



**BUSITEMA  
UNIVERSITY**  
*Pursuing Excellence*

**FACULTY OF ENGINEERING**

**DEPARTMENT OF WATER RESOURCES AND MINING ENGINEERING**

**FINAL YEAR PROJECT REPORT**

**DESIGN AND DEVELOPMENT OF DOMESTIC SLOW SAND WATER  
PURIFICATION SYSTEM**

**Kabrari Landing site Pingire sub county, Serere district**

**By**

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***A final year project proposal submitted to the Department of Water Resources and Mining Engineering as a partial fulfillment of the requirements for the award of a Bachelor of Science degree in Water Resources Engineering***

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## **ABSTRACT**

Uganda as a country is considered to be well endowed with natural water resources, with about 43,942 km<sup>2</sup> covered with wetlands and 16% of the total area covered with open water sources. This surface water resources act as major sources of water to communities without access to borehole, protected well and piped water especially village communities and peri urban communities, but these resources are continuously continued to be polluted by human activities and discharge of waste to them, this makes the water unsafe for consumption without any form of treatment and as a result persistent of water borne diseases. Kabrari landing site case study area of this project is an example of the communities who depend on surface water from Lake Kyoga and streams. Therefore the main objective of the study was to design and develop a domestic slow sand water purification system which would therefore provide access to safe and clean water at house hold level having average number of 6 people, reducing the prevalence of water borne diseases. The quantification of contaminants from Lake Kyoga, stream and nearby pond water was done by laboratory testing where by the water was found not to be safe for consumption without treatment. The major filter components were then designed and developed and others selected, The filter component were then assembled and its performance tested on the bacterial account removal, turbidity, TDS, pH, Nitrates and EC by taking filtered water to the laboratory for tests. The filter was able to reduce E-coli and T -coli to significant level though not to standards with 80.8% and 77% removal respectively. The physical and chemical parameters were reduced to the UNWQ standards with a filter being very much effective on turbidity removal by 92.6%. The filter was able to purify 9 litres of water per hour, providing 216 litres of water per day for 6 people in a house hold.

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## **DEDICATION**

To my beloved Father Mr Ekume Joseph Charles and mother Mrs Apino Jane, All what you have ever wanted for was to get better education so as to be a better person, thank you and may almighty God bless you and keep you well always.

**DECLARATION**

I EMARU ANDREW hereby declare that, this report is work of my hands and research and has never been presented by any person or institution for an academic award.

Signature: ..... 

Date: ..... 25<sup>th</sup> / 05 / 2016



**APPROVAL**

This piece of work has been approved by;

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## **LIST OF ACRONYMS.**

<b>HWTS</b>	Household water treatment and storage
<b>PET</b>	Polyethylene terephthalate
<b>NTU</b>	Nephelometer Turbidity Units
<b>EC</b>	Electrical Conductivity
<b>STDS</b>	Standards
<b>WHO</b>	World Health Organisation
<b>UNWQ</b>	Uganda National Water Quality
<b>PVC</b>	Poly vinyl Chloride
<b>GI</b>	Galvanized iron
<b>SSF</b>	Slow Sand Filter
<b>TDS</b>	Total Dissolved Solids
<b>UN</b>	United Nations

## **CHAPTER ONE: INTRODUCTION**

In Uganda, 39% of households do not have access to clean water and 19% to sanitation posing a great negative impact on Ugandans economic growth in terms of time and money on hospital treatment of water borne diseases such as cholera, diarrhoea, Typhoid, Hepatitis A and E among others that are caused by consumption of contaminated water and poor sanitation. (Water aid Uganda, may. 2015)

Although the number of people with access to safe water and sanitation has improved over the past 10 years, there are still many communities both rural and urban that rely on contaminated open water sources such as streams and ponds. This has caused constant outbreak of waterborne diseases such as cholera and dysentery (Water. Org, Uganda)

In order to reach UN SDGs, goal 6 of providing clean water to everyone and everywhere by 2030, and 10million people in Uganda alone will need access to improved water sources.

Kabrari landing site in Pingire sub county, Serere districts in Eastern Uganda is one of the communities highly heat by total lack of clean and safe water for domestic use. The landing site with a growing population of over 300 people has no boreholes or any other safe source of water for domestic use, This has left the community with the only option of using contaminated surface water from the nearby streams, rivers and lake Kyoga without any form of treatment. A half of the sub county is covered by source water resources and it has limited number of boreholes having salty water yet scarcely distributed increasing the distance walked to access water (Pingire sub county 5 year development program) . According to weekly health report from Pingire Health Centre III, Diarrhoea cases are the second ranked after malaria, this is as a result of consumption of contaminated water from the above mentioned sources.

Slow sand filtration (SSF) is a water treatment that emulates nature's purification process when rainwater seeps through the layers of the earth's crust and forms groundwater. It is the world's oldest known water treatment system that is simple, inexpensive, and reliable and environment friendly method of water treatment.

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