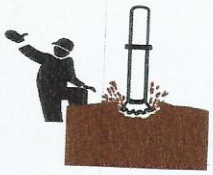

EDAL DRILLING COMPANY LTD.

GEOPHYSICAL SURVEY REPORT

SUBMITTED TO:

MR. P. J. COLE

LIFE LINE

35[A] Clewry's Lane, off Main Motor Road, Congo Cross, Freetown, Sierra Leone
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TABLE OF CONTENT

1. INTRODUCTION

To explore the possibility of developing groundwater through borehole drilling and as a prerequisite for drilling, Mr. P. J. Cole therefore contracted EDAL Drilling Company to conduct Hydrogeological/ Geophysical survey to locate the borehole position with possible groundwater potential at the proposed site.

These studies among others, provided enough data and information used in assessing the possibility of striking groundwater in the project area.

This report therefore 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 Basic Complex outcrop in the west as a result of younger igneous intrusions and it is predominantly of basaltic magmatism. 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.

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

However, groundwater quality and quantity could be high if properly located through the appropriate hydrogeological/geophysical investigations.

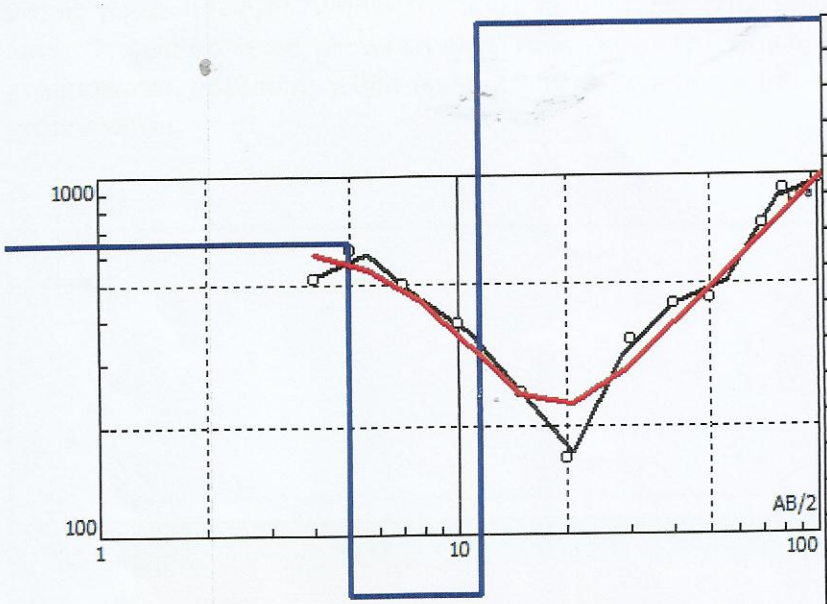
4. DATA ANALYSIS AND INTERPRETATION

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

Table 1: Schlumberger Array VES Data

Client: **Mr. P. J. Cole (Life Line)**			Community: **Kuntolon**	
Project: **Borehole Siting (Geophysical Survey)**			Sounding Number: **1**	
District: **Western Area**			GPS Coordinate East: **0700354**	
Date: **28th April, 2015**			GPS Coordinate North: **0935449**	
Field Operator: **Morlai Kanu**			Elevation: 161m	
Schlumberger Array VES Field Data				
No.	**AB/2**	**MN**	**Resistance (ohm)**	**Apparent Resistivity (ohm-m)**
1	4	0.8	8.397	522.39
2	5	0.8	6.4176	626.09
3	7	0.8	2.6028	499.27
4	10	1.5	1.8553	386.44
5	15	1.5	0.6530	248.52
6	20	1.5	0.1952	163.32
7	30	1.5	0.1845	347.60
8	40	7.6	0.6731	441.22
9	50	7.6	0.4437	455.94
10	70	7.6	0.3633	733.79
11	80	14	0.6384	909.94
12	100	14	0.4335	968.13

The VES data is first presented in the form of a table (as shown above) from which a graph of Apparent Resistivity (p_a) Vs half the Current Electrode Spacing (AB/2) is plotted.



N	ρ	h	d	Alt
1	656	4.95	4.95	-4.947
2	68.2	6.44	11.4	-11.39
3	90193			

Figure 1. Schlumberger Array VES Curve and Model

The data shows three-layer subsurface in which $p_1 > p_2 < p_3$. The unusually low apparent resistivity registered at some points in layer 2 is indicative of the presence of pore electrolyte, possibly groundwater, within fractures in bedrock. The equivalent layer thickness is 11.4m. Layer 1 is interpreted as weathered rock (Regolith) which, according to the data has little groundwater potential; while layer 2 and 3 constitute fractured bedrock that likely contain groundwater.

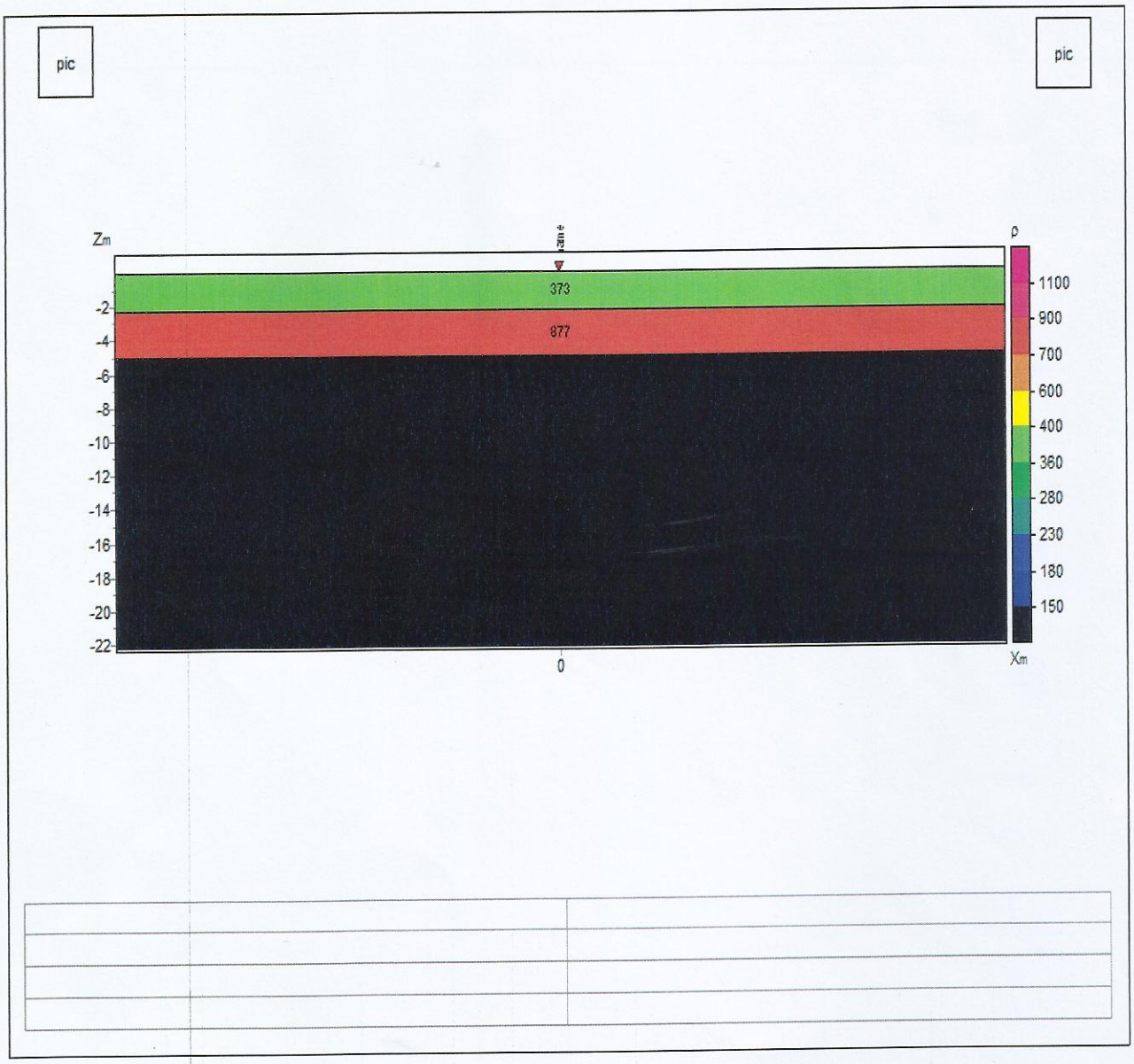


Figure 2. Pseudo - section Showing Apparent Resistivities and Layer Thicknesses

Table 2: Selected Promising Points from VES Data

No.	VES POINT	LAYER	THICK NESS (m)	DEPTH (m)	APPARENT RESISTIVITY (Ohm-m)	POSSIBLE WATER ZONES (M)	RANKING	MAX DRILLING DEPTH (M)
1	A	1 2 3	4.95 6.44	4.95 11.40	656 68.2 9019	15-40 50-70	1st	80

5.0 CONCLUSIONS AND RECOMMENDATIONS

Conclusion

Based on the analyses of the result, and in line with the aims of the study, the conclusions are as follows:

- The project area lies within the Freetown Basic Complex lithological formation.
- Groundwater potential (i.e. quality and quantity) could be high at depth within weathered zones and fractured bedrocks.
- The potential water zones are found between 15 - 40m and 50 -70m respectively as indicated from the resistivity values.
- It is premature, however, to estimate quantities, which could only be determined during test drilling and test pumping.
- The borehole location was selected in accordance with both national and international borehole siting guidelines.

Recommendation

In this regard, it is recommended that;

- Drilling should be carried out at the selected point to confirm the existence of groundwater.
- The 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.
- The maximum drilling depth should be 80m to cut across the two promising zones of 15m - 40m and 50m - 70m respectively for sustainable productivity and high yield of the borehole.
- Both physico-chemical and bacteriological test should be carried out on the borehole water sample after completion.

REPORT SUBMITTED BY:

30/04/15

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