

REPUBLIC OF GHANA

HELP IS ON THE WAY MINISTRY
TEMA,
GREATER ACCRA REGION

**TECHNICAL AND FINANCIAL
PROPOSAL
FOR
LIKPE ABRANI SMALL TOWN
WATER SUPPLY PROJECT**

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January 2008

1.0 INTRODUCTION

Help Is On the Way Ministry (HIOTWM) is a Non-Governmental Organization based in USA and has branch in Ghana based in Tema is helping rural communities and small towns in the Volta region have access to potable water.

Likpe-Abrani, a small town with current population of about 4,000 is about 35 km from Hohoe, the District capital. The community has 4 boreholes serving 4000 people. However, as per Ghana standards one borehole serves 300 people hence the 4 boreholes serve only 1200 people leaving a deficit of 2800 people.

In view of the water deficit in the community HIOTWM has asked AB-Serkoms to conduct a feasibility studies to test the four (4) existing boreholes in the community to see if those boreholes can be mechanized to fully supply water to the community.

A first step in the project implementation is to establish the adequacy and sustainability of the water source hence this proposal list the steps that has been taken and those needed to be taken to ensure that an adequate and a sustainable water source has been established.

2.0 OBJECTIVES

The objective of the assignment is to carry studies to establish an adequate and a sustainable water source and construct mechanized pipe system to adequately supply water to Likpe-Abrani community..

2.2 Scope of assignment.

To achieve the above objectives the assignment has been grouped into three (3) phases as follows:

- Phase 1 – Establishment of Reliable Water Source
- Phase 2 – Community Surveying, Design and System Cost Estimation
- Phase 3 – Construction of the System

This proposal captures phase 1 and phase 2 of the assignment.

3.0 PHASE 1 – ESTABLISHMENT OF WATER SOURCE

3.1 Approach and Methodology

3.1.1 Community Visit and Desktop Studies

3.1.1.1 Community Visit

In a company of officials of HIOTWM a community visit was undertake to familiarized

the community and obtain a first hand information on the size of the community, the number of boreholes and their ID numbers.

3.1.1.2 Desktop Studies

With borehole ID numbers a research was carried on each borehole to establish the yield and the depth of the boreholes. Table 1 to this proposal lists the data of the boreholes in four communities in the area including Likpe-Abrani.

4.0 FINDINGS

4.1 Community Water Demand

The current community water daily water demand using current population of 4000 and the following design national standard criteria, is estimated at **136 m³/day** (4000*34liters/person/day)

- Basic per capita consumption (80% of P_p) = 20lpd
- Per capita consumption, house connection (20% P_p) = 60lpd
- Population Growth Rate (National Average) = (2.5%)
- Physical Losses = 20%
- Design Period = 10 years
- Pumping Time = 16 hours maximum
- Population per stand pipe = 600 persons
- Maximum distance to a stand pipe = 500m
- Peak Hourly Factor = 2.5 minimum
- Storage Reservoir Capacity = 30% -40% daily demand

4.2 Existing Boreholes Characteristics

4.2.1 Borehole Yield

The yields for a 6-hour pumping test of three high yielding boreholes in the community are 89.3 liters/min, 89.1 liters/min and 60.6 liters/min. Base on the 6-hour pumping test alone the first two of these boreholes could have been mechanized to give the community adequate water, however, when these boreholes are subjected to 24-hour pumping test they may not be able to sustain the required abstraction rate because all the borehole are shallow wells.

4.2.2 Borehole Depths

From table 1 all the 4 boreholes in the Abrani are shallow wells with depths less than 20 meters drilled for only installation of only low lift hand pumps and as such none of these boreholes can be mechanized into pipe system. The reason being that if a submersible pump is installed in any of these 3 boreholes with only few hours of pumping the borehole

will run dry resulting in the burning of the submersible pump. Consequently, none of the boreholes are sustainable for mechanization.

Table 1- Borehole Data in Four Communities

Community	BH NO.	YIELD (lpm)	DEPTH (m)	
OLD BAIKA	B11/185A141	20.0	52.0	
	B12/185A142	60.0	46.0	
	B13/185A143	50.0	58.0	
	B14/185A143	30.0	61.0	
NEW BAIKA	B11/185A241	30.0	46.0	
	B12/185A242	15.0	52.0	
	B13/185A243	100.0	49.0	
	B14/187H411	20.0	48.0	
	B15/187H412	40.0	43.0	
LIKPE KUKURANTUMI	B11/187G892	80.0	31.0	
	B12/187G896	50.0	34.0	
	B13/187G897	20.0	61.0	
	B17/T47	37.9	91.0	
LIKPE ABRANI	B13/VSD48	89.1	19.8	
	B14/VSD49	89.3	18.9	
	B15/VSD51	60.6	17.4	
	B16/VSD57	14.5	18.0	

5.0 RECOMMENDATIONS

5.1 Phase 1 -Establishment of Adequate and a Sustainable Water Source

In order to obtain a sustainable and adequate water source for mechanization in Abrani it is recommended that the followings steps be taken:

1. A thorough hydrogeological studies be carried out in the community to locate three (3) favorable points for drilling
2. Drill the most favorable point of the three points to a depth of greater than 50 meters to see if adequate water can be obtained (Alternative 1 of Bill of Quantities of the financial proposal)
3. In case the first drilled borehole yield is not enough a second point be drilled to same depth as above to add up to the shortfall (Alternative 2 of Bill of Quantities of the financial proposal)

4. After making sure that a reliable water source has been established the project move to Phase 2 of the project implementation that is Community Surveying, Design and System Cost Estimation of the system.

5.2 Phase 2- Community Surveying, Design and System Cost Estimation

5.2.1 Community Meeting

An initial community meeting will be held in conjunction with HIOTWM officials in community to brief the community of the project and to determine the community's preference points for standpipes and other physical structures.

5.2.2 Engineering Survey and Mapping

A topographical survey will be undertaken to produce the layout of the system.

The spot heights and distances of the pipe lines will be taken for hydraulic design.

5.2.3 Design calculations

Hydraulic Design

All the variables picked from the survey (that is spot heights and distances) will be computer modelled using a computer software. During the modelling appropriate pipe sizes will be selected to get the required pressures in the distributions lines and at the standpipes. Appropriate pump will be select to lift water to the reservoir.

Structural Design

Reservoir

- **Size**

The size of the reservoir will be determined base on the National Policy Guidelines for Small Towns Water Supply.

- **Elevation**

During the survey the highest point in the community will be identified to provide the needed head to deliver the water to the standpipes

Preparation of Contract Documents

After the design a contract will be prepared for the consideration of the client. The contract dossier will contain contains the following:

- Contract Agreement form
- Scope of works

- Conditions of the contract
- Specifications
- Drawings
- Bill of Quantities

6.0 FINANCIAL PROPOSAL

6.1 Phase 1-Establishment of Water Source

6.1.1 ALTE RNAT IVE 1 - First Bore hole Has Eno ugh Water					
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2.2	Borehole Development and Testing				
	Air-lift, Development, Drawdown Test (24Hrs) Recovery (12Hrs)	Borehole	1	1,500	1,500
	Physico-Chemical Analysis				
	TOTAL				\$10,000

ALTERNATIVE 2 – Drilling Two Borehole					
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BILL OF QUANTITIES FOR SITING AND DRILLING 2 NO. 6 INCH BORE HOLES AT LIKPE - ABRA NE (FIRST DRILLING YIELD NOT ENOUGH AND ADDITIONAL ONE DRILLED					
ITEM	DESCRIPTION	Unit	Qty	Unit Cost (\$)	Amount (\$)
1.0	HYDROSTUDIES AND DRILLING				
1.1	Mobilization and Demobilization to and from Community	Lump Sum	2	1000	1000
1.2	Conduction of Appropriate Hydro Studies locate 3 possible points	Borehole	1	1,000	1,000
2.0	DRILLING				

2.1	Borehole and Equipment yield not enough	Borehole	1	7,000	7,000
	Drilling 50m max, (soft, diameter 91/2in)				
	Drilling (Hard, diameter 61/2in)				
	Backfill				
2.2	Additional Borehole drilling and Equipment Positive	Lump	1	7,000	7,000
	Drilling 50m max, (soft, diameter 91/2in)				
	Drilling (Hard, diameter 61/2in)				
	Protection PVC Casing Supply and install 6 inch PVC Screen pipes				
2.3	Borehole Development and Testing				
	Air-lift, Development, Drawdown Test (24Hrs) Recovery (12Hrs)	Borehole	2	1,500	3,000
	Physico-Chemical Analysis				
	TOTAL				\$19,000

Phase 2 - Community Surveying, Design and System Cost Estimation of the system

Phase 2 - Design Tendering Stage					
Item	Description of Item & Name	Units	Qty	Unit Rate (\$)	Amount (\$)
1.0	Professional Fees				
1.2	Water Supply Engineer	days	5.0	80	400
1.5	Land Surveyor	days	10.0	60	600
1.6	Draufman	days	5.0	50	250
1.7	Quantity Surveyor	days	5.0	60	300

	Subtotal				1,550
2.0	DSA (Per Diem)				
2.2	Water Supply Engineer	days	5.0	20	100
2.5	Land Surveyor	days	10.0	20	200
	Subtotal				300
3.0	Transportation	days	1200	1.5	1,800
	Subtotal				1,800
4.0	Equipment				
4.1	Computer & Accessories	days	5	10	50
4.2	Survey Equipment	days	5	50	250
	Subtotal				300
5.0	Printing & Stationery				
5.1	Draft Design Report	no.	2	10	20
5.2	Final Design Report	no.	2	10	20
5.3	Draft Construction Drawings	set	1	50	50
5.4	Final Construction Drawings	set	2	50	100
5.5	Draft Contract Documents	no.	2	25	50
5.6	Final Contract Documents	no.	2	25	50
5.10	Soft Copy (CD Rom) of all Documents	no.	1	10	10
	Subtotal				300
7.0	Miscellaneous Cost				500
7.1	Office Overhead Cost				1,500
	Subtotal				2,000
	Grand Total				\$6750