.3 Vertical Electrical Sounding (VES)

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

4. DATA ANALYSIS AND INTERPRETATION

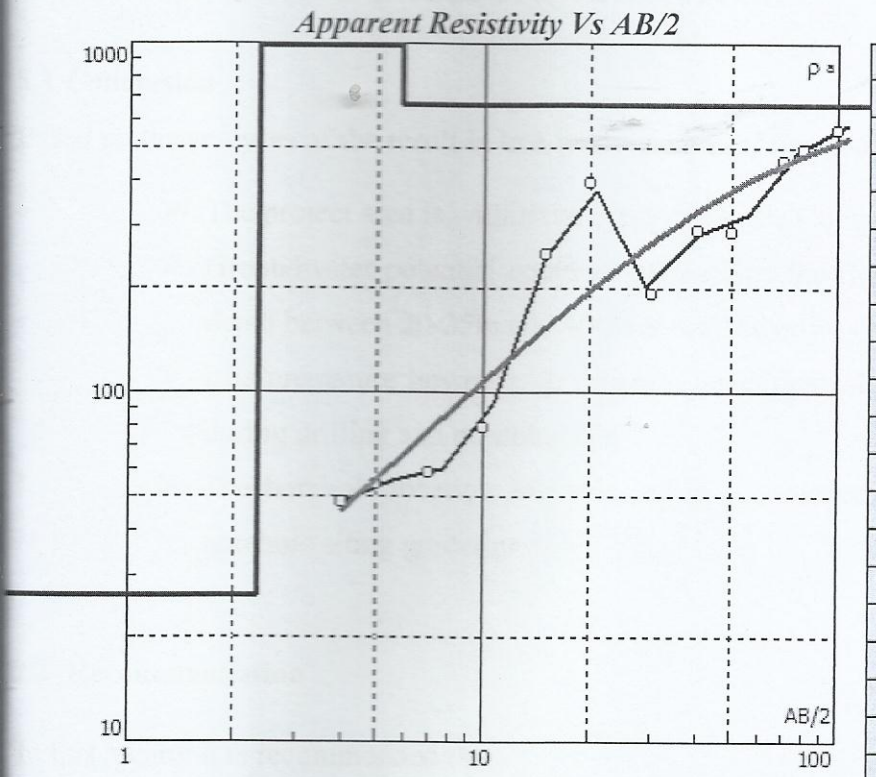
The Vertical Electrical Sounding (VES) data and the corresponding curve are presented below:

Table 1: Schlumberger Array VES Data

Client: **Concern Worldwide-SL**			Community: **Kuntorlon**	
Project: **Geophysical Survey**			Sounding Number: **1**	
District: **Western Area**			GPS Coordinate East: **0700266**	
Date: 14th September,2015			GPS Coordinate North: **0935942**	
Field Operator: **Kemoh Alie Bayoh**			Elevation: **105m**	
Schlumberger Array VES Field Data				
No.	**AB/2**	**MN**	**Resistance (ohm)**	**Apparent Resistivity (ohm-m)**
1	4	0.8	8.397	48.15
2	5	0.8	6.4176	54.34
3	7	0.8	2.6028	58.29
4	10	1.5	1.8553	78.8
5	15	1.5	0.6530	248.00
6	20	1.5	0.1952	396.00
7	30	1.5	0.1845	192.74
8	40	7.6	0.6731	289.99
9	50	7.6	0.4437	286.9
10	70	7.6	0.3633	459.91
11	80	14	0.6384	494.45
12	100	14	0.4335	564.35

Photo showing Geophysical team at work

Model-1: Schlumberger Array VES Curve and Model



N	ρ	h	d	Alt
1	26.4	2.33	2.33	-2.33
2	3722	3.5	5.83	-5.829
3	670			

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	2.33	2.33	26.4			
	2	3.5	5.83	3722	20-35	High	80
	3	-	-	670	40-55		

From the VES data above, it can be deduced that the maximum drilling depth should be 80m to cut across the first and second promising zones of 20-35m and 40-55m respectively to ensure reliable productivity. However this depth may be exceed based on other sub-surface conditions.

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 Freetown Basic Complex.
- Groundwater potential could be high within the two promising zones as shown above at depth between 20-35m.and 40-55m respectively 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 first and second promising zone of 20- 35m and 40-80m respectively 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:

.....Bayoh 01/10/15

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