

## **maisha borehole report 2011**



## **1. Description of the project funded, activities and the services provided**

The purpose of maisha is to give life, hope and a future to the unfortunate of this world through various projects. maisha is making a difference in the life of orphans from the slums of Nairobi Kenya, by giving them a home, food, clothes, an education, but most of all a family where they can find love.

The orphanage is located on the outskirts of Nairobi which is a relatively dry area and is not supplied with water by the Kenyan Government. Up until now, the orphanage has had to rely on rationed water from a neighbour, which is not fresh. This water was rationed because it is the only water source in the area and is hence overstretched by demands. It has therefore been difficult for the home to operate with rationed water. Moreover, some of the children have been diagnosed with typhoid fever and other serious water-related diseases. Thus the supply of fresh, clean water to the home became a priority for maisha and a necessity for the children's health and well-being.

The only solution was to drill a bore hole which was estimated to have to be 220 metres deep to provide fresh and sustainable water to the orphanage as well as potentially to the whole village. maisha carried out a hydro-geological survey which indicated that there was a river running underneath the place where the borehole would be drilled, thus a guarantee of fresh clean water. maisha also obtained permission from the Kenyan government to drill the borehole. This permit was valid for 12 months, so maisha only had a year within which to drill the borehole.

This project was estimated to cost approximately 28,000 Swiss francs. maisha planned various fundraising events and began to ask for donations from various foundations. After a year of fundraising, maisha finally reached its target. The first phase of this project, the drilling of the well, therefore began on February 9th, 2011.

After evaluating different companies, the maisha board members chose to use the same company that carried out the hydrogeological survey to conduct the maisha drilling project. This was convenient as they had already assessed the area and knew the location really well. The company also had good references. maisha was also fortunate enough to have found a volunteer from Switzerland, who spent



several days at the maisha home to supervise this initial phase and keep us updated and documented with photos on the progress. This volunteer, is well-known to several members of the maisha board and an expert in the field of water.

The work began as scheduled on the 9th of February and within two days the drilling had reached a depth of 200 metres. The drilling took place in different phases and water was struck at different levels. There are two sources of water: fractures and aquifers. The initial water found at a depth of 30 metres was an aquifer and is the water used in the local hand dug wells. This was cased in as it is not clean and fresh water. The second water hit at a depth of 85 meters was a fracture. They will both supply good water and are effectively underground streams fed by local aquifers.

The drilling continued without incident till around 185m when they hit a layer of water again. This was followed within a couple of meters by a layer of clay. At around 192m the clay finished and they hit rock again. There was also an aquifer. There was so much water pressure in the aquifer that it stopped the drill drilling. They waited a while to see if the pressure eased and then continued drilling. It was very slow going because of the back-pressure of water.

Finally the drilling was finished at the agreed depth of 200 metres!

The second step, the welding and lowering of the casings into the borehole was then carried out. The tubes were very rigid and made of steel grade 1 according to Kenyan standards, which is supposed to be the best. They were also glazed which will obviously make them last longer in water. Then the fill was placed into the bore hole outside the casings. This was quartz like stone gravel with 4-5mm size and was filled up to about 30m below surface level. This fill will reduce sediment in the water and also prevent the holes in the screen pipes from becoming blocked.

The drill rods were reconnected and lowered into the hole to a depth of 180m so that flushing could take place. This is when compressed air is forced into the hole and it serves to clean the water and pack the back fill and the sediment at the base of the bore hole. This reduces sedimentation of the water once it is pumped. The flushing forces water out of the wellhead. The team thought that the



quantity of water that was being forced out suggested a high yielding borehole. It was impressive to see it shooting up to 7 metres high into the air.

The test pump team then tested the water for 24 hours to check the volume of production. The water quality was also tested after 24 hours. The water was really dirty to start with as expected as it is flushing out the entire back fill. The water level dropped a little as pumping started and then held steady at 75m. The flow rate initially was 36m<sup>3</sup> an hour. That's 36,000 litres an hour!

The second phase which consisted of installing a tower, tank and completing the pipe work was successful. The installation of a 3 phase power which will enable a more powerful and reliable pump to be fitted was bought as this will help us to supply water to the entire village. The water tower and the control panel were installed. The children now have a sufficient supply of clean water for their daily use. We have also started to supply water to the village as word has rapidly got around that the maisha home has very clean water that does not taste salty.

## **2. The geographical region and the clients that were served**

As described above, the aim of the project was to provide water to the orphanage and potentially the whole village.

### **2.1. Location and Physiographics**

The maisha home's two acres plot of land is located about 5 kilometres to the west of Kamulu Shops and about 4 kilometres from Ruai Market. The plot is about 1.4 kilometres from Ruai - Koma Rock Tarmac Road on the northern side. The access to murram road is at the Makongeni point along a tarmac Road which is almost midway between Kamulu Shops and Ruai Market. The approximate grid reference of the plot is 37M 0280254; UTM 9859993 on map sheet Nairobi 149/3 at an elevation of about 1512 metres above sea level. The project plot is situated in an area of mild topography with extensive plains which are only interrupted by low lying ridges and shallow gullies. The landscape in the project area slopes towards the north and northeast. The higher ground is covered by sandy silty soils whereas the lower parts are covered by sticky black cotton soils.

## **2.2. Drainage**

The area is drained by Athi River and its tributaries which flow north-eastwards and eastwards. Athi River which drains this area has several seasonal tributaries which have water during the rain seasons and immediately after, otherwise they are normally dry for most or part of the year. Athi River is several kilometres to the eastern side of this area and the site is underlain by thin layers of Athi tuffs and lake beds which overly Kapiti phonolites and basement rocks, mainly gneisses and schists. Groundwater occurs within the Athi series, Kapiti phonolites and at the contact zones between the Athi tuffs and lake beds and Kapiti phonolites and the underlying basement rocks and also within the weathered and fractured zones of these rocks

## **2.3. Rainfall and Climate**

The area displays a bi-modal rainfall pattern with two rainy seasons lasting from about March to May and mid-October to mid-December. The region receives a mean annual rainfall of about 600 mm. Temperatures are highest in the months of January-March before the rain season and lowest in the months of July-August. The climate is savanna type with seasonal dry and wet periods.

## **3. Project outcomes both quantitative and qualitative**

The detailed borehole geologs and other project results can be found in the appendix.

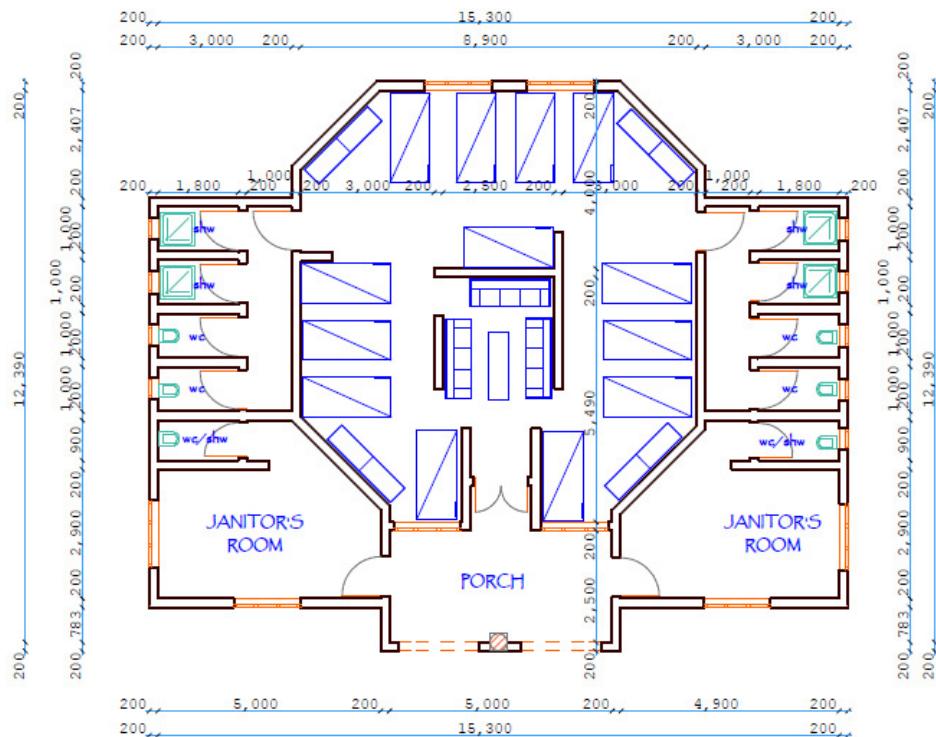
## **4. The challenges we faced to meet our goals**

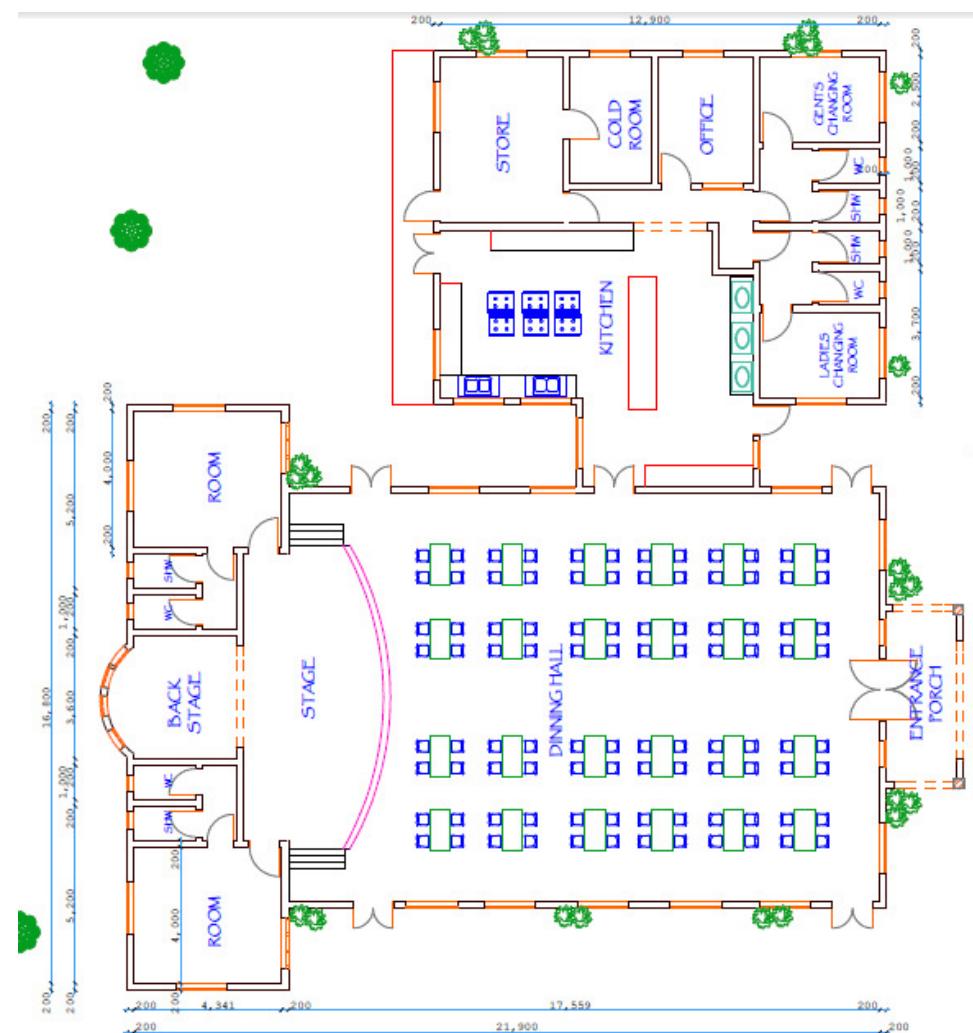
One of the challenges that we faced was the installation of a three power as this was not under our control but rather the government of Kenya. It took longer than we expected as the procedure was long and demanding. The other challenge we faced was the fundraising for the well. We had exactly one year in which to raise the required amount to drill the borehole. If not we would have had to start the procedure over again and there was no guarantee that we would obtain the permission from the government to drill the borehole. Nevertheless, the orphanage has water now.

## **5. The future of our project and the source of funding to ensure its continuation**

Having drilled the well, we have accomplished our first demanding project which was to provide the children and potentially the whole village with clean, fresh water. Our next project is to build a new home for maisha. The maisha home was originally built as a private house for one of the founder's mother. This house has since been converted to become the maisha home and houses 25 people including the children and the employees. However, with limited space and housing both boys and girls, some of whom are reaching the teenage stage, we feel it is imperative to build a proper children's home purposely designed to accommodate the childrens' needs. An example of this is that currently there is only ONE bathroom for 25 people. Thanks to several generous donations from various individuals we have been able to buy 1250 square metres of land which now belongs to maisha and so our plan is now to raise enough funds to be able to build a proper maisha home and extend maisha in 2012. Once again, we will be relying on donations to build this house with the help of private donors and foundations. The cost of building a new home incl. dining hall and kitchen will be approximately 150,000 Swiss francs.

The following sketches that were created by a Kenyan architect in May 2011 show possible shapes of a new maisha dormitory hall and a dining hall including kitchen.







## 6. Additional comments

maisha is extremely grateful for any grant without which we would not have been able to have drilled the borehole. In the appendix there are some photos that were taken both during and after the drilling. On behalf of the maisha children we would like to sincerely thank any contributors for its invaluable support.

## 7. Other Information

### 7.1. Project costs

Phase 1	Drilling / Casing	1'180'000.00
Phase 2	Equipping (Pipes, Cover, Cables, Motor, etc.).	723'175.00
Phase 3	Fabrication, supply and Installation of elevated Tank	519'000.00
	<b>TOTAL costs (KSH)</b>	<b>2'422'175.00</b>

(2.4 Million KSH is equal to USD 29'000.-).



## 7.2. Borehole Geologs with sketch

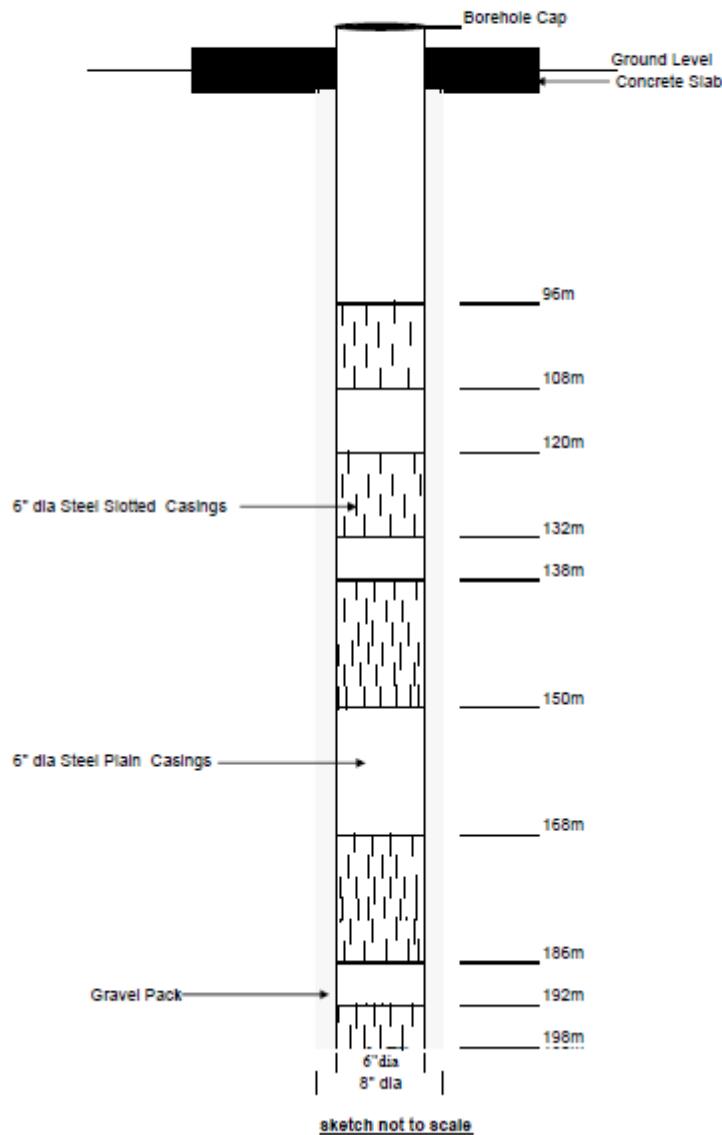
**Name of Client:** maisha, c/o Susan Wangare Chimba  
**Location:** Kamulu Area Embakasi District  
**Borehole No:** WRMA/ACB/8203  
**Drilling Started:** 08.02.2011  
**Drilling Completed:** 10.02.2011

DEPTH (M)	DESCRIPTION
0-4	- Deep red soil
4-10	- Dry grayish black clay materials
10-14	- Decomposed trachytes green tinged
14-20	- Dry greenish trachytes (fine)
20-24	- Nairobi Phonolites fine grey coloured
24-30	- Weathered/fractured tuffs
30-90	- Fractured phonolites
90-96	- Fractured reddish brown tuff lavas
96-100	- Weathered tuff sediments (moist)
100-104	- Fractured tuffs brown colored
104-106	- Highly fractured tuffs (aquifer)
106-108	- Fractured tuffs with interstitial clay
108-116	- Vesicular tuffs & sediments
116-120	- Leucocratic sediments (possible aquifer)
120-126	- Phonolites with clastic sediments
126-136	- Fractured matic phonolites
136-150	- Compact phonolites
150-156	- Weathered matic sediments
156-168	- Sediments with old land surface
168-172	- Sediments with subordinate clay
172-192	- Athi series (lepticlastic)
192-198	- Fractured tuffs

**Total Drilled Depth:** 198mgl

**BOREHOLE SKETCH**

**Client Name** maisha, c/o Susan Wangare Chomba  
**Location:** Kamulu Area Embakasi District  
**Serial No.** WRMA/ACB/6203  
**Drilling Started:** 08/2/2011  
**Drilling Completed** 02.10.2011



### 7.3. Borehole Water Results

**REPUBLIC OF KENYA**



**MINISTRY OF WATER AND IRRIGATION**

Central Water Testing Laboratories

Tel. No. (020) 553834, 553665  
P.O. Box 30521-00100,  
NAIROBI.

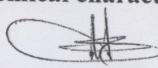
**PHYSICAL/CHEMICAL WATER ANALYSIS REPORT**

Sample No.....	3088.....	Date of Sampling ...	12 – 01-11.....
Source.....	Mr. Chimba Borehole - Ruai .....	Date Received.....	15 – 02 – 11.....
Purpose of Sampling.....	Domestic.....	Submitted by.....	Kisima Drilling (E.A) Ltd .....
Address.....			

PARAMETERS	UNIT	RESULTS	REMARKS
pH	pH Scale	<b>8.40</b>	
Colour	mgPt/l	<b>&lt; 5</b>	
Turbidity	N.T.U.	<b>3</b>	
Permanganate Value (20 min. boiling)	mgO <sub>2</sub> /l	<b>0.79</b>	
Conductivity (25° C)	µS/cm	<b>988</b>	
Iron	mg/l	<b>0.04</b>	
Manganese	mg/l	<b>&lt; 0.01</b>	
Calcium	mg/l	<b>3.2</b>	
Magnesium	mg/l	<b>1.46</b>	
Sodium	mg/l	<b>220</b>	
Potassium	mg/l	<b>0.4</b>	
Total Hardness	mgCaCO <sub>3</sub> /l	<b>14</b>	
Total Alkalinity	mgCaCO <sub>3</sub> /l	<b>350</b>	
Chloride	mg/l	<b>61</b>	
Fluoride	mg/l	<b>12.0</b>	
Nitrate	mgN/l	<b>0.27</b>	
Nitrite	mgN/l	<b>&lt; 0.01</b>	
Ammonia	mgN/l	-	
Total Nitrogen	mgN/l	-	
Sulphate	mg/l	<b>24</b>	
Orthophosphate	mgP/l	-	
Total Suspended Solids	mg/l	-	
Free Carbon Dioxide	mg/l	<b>Nil</b>	
Dissolved Oxygen	mgO <sub>2</sub> /l	-	
Total Dissolved Solids	mg/l	<b>613</b>	
Others			

**COMMENTS**

Soft, clear water with high Fluoride content. For drinking purposes, defluoridation or mixing with water of low Fluoride content is recommended such that the eventual Fluoride concentration does not exceed 1.5mg/l. The other chemical characteristics are satisfactory.

  
 O/c .....J. N. MUASYA.....  
 CENTRAL WATER TESTING LABORATORIES  
 WATER QUALITY LABORATORY  
 P.O. BOX 30521, NAIROBI

## 8. Appendix



The drilling machine.





Water is found.



The tank and the tower which pumps water in the house.





Finally maisha children have water.





As the result of the water maisha home can now grow its own food organically (in the front: the borehole being covered).



maisha has also enough water to grow its own fishes.



maisha home (background) with the land part (in front) for a potential new home.