FACULTY OF ENGINEERING

DEPARTMENT OF WATER RESOURCES AND MINING ENGINEERING

FINAL YEAR PROJECT.

DESIGN OF A CONSTRUCTED WETLAND FOR WASTEWATER TREATMENT CASE STUDY KAPCHORWA TOWN.

BY

ADONG RACHEL

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TEL: +256-773265617/+256-755910161

Email:racheladongotim@gmail.com

MAIN SUPERVISOR: Ms MARION ENGOLE

CO-SUPERVISOR: Ms. VICTOR NABUNYA

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ABSTRACT

Constructed wetlands are engineered and managed wetland systems that are increasingly receiving worldwide attention for wastewater treatment and reclamation. Compared to conventional treatment plants, constructed wetlands are cost-effective and easily operated and maintained, and they have a strong potential for application in a small community like Kapchorwa town, a town in eastern Uganda that has available land for wetland construction.

The purpose of the study was to design a cost effective treatment facility that will provide adequate treatment to the wastewater generated in Kapchorwa town thereby reducing the impacts of poor waste management being experienced.

The study objectives were to quantify the total volume of raw wastewater generated. This was done first by projecting the total population of Kapchorwa town. Knowing the total amount of water consumed by this population, the amount of wastewater generated was calculated. Characterization of the raw wastewater was done and achieved by sampling the wastewater and taking it to the laboratory for analysis comparing it with the national standards for effluent discharge. The design and sizing of the wetland cells were done basing on the test results and objective one.

The study was limited to quantifying, characterizing, modelling and designing a constructed wetland that can treat Kapchorwa town wastewater.

DECLARATION

I ADONG RACHEL do declare that this project work is my original effort and has never been produced in part or whole for any academic award in any university, college or institution of learning.

ADONG RACHEL

Date …...

APPROVAL

This project report was presented for approval and was satisfied by undersigned supervisors

Main supervisor: Mrs. Marion Engole

Sign…….

Date…….

Co-supervisor: Mrs. Victo Nabunya

Sign……

Date……

DEDICATION

I dedicate this final year project to my dear parents, Mr. OTIM PATRICK and Mrs. BETTY OTIM. Am very proud of you and without you I would not have reached this far. May God bless you abundantly.

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I wish to thank God for the gift of life and providence offered to me.

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ACRONYMS

BOD	Biological Oxygen Demand.
BOD5	Five – day Biological Oxygen Demand.
COD	Chemical Oxygen Demand.
NTU	Nephlometric Turbidity Unit.
SOR	Surface Organic Loading.
WHO	World Health Organization.
MWE	Ministry of Water and Environment
PH	Power of Hydrogen ion.
TSS	Total Suspended Solids.
HDT	Hydraulic Detention Time
HLR	Hydraulic Loading Rate.
TP	Total Phosphorus.
TN	Total Nitrogen
CW	Constructed wetland

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CHAPTER ONE: INTRODUCTION

1.0 Introduction

This chapter presents the background, significance and the objectives of the study. It also presents the problem to be addressed and the boundary of the study.

1.1 Background of the study.

Sewage treatment system plays an important role in ensuring public health, environmental protection and enhancing the standard of living of the general population.

Municipal wastewater discharge is one of the most serious threats to the ecosystem. Therefore, the wastewater needs to be treated appropriately before it is discharged into the environment (U.S. EPA, 2001)

In Uganda, there are a lot of wastewater treatment technologies in place like conventional method, activated sludge technology, waste stabilization ponds among others. But the high cost of conventional treatment processes has produced economic pressures in order to search for cost effective, aesthetic and environmental friendly ways to control water pollution. Under these conditions, natural systems for waste water treatment have become popular. (MWE, 2016)

Constructed wetlands (CWs) have been proved “cost-effective” methods for wastewater treatment. CWs are artificial wetland systems that are designed to exploit the physical, chemical, and biological treatment processes that occur in wetlands and provide for the reduction in organic material, total suspended solids, nutrients, and pathogenic organisms.(Sheet, 2013)

The constructed wetlands have been used for sewage treatment in the whole of Europe, even in countries with harsh winters such as Norway. (Jenssen et al 1994). A database compiled by United States environmental protection agency contains an inventory of over 150 North American wastewater treatment wetlands (Brown and Reed 1994).

In Uganda, the use of constructed wetlands for wastewater treatment is still limited. In most areas, like Kapchorwa town in eastern Uganda, waste water is being discharged to a storage lagoon which has reached its designed capacity so there is no standard treatment being given to the wastewater which leads to environmental pollution (MWE, 2016).

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