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FACULTY OF ENGINEERING

DEPARTMENT OF MINING AND WATER RESOURCES ENGINEERING

WATER RESOURCES ENGINEERING PROGRAMME

DESIGN AND CONSTRUCTION OF A HYBRID BOREHOLE PUMPING SYSTEM AT BUSITEMA COLLEGE PRIMARY SCHOOL

BY

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SUPERVISED BY

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DESIGN PROJECT SUBMITTED IN PARTIAL FULFILLMENT TO THE AWARD OF BACHELOR OF SCIENCE DEGREE IN WATER RESOURCES ENGINEERING

ABSTRACT

The idea for Play Pumps originated in 1989 near Johannesburg, South Africa. Fields licensed the merry-go-round water pump technology from its inventor in 1994 and renamed it "Play Pump''. The pump was designed to extract water from as deep as 40 meters using kinetic energy supplied by children spinning the wheel (play pump international , April 2012)

Even without drought or contamination, collecting water in rural schools of the developing world is difficult. Well-developed infrastructure for pumping water is frequently lacking.

The proposed hybrid borehole pumping system targeted a borehole in Busitema college primary school of about 551 pupils.

This project involved a review of relevant literatures on the several existing types of pumps with varying energy sources especially those available and used in Uganda. It also describes the hybrid swing pump in depth, clearly pointing out its applicability, advantages over other available pumps, its components and lastly, its operation

As well addresses the methodology describing step by step procedures and methods that have been used in obtaining the specific objectives that led to the design of the pumping swing

ACKNOWLEDGEMENT

All glory and thanks go to God, who has granted me the gift of life and a chance to reach this moment of writing this project and I pray that he grants me more time to live and implement this study as well as ascertaining its contribution to the case study area...Amen.

Appreciation to my family members I love so much and I will always pray that God continuously bless you abundantly and exceedingly.

To my lovely supervisors, Mr. Wangi Mario and Mr. Muyingo Emmanuel, I sincerely appreciate you for all the time, support, guidance, knowledge and advice that you readily provided during the preparation of this project, may your prayers in life always be answered. More thanks go to the entire staff of water and Mining Engineering departments especially Mr. Wangi Mario and all those who readily gave me a go ahead to work on this project with guidelines to follow.

Lastly to all my fellow students in my WAR of 2013 class who rendered all that were within their reach towards the accomplishment of this project, only God the almighty can reward you generously.

DEDICATION

To my loving Son Lalar Jalon Okot, daughter Anena Babra and my parents who have worked hard and tireless to ensure i attain my education may the almighty bless you? Amen.

DECLARATION

I OKENY GEOFFREY declare that the work presented in this project report is my own and has never been presented to any University or higher institute of learning for any academic award.

Signature.....

Date..30/05/2017.....

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APPROVAL

This final year project report has been submitted to the Department of Water and Mining Engineering for examination with approval from the following supervisors:

Mr. Wangi Mario

Signature.....

Date.....

Mr. Muyingo Emmanuel

Signature.....

Date.....

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UPE –Uganda primary Education

HDPE-high density pipe

PVC-Polyvinyl chloride

CHAPTER ONE: INTRODUCTION

This chapter briefly gives the general information relevant to the research topic whilst clearly showing the problem of interest that forced the researcher to undertake the project. It as well shows how this study provides solution to the identified problems, the objectives and scope of study.

1.1 BACKGROUND OF THE STUDY

The history of pumps is long from 2000BC Egyptians invented shadoof to raise water. It uses a long suspended rod with a bucket at one end and a weight at the other. (Pumps & Systems Staff)) According to (Muhammad e. a., (2007),)power source is a component which can greatly increase or decrease the overall efficiency of any given system. All power sources need energy in one form or another to operate.

According to the United Nations, people living in Sub-Saharan Africa spend 40 billion hours each year collecting water. Clearly, any innovation able to supply clean water to rural communities in this region and ease the burden of collection could save many lives and improve quality of life (play pump international, April 2012)

The idea for Play Pumps originated in 1989 near Johannesburg, South Africa. Fields licensed the merry-go-round water pump technology from its inventor in 1994 and renamed it "Play Pump''. The pump was designed to extract water from as deep as 40 meters using kinetic energy supplied by children spinning the wheel. Each Play Pump also included a 2,500-liter water storage tank raised seven meters above ground. (In 2005), the World Food Programme, UNICEF, Canadian Development Agency, Lemelson Foundation, and Mozambique Departments of Education and Water Affairs partnered to bring PlayPumps to Mozambique. (play pump international , April 2012)

Field's challenges were the design did not protect children from falling and the base of the wheel was concrete. Some children suffered bruises, cuts, and fractures after falling off. School children also reported that they would become tired quickly after pushing the wheel. Both children and women do vomit after spinning on the pump carousel. "Smaller children reported that one minute of rotation was enough to make them dizzy and want to stop playing with the pump.

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