



**BUSITEMA
UNIVERSITY**
Pursuing Excellence

FACULTY OF ENGINEERING

DEPARTMENT OF WATER RESOURCES AND MINING ENGINEERING

BACHELOR OF SCIENCE IN WATER RESOURCES ENGINEERING

FINAL YEAR PROJECT REPORT.

**DESIGN AND SIMULATION OF AN APPROPRIATE SLAUGHTERHOUSE
WASTEWATER TREATMENT AND RECYCLING SYSTEM FOR SANITARY USES.
CASE STUDY: IGANGA MUNICIPAL ABATTOIR**

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ABSTRACT

The abattoir (meat processing industry) is one of the largest consumers of total freshwater used in the agricultural and livestock industry worldwide. Abattoir produce large amounts of slaughterhouse wastewater (SWW) because of the slaughtering process and cleaning of facilities. SWWs need significant treatment for a sustainable and safe discharge to the environment due to the high content of organics and nutrients. Due to the percentage of wash wastewater discharged, there is a lot of wash wastewater that needs to be recycled and reused. In Iganga municipality, abattoir wash wastewater is discharged to the environment without prior treatment hence polluting the environment and wasted water. Poor management of wash wastewater at the abattoir has led to poor sanitation within and around it, has also led to increased disposed wastewater volume, has also led to pollution of domestic water sources like wells, boreholes etc., has also led to increased bad smell and odors misuse. The purpose of the design project was to design a wash wastewater recycling system that would help to manage the wash wastewater and also supplement on the available source of water. Wash wastewater quality was determined by collecting samples and taking them to the laboratory for analysis, generated quantity of wash wastewater was determined depending on the total water consumption by the abattoir.

Design of various components of the wash wastewater treatment and recycling system was done using the given relevant formulas and equation. From the research, wash wastewater being generated currently was 2636 liters per day and projecting for a month 73808 litres per day was estimated. The wash wastewater being discharged showed poor physical, biological characteristics and thus needs treatment before reuse. Diversion pipes, collection chamber was sized then treatment units where one sedimentation tank, Aerated lagoon, Disinfectant tank, then distribution clear tank, pumping unit, distribution pipe and head tank were sized. An economic evaluation of the system was done using benefit cost ratio approach and it was found to be 1.35 this meant that the project was feasible and thus should be implemented at the abattoir to curb the problem of poor wastewater management. The possibility of using the preliminary; primary; secondary and tertiary processes for slaughterhouse wastewater treatment was investigated. The results showed that the processes could be an efficient purification method. Its application resulted in about 99 % and 98 % removal of total suspended solids and total dissolved solids respectively. The removal efficiency of COD and BOD5 exceeded 94 %.

DECLARATION

I **KUTESA SCOVIA** hereby declare that, this report is work of my hands and has never been presented by any person or institution for an academic award

Signature: 

Date: 5th / 06 / 2018



APPROVAL

This is to certify that this report was compiled by **KUTESA SCOVIA**, registration number **BU/UP/2014/583** on the account of the project research for the award of a Bachelor's Degree in Water Resources Engineering at Busitema University

Approved by;

Main Supervisor

Madam. NABATEREGA RESTY

Signature.....

Date.....

Co-supervisor

Mr. SSERUMAGA PAUL

Signature.....

Date.....

DEDICATION

I dedicate this Project to my Mummy, Namwase Florence, Daddy, Wagubi Robert, my sisters and brothers for their moral, spiritual and financial support and to all my dear friends for their social support, my relatives for their constant encouragement and my university, Busitema University, for nurturing me into who I am today. I am glad of you all.

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LIST OF ACRONYMS

BOD	Biological oxygen demand
COD	Chemical oxygen demand
TSS	Total suspended solids
TN	Total Nitrogen
TP	Total Phosphorus
SWW	Slaughterhouse wastewater
MPPs	Meat processing plants
EPA	Environment protection Agency
PH	Power of hydrogen ion
WHO	World health organization
EDA	Electronic design automation
NPV	Net present value
IRR	Internal rate of returns
NWSC	National water and Sewerage Corporation
TOC	Total organic carbon
m	meter
mm	millimeters
mg/l	milligram
WWTP	Wastewater treatment processes

CHAPTER ONE: INTRODUCTION

This chapter entails relevant information about the project, problem statement, and justification, objectives of the study, purpose of the study and the scope of the study.

1.1 BACKGROUND

The treatment and re-use of wastewater worldwide is of prime importance for identifying new water resources for increased water demand, wastewater management and to find economical ways to meet increasing more stringent discharge standards and environmental and public health reasons. It is necessary to reduce on the fresh water consumption by getting alternative water sources to optimize the fresh water use efficiency through reuse options(Pitt, 2000). This design project focuses on the wash wastewater recycling as the alternative source.

Worldwide, slaughterhouses produce large amount of wastewater from the slaughtering of animals and cleaning of slaughterhouse facilities Up to 24% of the water used in the food and beverage industry is from the meat processing (Widiasa and Johari, 2011). Slaughterhouses and meat processing plants (MPPs) are part of a large industry worldwide. Due to the percentage of wash water discharged, there is a lot of wash water discharged that need to be recycled and reused.

Because of high rates of meat consumption, cities face serious problems of high volumes of wastewater characterized by inadequate disposal technologies, high costs of management and the adverse impact of wastewater on the environment (Widiasa and Johari, 2011). Abattoirs or slaughter houses are a major source of water and air pollution worldwide.

Iganga municipal abattoir is a slaughter house and was donated by the Austrian government through united leather project and commissioned by the minister of state, Agriculture, animal industry and fisheries (Administrator and Meat inspector Iganga municipal council). It is a system assembled to produce quality and safe meat for human consumption and as a disease control, the abattoir slots 406 animals per week (280 shoats and 126 cattle). During the production of meat for human consumption $73.8m^3/day$ of wastewater is being produced. Currently, there is no organized system for wastewater generated in Iganga municipal abattoir. All this wastewater is discharged to the environment thus negatively impacting the environment.

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