ZAMBIA

An Assessment of the Effectiveness of Kiosk Water Supply in Luapula Province

Case Study of Mwansabombwe District in Luapula Province

December 2022

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ABBREVIATIONS

BoQ	-	Bill of Quantity
CDF	-	Community Development Fund
CU	-	Water Supply and Sanitation Commercial Utility
GIZ	-	Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH
LA	-	Local Authority
LpWSC	-	Luapula Water Supply Sanitation Company
MLGH	-	Ministry of Local Government and Housing
MWDS	-	Ministry of Water Development and Sanitation
NWASCO	-	National Water Supply and Sanitation Council
O&M	-	Operation and Maintenance
PLGO	-	Provincial Local Government Officer
PWS	-	Pipe Water Supply Scheme
WASH	-	Water Sanitation and Hygiene

Chapter 1: INTRODUCTION

1.1. Overview

Chapter one presents the background to the study, the purpose of the study, research objectives including the research questions and the significance of the study.

1.2. Introduction

A significant obstacle faced by Zambia is quality of service delivery in rural areas. One initiative undertaken to address the water supply in Zambia has been the introduction of water kiosk supply systems. A water kiosk is a point of sale for portable clean water and was introduced as an alternative to hand water pumps.

1.3. Background

The kiosk water supply system in Zambia served as a potential solution for reliable and safe drinking water supply to the densely populated low-income areas at affordable prices. It spars economic development and has very high positive environmental health impacts on the community as a whole. The kiosk water supply system in Zambia is targeting the pro-poor and highly populated areas in unplanned settlements in order to reduce and completely stop the communicable water borne diseases.

1.4. Aim

The overall aim of the study is to assess the effectiveness of the kiosk water supply system in Mwansabombwe District.

1.5. Research Objectives

The research is guided by the following objectives:

1.5.1. General Objectives

The general objective of this research is to assess the effectiveness of kiosk water supply systems in Luapula Province - A case study of Mwansabombwe District.

1.5.2. Specific Objectives

The specifics objectives of the study are:

a. To examine the effectiveness of the kiosk water supply system in Mwansabombwe District.
b. To explore the social – economic effects associated with the kiosk water supply system in Mwansabombwe District.
c. To determine and tabulate lessons from the research for possible application to other districts in Luapula Province.

1.5.3. Research Questions

The following were the research questions of the study:

a. How effective is the kiosk water supply system in Mwansabombwe District?
b. What are the social – economic effects associated with the kiosk water supply system in Mwansabombwe District?
c. What lessons have been determined from the research for possible application to other districts in Luapula Province?

1.6. Significance of the Study

Water kiosks in Zambia are being promoted as an effective alternative to hand water pumps as means of providing drinking water supplies to low-income areas. The kiosks are viewed to be a cheap and

sustainable water supply solution. Requiring low technology costs and easy to scale-up, the kiosk is a low-cost alternative to hand water pumps. In addition, the kiosk has the potential to reduce the to and from far distances to obtain water, with an added advantage of making it also safer for women and children.

This study aims to also highlight and provide first-hand information on what challenges are associated with the kiosk water supply system in Mwansabombwe district. This will be a useful reference tool not only for the present, but also for the future generation by providing required information on the socio-economic impacts associated with the kiosk water supply system.

In addition, the study also is aimed at strengthening the local people's links with other stakeholders involved in the management of the water provisions through kiosk water supply systems.

Chapter 2: LITERATURE REVIEW

2.1 Overview

This chapter presents the literature on the operation of water kiosk systems in Zambia.

2.2 Water Kiosk System in Zambia

A water kiosk is an outlet through which water providers deliver safe and reliable water at affordable prices to residents in low-income areas (GTZ, 2009). The concept of water kiosks was developed upon realizing that there exist not many technically feasible options for the provision of drinking water supply to the low-income areas due to lack of funds for large-scale rehabilitation and extension of existing central water supply systems.

The number of kiosks built in any given area is determined by assessing the potential income for the kiosks operators which in turn is dependent on the number of customers, average daily consumption as well as the ability and/ or willingness to pay. Thus, sustainability of the water kiosk system in Zambia is ensured by these four variables: adequate income for the operator; average daily consumption; ability to pay and willingness to pay which in turn necessitates the water provider to cover the operating and maintenance costs of the kiosks (GTZ, 2009).

The structural design of the water kiosks has been found to be a critical component for the successful and sustainable operation of the kiosk and therefore a provision is made for the kiosks to be used for additional income generating activities such as the selling of other goods by including shelves and adequate space since these have been seen to be fundamental to keeping the motivating of the vendor high because the income generated from the sale might be enough to cover a provider's costs although insufficient to keep the kiosk vendor motivated (GTZ, 2009).

Chapter 3: RESEARCH METHODOLOGY

3.1 Introduction

This chapter highlights the methodology used in collecting and analysing the data obtained. The chapter presents the target population, data collection procedure and analysis and the instruments that were used.

3.2 Target Population

This case study is about assessing the effectiveness of the kiosk water supply system in Mwansabombwe District, in Luapula Province. The study is a quantitative study and purposive sampling was used to administer the questionnaires to households based on their active participation in the water kiosk committee in their community as guided by the Mwansabombwe Town Council Representative.

3.3 Instruments for Data Collection

Data for the study was collected through questionnaires.

3.4 Procedure for Data Collection

In the study eight (8) questionnaires were distributed as follows: - *The researcher administered one questionnaire to one household in each community at each of the eight water kiosks available in Mwansabombwe.*

3.5 Ethical Consideration

A range of ethical issues were considered in the research. The study was guided by the following ethical considerations: participants were allowed to decline or to participate freely through the use of a consent form: derogatory statements that could harm the respondents were avoided because dealing with human beings the researcher requires that research ethics are adhered to.

The purpose of the research was explained to the participants, allowing them to choose whether to participate or not. Informed consent was then obtained from all those who agreed to participate in the study. Participants were assured that no harm would come to them as a result of their participation or refusal to participate in the research. They were also assured about the confidentiality of all that they would say in the study. Lastly the researcher assured the participants that the resulting research and publications would not be used in any way that might bring harm to them as a group.

3.6 Scope of Study

The study was conducted in Mwansabombwe District because there have been eight recently commissioned water kiosk systems that were transformed from hand pumps to kiosks and have now become an improved method of providing clean and safe water to various communities in Mwansabombwe.

3.7 Summary

The study was conducted in Luapula Province which assessed the effectiveness of the kiosk water supply system in Mwansabombwe District. The study targeted consumers who were active members in the water kiosk committee to obtain the relevant data from.

Chapter 4: PRESENTATION OF RESULTS

4.1 Presentation of the Findings

This chapter presents the findings of the study on effectiveness of the kiosk water supply system Mwansabombwe District. This chapter highlights the results and interprets the calculations generated. A total of 8 households were interviewed to assess the effectiveness of kiosk water supply and the variables have been grouped in order to give the overall picture. Similarly, findings have been presented in different forms that comprise frequency tables.

Table 1: Demographic Profile of Questionnaires Administered

Demographic Profile	Frequency / Percentage
Gender	
Male	4 (50%)
Female	4 (50%)
Age in years	
20 - 30	2 (25 %)
31 - 40	1 (12.5 %)
41 - 50	1 (12.5 %)
51 years and above	4 (50 %)
Marital status	
Single	0 (0%)
Married	7 (87.5.1%)
Divorced	0 (0%)
Widowed	1 (12.5%)
How many people live in the house?	
1 - 4	3 (37.5%)
5 - 7	2 (25%)
8 - 10	3 (37.5%)
Above 10	0 (0%)

Table 2: Level of Effectiveness of Water Kiosk Supply System in Mwansabombwe

Demographic Profile	Frequency / Percentage
Are you aware about the kiosk within your area?	
Aware	0 (0%)
Not aware	8 (100%)
How far from your household is the water kiosk?	
Below 50m	6 (75%)
50m - 100m	2 (25%)
100m - 150m	0 (0%)
150m - 200m	0 (0%)
How many litres of water do you use per day	
Below 40 litres	0 (0%)
40 litres-60 litres	3 (37.5%)
80 litres-100 litres	5 (62.5%)
100 litres and above	0 (0%)
How long do you usually wait in line at the water source?	
0 - 30 minutes	2 (25%)
30 minutes – 60 minutes	3 (37.5%)
Above 60 minutes	3 (37.5%)
How available is the water supply from the water kiosk?	
Water is always available	0 (0%)
Water is only for a few hours in the morning and evening	8 (100%)

Water is never available	0 (0%)

Table 3: Service Satisfaction

Demographic Profile	Frequency / Percentage
How reliable is the kiosk water supply in your area?	
Reliable	3 (37.5%)
Fairly reliable	5 (62.5%)
Very reliable	0 (0%)
Not reliable	0 (0%)
How often do you use the services of the water kiosk?	
Everyday	5 62.5 %)
Sometimes	1 (37.5 %)
How satisfied are you with the services provided by the water kiosks?	
Not Satisfied	0 (0%)
Satisfied	4 (50%)
Fairly Satisfied	4 (50%)
Very Satisfied	0 (0%)
How satisfied are you with the amount paid for water supplied by the water kiosks?	
Not Satisfied	2 (25%)
Satisfied	6 (75%)
Very Satisfied	0 (0%)

Table 4: Relation Between Respondents' Monthly Income and Satisfaction with the Amount Paid for Water

How satisfied are you with the amount paid for water that is supplied by the water kiosk?			
Monthly Income	**Not Satisfied**	**Satisfied**	**Very Satisfied**
Below K500	0 (0%)	4 (50%)	0 (0%)
K500 – K1000	2 (25%)	2 (25%)	0 (0%)
K1000 – K1500	0 (0%)	0 (0%)	0 (0%)
K1500 – K2000	0 (0%)	0 (0%)	0 (0%)
Above K2000	0 (0%)	0 (0%)	0 (0%)

4.2 Summary

The study was about the assessment of the effectiveness of the kiosk water supply system in Mwansabombwe. The findings show that the consumers are generally satisfied with the service delivery and that the kiosk water supply system can be considered to be an effective method of the water service delivery for the communities in Mwansabombwe.

Chapter 5: DISCUSSION AND INTERPRETATION OF RESULTS

5.1 Introduction

This chapter presents the discussion and interpretation of the findings of the study following an assessment of the effectiveness of kiosk water supply systems in Mwansabombwe District.

5.2 Households Serviced by the Water Kiosks

The study findings revealed that 75 percent of the households expressed happiness towards reduced distances to water kiosks, as they are within a 50 m walking distance. The reduction in distances to water points has directly reduced the time spent walking to and from the water point especially among women who play a major role in water issues at household level. However, the findings also indicated that 25 percent of the respondents accessed water from a distance of more than 50m but within 100m which still makes accessibility of water a challenge for these households.

On reliability at water points, 37.5 percent of the respondents indicated that water is reliable at the kiosk, 62.5 percent of the respondents said that the water is fairly reliable.

5.3 Low Incidence of Water Disease Cases

The results from the study indicate that 95 percent of the respondents attributed the low incidence of waterborne diseases to the good quality of water from kiosks. In addition, nearly all the respondents indicated that the living standard in the community had improved, because the prevalence of waterborne high fair low varies.

5.4 Affordability of Water

Affordability is always a concern when addressing the poor. It is the factor that causes the poor to be less able to get access to needs. According to the responses, 75 percent of the respondents had no problem paying for water at the kiosk because it was very affordable. 87.5 percent of the respondents pay K5 per month for the water supplied from the water kiosks. However, 25 percent of the respondents were not satisfied with the amount paid for the water supplied and indicated that the existing amount should be increased to K10.

5.5 Summary

The study was about the assessment of the effectiveness of the kiosk water supply system in Mwansabombwe. From results analysed it can be established that the kiosk water supply system is affordable and has contributed to the reduction of water borne diseases in the communities in Mwansabombwe. Some of the positive impacts of kiosk water supply systems were found to be: reduced distances to the water points; less time spent queuing to draw water; and improved water quality. The positive social-economic impacts in this study outweighed the negative impacts which included water supply at the kiosk not being available on a 24-hour basis. The system provides clean drinking water to the community and has a positive impact on the local society, especially on women.

Chapter 6: CONCLUSION AND RECOMMENDATIONS

6.1 Introduction

This chapter concludes the study and presents the operation and maintenance of the water kiosks and recommendations for further consideration.

6.2 Operation and Maintenance

Maintenance works are carried out as and when they are required. However, there is a system which serves as a technical monitoring tool, for carrying out the maintenance works. The town council has set up water kiosk committees within each area the water kiosk serves. The water kiosk committees consist of members of the community who have chosen to be representatives of the community on issues pertaining to the management of the water kiosk. The committees consist of ten (10) members elected by the community and all serve for a three-year term after which a new committee is re-elected to serve the community. The current size of the existing committees has proven to be a challenge in ensuring proper management of the water kiosk. There is a proposal to reduce the existing number to six (6) members in each committee for effective management of the water kiosks.

This committee monitors and assists the town council in identifying the water kiosks that require attention and they provide any updates on the status and management of the water kiosks. The committee is also responsible for ensuring that there is a caretaker who opens and closes the water kiosk during the agreed times and keeps the area around the water kiosk clean.

6.3 Recommendations

Based on the findings the following recommendations emerged from this study;

a. Support can be rendered to the town council in addition to the Community Development Fund (CDF) will enable them to facilitate the transformation of more hand pumps to water kiosk systems in a distance of 50 metres or less.
b. Allocation of more resources to the town council will enable them to supervise and better manage the water kiosks (8) and hand pumps (100) in Mwansabombwe District.
c. Training offered to the town council operators and committee representatives on how to repair the various components of the water kiosk water supply system in case of any faults will reduce the fee required to pay an electrician.
d. Increasing the size of the water tanks from 5,000 litres to 10,000 litres will ensure availability of water throughout the day.

The Mwansabombwe town council provided the following recommendations tailored to the need in their community;

a. Create a hybrid system by providing an inverter and batteries to increase the reliability of the solar energy system.
b. Improve the design of the water kiosk tap stand to be used as an outlet for water.
c. Develop a model that can be a source of revenue and be self- sustaining financially with an increased number of water outlets.
d. Provide for two (2) 10,000 litre tanks per tank stand to increase capacity and improve service delivery.

6.4 Summary

This study generated information that will contribute to improving the existing body of knowledge and offer some possible solutions to the problems being encountered in the implementation of kiosk water supply systems. The findings would further help stakeholders identify the strengths and weaknesses of the water kiosk service delivery.

REFERENCES

[1] **The Water Supply and Sanitation Act, 1997. Lusaka: GRZ.GTZ, 2009**. **Case Study: Water Kiosks (Draft Version)**. *Eschborn, Germany: Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ)*.

APPENDICES

MWANSABOMBWE TOWN COUNCIL CHIPUNKA KIOSK

This water kiosk is managed by the Mwansabombwe Town Council and it serves a total of 80 households. Each household pays a monthly fee of K5 per month.

Figure 1

MWANSABOMBWE TOWN COUNCIL MUMBOLO KIOSK

This water kiosk is managed by the Mwansabombwe Town Council and it serves a total of 25 households. Each household pays a monthly fee of K5 per month.

Figure 2

MWANSABOMBWE TOWN COUNCIL MONDO KIOSK

This water kiosk is managed by the Mwansabombwe Town Council and it serves a total of 80 households. Each household pays a monthly fee of K5 per month.

Figure 3

LUFUBU PURIFIED WATER KIOSK

This water kiosk is not managed by the Mwansabombwe Town Council and it serves a total of 48 households. Each household pays a monthly fee of K5 per month.

Figure 4

MWANSABOMBWE TOWN COUNCIL CHOKWE KIOSK

This water kiosk is managed by the Mwansabombwe Town Council and it serves a total of 40 households. Each household pays a monthly fee of K5 per month.

Figure 5

MWANSABOMBWE TOWN COUNCIL CHOMBA KIOSK

This water kiosk is managed by the Mwansabombwe Town Council and it serves a total of 30 households. Each household pays a monthly fee of K5 per month.

Figure 6

MWANSABOMBWE TOWN COUNCIL LIBANSE KIOSK

This water kiosk is managed by the Mwansabombwe Town Council and it serves a total of 22 households. Each household pays a monthly fee of K10 per month.

Figure 7

MULALAMI PURIFIED WATER KIOSK

This water kiosk is not managed by the Mwansabombwe Town Council and it serves a total of 40 households. Each household pays a monthly fee of K5 per month. Its solar panels are located 200 metres away from the kiosk.

Figure 8

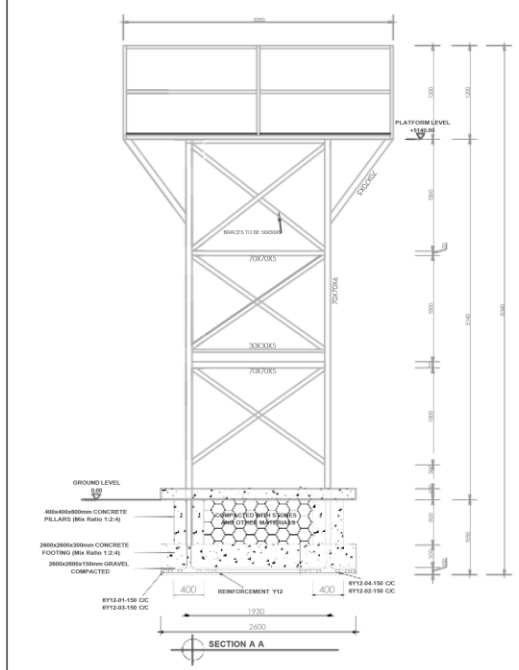
Figure 9

MWANSABOMBWE TOWN COUNCIL

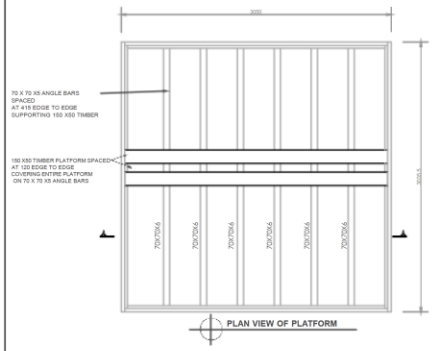
BILL OF QUANTITIES FOR THE PROPOSED CONSTRUCTION OF A KIOSK, TANK STAND AND INSTALLATION OF A SOLAR PUMP

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
				ZMK	ZMK
	Un-plasticized polyvinyl chloride (uPVC) pipes shall be used in the plumbing installation and they must conform in every respect to the requirements of BS 4514	**NOTE**			
	All fittings and pipe specials used in the plumbing installations shall be suitable and compatible with all respects to the pipeline to which fittings and specials are fitted.	**NOTE**			
	Rates for water fittings shall include for: Fittings such as taps, internal overflows etc, and supporting brackets, incidental materials for fixing, unless otherwise measured separately.	**NOTE**			
	Assembling, joining together fixing components parts, and joining to pipes including necessary coupling and for leaving perfectly clean and in perfect working order on completion.	**NOTE**			
	Necessary screws, nails sockets, connection back nuts, standard pipe fixing or supporting clips, saddles, brackets, holder bats, straps etc.	**NOTE**			
A	Conduct a pumping test to ensure the borehole can sustain the required submersible pump	**Item**	1		
B	Supply and install suitable 0.7Hp SOLAR pump supplied with solar panel and all accessories including all piping from the pump to the elevated tank (to be provided by client) and all electrical connection from the pump (from existing borehole) to the control panel.	**Item**	1		
C	Fabrication, supply and erection of a 6.34m high steel tank stand well-structured to support a 5000-litre tank to the satisfaction of the clients Civil/Structural Engineer as per drawing provided and painted in colour of Engineers choice.	**Item**	1		
D	Fabrication of a support structure for the solar panels constructed on concrete foundation pads with a locking mechanism that enables the safety locking of the solar panels to the satisfaction of the client. All connections from the solar panels	**Item**			

	to the control panel must be protected from the sun, wind and water by appropriate means (insulation, burying etc).				
E	Construct steel water kiosk on concrete base reinforced with conforce 86 with two water outlets connected to the water tank stand complete with roofing and all ventilation requirements, one door and one metal window opening inside.	**Item**			
F	Construct a concrete apron of 1.5m X 2m, a 3m lined drainage and a soak pit constructed to Engineers specifications	**Item**			
	SUBTOTAL **SUBTOTAL MULTIPLIED BY 2** **ADD CONTINGENCY @ 5%**				
	TOTAL COST OF INSTALLATION				

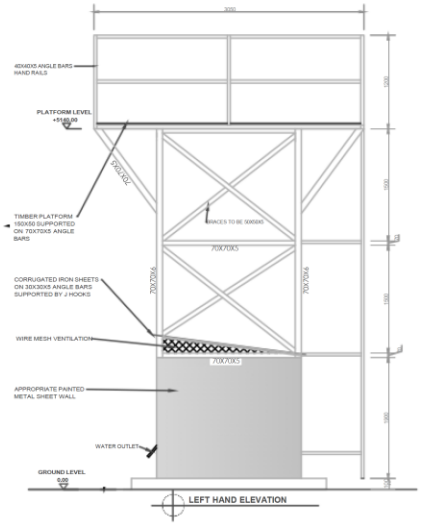


SECTION A A

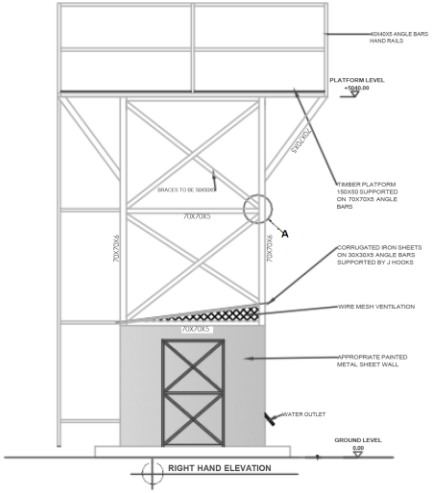


PLAN VIEW OF PLATFORM

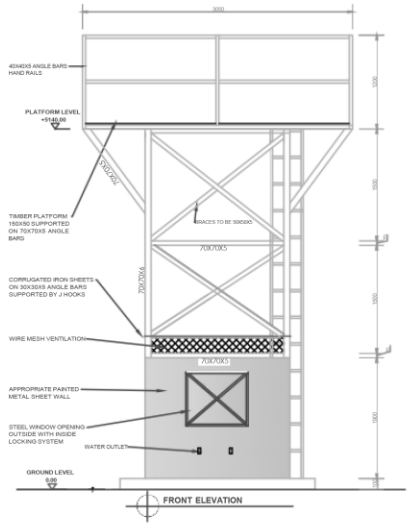
TYPICAL DETAIL A



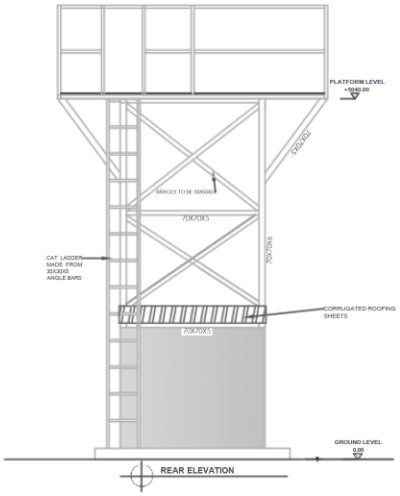
LEFT HAND ELEVATION



RIGHT HAND ELEVATION



FRONT ELEVATION



REAR ELEVATION

GENERAL NOTES

1. ALL DIMENSIONS ARE NOT TO BE SCALED FROM THE DRAWING
2. ALL MATERIALS AND WORKMANSHIP TO BE IN ACCORDANCE WITH THE REQUIREMENTS OF THE LATEST BRITISH STANDARD AND CODES OF PRACTICE
3. CONCRETE TO BE USED IN FOOTING AND PADS TO BE C25
4. ALL CONNECTIONS TO BE WELDED UNLESS OTHERWISE STATED

CONSULTING ENGINEERS

CLIENT

PROJECT TITLE
CONSTRUCTION OF TANK STAND AND WATER KIOSK IN MWANSABOMBWE DISTRICT

NO.	REVISION	ISSUED TO	DATE

SCALE:NTS			
DESIGNED BY	AM	DESIGN CHECKED BY	KT
DATE DESIGNED	2021	DATE DESIGN CHECKED	2021
DRAWN BY	AM	DWG CHECKED BY	AS
DATE DRAWN	2021	DATE DWG CHECKED	2021

DWG NO.: WATERWORKS MWA001

DRAWING TITLE: FRONT ELEVATION,RIGHT ELEVATION, LEFT ELEVATION REAR ELEVATION,PLAN,SECTION

SHEET NO.: 1 OF 1

CUSTOME NAME : **MWANSABOMBWE TOWN COUNCIL**
LOCATION : **KAPESA VILLAGE**
BOREHOLE PUMP USED : **DAYLIFF DSP 3-13 SUBMERSIBLE BOREHOLE PUMP**
DEPTH OF BOREHOLE : **54.5M**
PUMP DEPTH : **45M**

YIELD TESTING				RECOVERY LEVEL AFTER PUMPING		
CLOCK	ELAPSED	YIELD	DEPTH FROM	CLOCK	ELAPSED	DEPTH FROM
Time	Time (min)	Pumping Rate (lpm)	Ref. Point to Water (m)	Time	Time (Min)	Ref. Point to Water (m)
12:15	0	80	15.56	13:46	0	23.00
12:16	1	80	16.80	15:47	1	38.50
12:18	2	80	18.90	15:49	2	36.06
12:21	3	70	33.57	15:52	3	33.75
12:24	3	50	40.41	15:57	5	30.11
12:27	3	50	43.00	15:07	10	24.68
				13:00	11	21.10
NOTE: The draw down was not good and since we are using **'CONSTANT FLOW'** yield determination, we had to stop 3m from the **PI** so as to prevent dry running of borehole and allow for the recovery process of borehole.						
13:00	0	50	21.10	14:30	0	34.26
13:01	1	50	25.60	14:31	1	30.92
13:03	2	40	26.80	14:33	2	29.76
13:06	3	40	27.70	14:36	3	28.17
13:09	5	40	28.56	14:41	5	26.07
13:19	10	40	30.26	14:51	10	22.94
13:34	15	40	32.06	15:06	15	20.44
13:54	20	40	33.21	15:26	20	18.92
14:19	25	40	34.08	:		
14:30	11	40	34.26	:		

Quality of Water After Yield Test

Turbid ☐ Clear ■

TECHNICIAN: MWAMAHONJE HOPSON
CLIENT SIGNATURE: NATASHA MWILA

REMARKS

1. Water was with high number of Total Suspended particles due to higher abstraction compared to the recharge of aquifer. Water only cleared a bit after about an hour of pumping.
2. The borehole has a low yield and poor recovery after abstraction. This could be because it is drilled 53m only on the higher side of the hill and might run Dry especially during dry periods.
3. Yield (De-Rated) is approximately 0.5lps which is not good taking note that the test has been conducted towards the end of rainy season when we expect underground water table to at its best level of the year.
4. We recommend use of hand pump installed with 17x3m pipes to optimize water abstraction.

5. When using solar pump, we recommend throttling at the well seal so as to regulate the water abstraction.

CUSTOME NAME : **MWANSABOMBWE TOWN COUNCIL**
LOCATION : **KAZEMBE – KABALENGE VILLAGE**
BOREHOLE PUMP USED : **DAYLIFF DSP 3-13 SUBMERSIBLE BOREHOLE PUMP**
DEPTH OF BOREHOLE : **53M**
PUMP DEPTH : **45M**

YIELD TESTING				RECOVERY LEVEL AFTER PUMPING		
CLOCK	ELAPSED	YIELD	DEPTH FROM	CLOCK	ELAPSED	DEPTH FROM
Time	Time (min)	Pumping Rate (lpm)	Ref. Point to Water (m)	Time	Time (Min)	Ref. Point to Water (m)
13:35	0	80	23.70	15:36	0	26.95
13:36	1	80	25.48	15:37	1	24.30
13:38	2	80	25.66	15:39	2	24.21
13:41	3	80	25.79	15:42	3	24.12
13:46	5	80	26.32	15:47	5	24.02
13:56	10	80	26.46	15:57	10	23.92
14:11	15	80	26.65	16:12	15	23.84
14:31	20	80	26.77	16:35	23	23.78
14:56	25	70	26.87	:	25	
15:26	30	70	28.93	:	30	
15:36	10	70	28.93		35	
					40	
:	45			:	45	
:	60			:	60	
:	70			:	70	
:	80			:	80	
:	90			:	90	
:	100			:	100	

Quality of Water After yield Test

Turbid ☐ Clear ■

TECHNICIAN: MWAMAHONJE HOPSON
CLIENT SIGNATURE: MARTIN SIWAKWI

REMARKS:

1. Water is clear, and pumping is continuous throughout the test
2. Borehole is able to recover 98% after 59minutes
3. Estimated Yield De- Rated Yield of borehole is 1.3 lps
4. Lower aquifer position at about 27m

CUSTOME NAME	:	**MWANSABOMBWE TOWN COUNCIL**
LOCATION	:	**MUNUNSHI VILLAGE**
BOREHOLE PUMP USED	:	**DAYLIFF DSP 3-13 SUBMERSIBLE BOREHOLE PUMP**
DEPTH OF BOREHOLE	:	**20M**
PUMP DEPTH	:	**18M**
START TIME	:	**14:20HRS**
END TIME	:	**16:21HRS**
DURATION	:	**2HRS** **DWL: 8.37M - SWL: 8.49M**
COORDINATES	:	**-10.01473S, 28.70499E**

YEILD TESTING				RECOVERING LEVEL AFTER PUMPING		
CLOCK	ELAPSED	YIELD	DEPTH FROM	CLOCK	ELAPSED	DEPTH FROM
Time	Time (min)	Pumping Rate (lpm)	Ref. Point to Water (m)	Time	Time (Min)	Ref. Point to Water (m)
14:28	00	120	8.37	16:00	0	8.56
14:29	01	120	8.43	16:01	1	8.44
14:32	02	120	8.45	16:03	2	8.41
14:35	03	120	8.46	16:06	3	8.38
14:40	10	120	8.47	16:11	5	8.37
14:50	15	120	8.48	16:21	10	8.37
15:05	20	120	8.49	:	15	
15:25	25	120	8.49	:	23	
15:50	05	120	8.49	:	25	
15:55	05	WOT	8.55	:	30	
16:00	05	WOT	8.56		35	
:	40				40	
:	45			:	45	
:	60			:	60	
:	70			:	70	
:	80			:	80	
:	90			:	90	
:	100			:	100	

Quality of Water After yield test

Turbid ☐ Clear ■

DAYLIFF DSP 3-13 WOT at head of 8m: 10.8m3/h (180 lpm) – Cavitation pt.

TECHNICIAN: MWAMAHONJE HOPSON

CLIENT SIGNATURE: KONDWELANI ZIMBA

REMARKS:

1. Water is VERY CLEAR, and pumping is continuous throughout the test
2. Borehole has very good recovery rate, a full recovery after 11 minutes
3. Estimated Yield (De- Rated Yield) of borehole is 2.0 lps.
4. Lower aquifer position at 8.5M

CUSTOME NAME : **MWANSABOMBWE TOWN COUNCIL**
LOCATION : **MUMBOLO VILLAGE**
BOREHOLE PUMP USED : **DAYLIFF DSP 3-13 SUBMERSIBLE BOREHOLE PUMP**
DEPTH OF BOREHOLE : **42M**
PUMP DEPTH : **40M**

YIELD TESTING				**RECOVERY LEVEL AFTER PUMPING**		
CLOCK	**ELAPSED**	**YIELD**	**DEPTH FROM**	**CLOCK**	**ELAPSED**	**DEPTH FROM**
Time	Time (min)	Pumping Rate (lpm)	Ref. Point to Water (m)	Time	Time (min)	Ref. Point to Water (m)
11:45	0	80	12.00	13:46	0	24.46
11:46	1	80	19.00	15:47	1	16.00
11:48	2	80	22.00	15:49	2	13.90
11:51	3	78	22.95	15:52	3	12.82
12:01	10	75	23.95	15:57	5	12.45
12:16	15	75	23.23	15:07	10	12.25
12:31	15	75	24.00	:	15	
12:51	20	75	24.25	:	23	
13:16	25	75	24.45	:	25	
13:46	30	75	24.46	:	30	
:	35				35	
:	40				40	
:	45			:	45	
:	60			:	60	
:	70			:	70	
:	80			:	80	
:	90			:	90	
:	100			:	100	

Quality of Water after yield Test

Turbid ☐ Clear ■

TECHNICIAN: MWAMAHONJE HOPSON

CLIENT SIGNATURE: NATASHA MWILA

REMARKS:

1. Water is clear, and pumping is continuous throughout the test
2. Borehole has very good recovery rate, a full recovery after 21 minutes.
3. Estimated Yield (De- Rated Yield) of borehole is **1.25 lps**.
4. Lower aquifer position at about 25m.

CUSTOME NAME : **MWANSABOMBWE TOWN COUNCIL**
LOCATION : **KAZEMBE – CHOMBA VILLAGE**
BOREHOLE PUMP USED : **DAYLIFF DSP 3-13 SUBMERSIBLE BOREHOLE PUMP**
DEPTH OF BOREHOLE : **52M**
PUMP DEPTH : **47M**

YIELD TESTING				RECOVERY LEVEL AFTER PUMPING		
CLOCK	ELAPSED	YIELD	DEPTH FROM	CLOCK	ELAPSED	DEPTH FROM
Time	Time (min)	Pumping Rate (lpm)	Ref. Point to Water (m)	Time	Time (min)	Ref. Point to Water (m)
11:23	0	80	23.00	14:29	0	28.45
11:24	1	80	24.00	14:30	1	24.40
11:26	2	80	25.00	14:32	2	24.06
11:29	3	80	26.00	14:35	3	23.77
11:34	5	80	27.80	14 :40	5	23.55
11:44	10	80	28.20	14:50	10	23.35
11:59	15	80	28.20	15:05	15	23.25
12:19	20	100	28.30	15:25	20	23.16
12:44	25	100	28.40	:	25	
13:14	30	100	28.45	:	30	
13:49	35	100	28.45		35	
14:29	40	100	28.45	:	40	
:	45			:	45	
:	60			:	60	
:	70			:	70	
:	80			:	80	
:	90			:	90	
:	100			:	100	

Quality of Water after yield Test

Turbid ☐ Clear ☐

TECHNICIAN: MWAMAHONJE HOPSON

CLIENT SIGNATURE: ……

REMARKS:

1. Water cleared after about an hour of continuous pumping
2. Borehole is able to recover 95% after 33minutes and full recovery after about 50 minutes
3. Estimated Yield of borehole is 2lps but to be de-rated to about 1.5lps as test has been done toward end of rainy season.

Questionnaire

Dear Respondent,

I am Natasha Mumba, a Junior Consultant with GIZ. I am conducting a study on the effectiveness of the kiosk water supply system in Luapula. Mwansabombwe district has been selected for this case study and you have been purposively selected to participate in the study.

This questionnaire is meant to collect data on the effectiveness of kiosk water supply systems in relation to water consumers. Please kindly respond to the questionnaire, truthfully, your response will be treated with strict confidence. Where several options are available, indicate your choice with a tick in the space provided.

CONSENT OF AGREEMENT

I have understood the conditions hereby given by the researcher (Natasha Mumba) who is conducting the study on the effectiveness of kiosk water supply systems in Luapula Province of Zambia. I understand that my responses will not be associated with me at all costs. I agree to participate in the study.

Sign: …… Date: …….

INTERVIEW SCHEDULE FOR CONSUMERS

Section A: Demographic

1. **Sex**

Male	Female

2. **Age**

20-30 years	31-40 years	41-50 years	51 years and above

3. **Marital Status**

Single	Married	Divorced	Widowed	Other

4. **How many people live in the house?**

1 - 4	5 - 7	8 - 10	Above 10

5. **How long have you been living here?**

Below 1 year	1-5 years	5-10 years	10-15 years	15 years above

6. **What is your occupation?**

Unemployed	Farmer	Self-employed	GRZ/Other

7. **What is the monthly income?**

Below K500	K500 - K1000	K1000 - K1500	K1500 - 2000	Above K2000

8. **How many litres of water do you use per day?**

Below 40 litres	40 litres - 60 litres	80 litres - 100 litres	100 litres and above

9. **How far from your house is the water kiosk where you get the water from?**

Below 50m	50m - 100m	100m - 150m	150m - 200m

10. **How long do you usually wait in line at the water source?**

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Section B: Customer Satisfaction of the Kiosk Water Supply

11. **Are you aware of other water kiosks within your area?**

Yes	No

12. **How available is the water supply from the water kiosk during the day?**

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13. **How reliable is the kiosk water supply in your area?**

Reliable	Fairly reliable	Very reliable	Not reliable

14. **How often do you use the services of water kiosks?**

Everyday	Sometimes	Never

15. **How satisfied are you with the services provided by the water kiosks?**

Not satisfied	Satisfied	Fairly satisfied	Very satisfied

16. **How satisfied are you with the amount paid for water that is supplied by the water kiosks?**

Not satisfied - 1	Satisfied - 2	Very satisfied - 3

17. **In your opinion, how can the kiosk water supply system be improved in your area?**

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18. **Have you ever experienced any waterborne diseases due to lack of clean water from the kiosk?**

Yes	No

End of Interview Schedule

Thank You for Sparing Your Precious Time to Participate