



**BUSITEMA  
UNIVERSITY**  
*Pursuing Excellence*

## **FACULTY OF ENGINEERING**

**DEPARTMENT OF MINING AND WATER RESOURCES  
ENGINEERING**

### **FINAL YEAR PROJECT REPORT**

## **DESIGN OF A SAND MOUND SEWAGE DISPOSAL SYSTEM**

**(Case study: Kimbilio Primary School-Tororo)**

BY

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## ABSTRACT

The rural communities in Tororo are not served by public Sewer facilities and the majorly existing excreta disposal facilities in these areas include simple pit Latrines, Ventilated Improved Pit (VIP) latrines and a few institutions in the area use systems that require water for their operation such as flush toilets (TDLG, 2013).

Kimbilio Primary school is located in the rural areas of Tororo district on a site with Shallow soil depth over underlying bedrock making it difficult to use conventional subsurface soil absorption systems for waste water disposal. This inappropriate disposal of sewage makes the school and the entire community more susceptible to water borne diseases.

The main objective of this project was to design a Sand Mound Sewage disposal system for Kimbilio Primary School. The project involved a review of several literature pertaining sewage disposal systems, geophysical study of the site, characterizing and quantifying the waste water composition, designing the various components of the sand mound sewage disposal system and finally economic analysis of the project was done.

The study was very successful in achieving its objective of designing a Sand Mound Sewage disposal system for the school. The geophysical investigations of the site indicated a clay loam soil of average percolation rate 31.3 sec/mm and a site slope of 2%. A 20m<sup>3</sup>/day sand mound sewage disposal system was designed to meet a projected population of 500 people in 25 years. The economic evaluation of the designed sand mound sewage disposal system indicated a cost benefit ratio of 1.81 hence making the project viable.

This design once constructed will provide a method of final treatment and discharging of partially treated wastewater to the soil environment where it receives final treatment by the natural soils prior to contact with the groundwater.

In order to ensure success of the project, the designed sand mound sewage disposal system should be fenced to prevent traffic and compaction of the absorption site, a diversion ditch should be constructed uphill of the mound to prevent surface water and an additional useable area of 50 percent should be set aside for future expansion.

## DECLARATION

I OMWENE PHILIP ISAAC of Busitema University do declare that this project report on the design of a Sand Mound Sewage Disposal System is as a result of my own research and has never been presented in any academic institution for any award.

Signature: .....  ..... Date: 27<sup>th</sup> - May - 2015



## APPROVAL

This project report on the Design of a Sand Mound Sewage Disposal System has been written under the supervision of;

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Date.....

**ENG. OKELLO GEATANO**

**Main supervisor**

Signature .....

Date.....

**MR. JOSEPH DDUMBA LWANYAGA**

**Co-Supervisor**

## DEDICATION

This report is dedicated to my father Mr. Omwene Edward and my mother Mrs. Christine Omwene for the tireless efforts and sacrifices they have shown to me throughout my education.

## ACKNOWLEDGEMENT

I thank the almighty God for guiding me through my final year project and providing me protection and strength.

I would also like to thank my academic supervisors Eng. Okello Gaetano and Mr. Joseph Ddumba Lwanyaga and the entire staff of the department of Mining and Water Resource Engineering Busitema University who endeavored their best to guide me where necessary throughout this project, may the good Lord bless them.

With great concern I send my sincere appreciation to my father Mr. Omwene Edward and my dear mother Mrs. Christine Omwene for all the material and financial support they offered to me throughout my education.

Finally, in special attention I convey my sincere appreciation to my elder brother Mr. Ajalla Philemon for the Laptop computer, financial support and encouragement he always offered to me. May the almighty God reward him abundantly.

## ACRONYMS

ACF	Action Contre La Faim
AOAC:	Association of Official Analytical Chemists
APHA	American Public Health Association
BOD	Biochemical Oxygen Demand,
BOD <sub>5</sub>	Five-day biochemical oxygen demand
DICL	Ductile Iron Cement Lined
HRT	Hydraulic Retention Time
MLSS	Mixed Liquor Suspended Solids
MLVSS	Mixed Liquor Volatile Suspended Solids
MWE	Ministry of Water and Environment
NEMA:	National Environment Management Authority
NWSC	National Water and Sewerage Corporation
NTUs:	Nephelometric Turbidity Units
TDLG	Tororo District Local Government
TDS:	Total Dissolved Solids
WHO:	World Health Organization

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## CHAPTER ONE

### 1.0 INTRODUCTION

This chapter outlines the relevant information and clearly shows the problem of interest for the research. It stipulates how this study will help reduce the problem through fulfillment of objectives discussed below.

#### 1.1 Background of the project

The rural communities in Tororo are not served by Public Sewer Facilities and have poor public health and sanitation practices (NWSC, 2014).

The majorly existing excreta disposal facilities in the rural areas of Tororo include simple pit latrines and ventilated improved pit (VIP) latrines. However few institutions in the area use systems that require water for their operation such as flush toilets (TDLG, 2013).

Some areas of the district are characterized by High water tables, Shallow soils over fractured bedrock and slowly permeable soils making it difficult to use conventional subsurface soil absorption systems for wastewater treatment and dispersal (TDLG, 2013)

Access to water and sanitation is one of the major challenges in the district. According to TDLG, 2013, 40% of the district population does not have access to safe water and 48% do not have access to basic sanitation facilities. As a consequence, some of the affected people die from water and sanitation related diseases.

The most affected populations in the district live in extreme poverty, particularly in peri-urban and rural areas. Sanitary facilities are essential for improving the sanitary environment, but poor results will be achieved in terms of public health if hygiene practices are not appropriate (ACF, 2006).

According to the Ministry of Education and sports, thousands of children, particularly in rural area suffer from malnutrition, low school attendance rates, and economic losses due to diarrheal diseases that are preventable by adequate sanitation.

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