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DEPARTMENT OF MINING AND WATER RESOURCES ENGINEERING

FINAL YEAR RESEARCH PROJECT

**ASSESSING THE DESIGN INEFFICIENCIES OF THE WASTE WATER
TREATMENT PLANT**

CASE STUDY: NWSC TORORO

BY

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ABSTRACT

Information on waste water treatment plants function in waste water treatment is very important as the information can be used to detect undesirable qualities of water. The aim of the study was to assess the design inefficiencies of the waste water treatment plant at Tororo waste water treatment plant.

The plant receives sewage directly from users and septic tanks and consists of Primary plant (anaerobic ponds), secondary plant (maturation pond) and tertiary plant which a mixture of a quantic plants and free water surface (artificial wetland).

The plant discharges into Atirikuku stream where water for different activities are being withdrawn, thereby potentially causing harm to downstream operations. The objectives of the study where to find out the level of performance failures of each component, to improve on the system based on the findings and to test the performance of the proposed system.

Waste water samples were collected on different point of the plant that is raw waste water, Pond effluent, wetland influent and wetland effluent. The parameters whose concentrations were determined included pH, electrical conductivity, temperature, BOD₅, TDS, TSS, Total phosphate. The study revealed that for most of the parameters understudy there was a decrease in their concentration after the water passed through the different stages of treatment. The results revealed that the primary stage played a role in the removal of chemical pollutants where the best performance was obtained at BOD₅ with removal efficiency of 43.6% and the artificial wetland played a role in the removal of nutrients.

The results of this study shows that not only the effluent of WWTP cannot meet the quality standards for discharge into the environment or water bodies but also the total percentage removal of the secondary treatment level was not up to the recommended design percentage removal which indicate the extra application of the facultative pond treatment unit.

The study then concluded that from the findings that the designed facultative pond should be in incorporated in treatment system since the maturation pond cannot perform up to the required standards under secondary treatment. Some recommendations considered were that regular monitoring, analysis and assessment of the efficiency level of the plant to remove pollutants from the waste water should be carried out.

DECLARATION

I hereby declare that this report is my original work and has not been presented for a degree in any other University or any other award.

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SIGN..........

DATE.....29th MAY, 2017.....



APPROVAL

We confirm that the work reported in this report was carried out by the student under our supervision.

Main Supervisor

Mr. Okirya Martin

SIGN.....

DATE.....

Co. Supervisor

Mr. Mugisha Moses

SIGN.....

DATE.....

DEDICATION

To my Mum, Dad, Grandmother, Brothers, Sister, Aunt, Uncles and all my friends.

ACKNOWLEDGEMENT

I would like to express my gratitude to all those who gave me the possibility to complete this report. Especially, I would like to give my special thanks to Almighty God, whose love and protection enabled me to complete this thesis. To God be the Glory.

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TABLE OF CONTENTS

ABSTRACT	i
DECLARATION	ii
APPROVAL	iii
DEDICATION	iv
ACKNOWLEDGEMENT	v
LIST OF FIGURES	viii
LIST OF TABLES	ix
ABBREVIATIONS/AGRONOMY	x
CHAPTER ONE:	1
1.0 INTRODUCTION.....	1
1.1 BACK GROUND.....	1
1.2 PROBLEM STATEMENT.....	3
1.3 JUSTIFICATION OF THE STUDY.....	3
1.4 SIGNIFICANCE.....	3
1.5 OBJECTIVES.....	3
1.5.1 MAIN OBJECTIVE.....	3
1.5.2 SPECIFIC OBJECTIVES.....	3
1.6. Scope / limitation of the study / assumption.....	4
CHAPTER TWO	5
2.0 LITERACTURE REVIEW.....	5
2.1 Municipal waste water.....	5
2.2 Conventional Wastewater Treatment Process.....	6
2.3 Waste Water Stabilization Pond.....	7
2.3.1 Anaerobic Ponds.....	8
2.3.2 Facultative ponds.....	8
2.3.3 Maturation ponds.....	10
2.3.4 Constructed wetlands.....	13
2.4 Population projection.....	19
2.5 Quantification of waste water generated.....	21
CHAPTER THREE	22
3.0 Introduction.....	22
3.1 PROJECT AREA.....	22
3.2 Data Collection Technique.....	22

3.4 Sampling	23
3.5 Sample analysis.....	23
3.6 Investigation for the level of performance failures of each component.....	24
3.6.1 Characterization of the physico-chemical parameters of waste water	24
3.6.2 Analytical procedures	24
3.6.3 Laboratory analyses	25
3.6.3 Percentage removal of each component.....	28
3.7 System design.....	28
3.7.1 Data collection techniques	28
3.7.2 Design parameters.....	29
3.8 Performance of the proposed system	30
CHAPTER FOUR.....	32
4.0 RESULTS AND DISCUSSIONS	32
4.1 Performance failures of each component.....	32
4.1.1 Water quality characteristics.....	32
4.1.2 Analytical procedures	33
4.1.4 Percentage removal	41
4.2 Results for the improved system.....	43
4.2.1 Design parameters of the facultative pond.....	43
4.2.2 Determination of design flow	44
4.2.3 Quantification of waste water discharged	44
4.2.4 Design criteria of facultative pond.....	44
4.3 Pollutant removal from the proposed system.....	45
CHAPTER FIVE	48
5.0 CHALLENGES, RECOMMENDATIONS AND CONCLUSIONS	48
5.1 Challenges faced;.....	48
5.4 Conclusions.....	48
5.2 Recommendations for management actions	48
5.3 Recommendations for further study.....	49
REFERENCES.....	50
APPENDICES	52

LIST OF FIGURES

Figure 1: Showing anaerobic treatment process	8
Figure 2: Showing the facultative treatment process	9
Figure 3: showing the map of the project area.....	22
Figure 4: showing the flow chart indicating the sampling points.....	23
Figure 5: showing the PH meter	26
Figure 6: showing the spectrophotometer for determining TSS.....	26
Figure 7: Showing the EC meter for determining the EC.....	27
Figure 8: showing the PH concentration.....	33
Figure 9: Showing the temperature concentration	34
Figure 10: Showing the electrical conductivity concentration	35
Figure 11: Showing the BOD concentration at different levels.....	36
Figure 12: showing COD concentration	37
Figure 13: Showing the TSS concentration at different levels	38
Figure 14: Showing the TDS concentration at different levels.....	39
Figure 15: Showing the Total phosphate at different levels	40
Figure 16: Showing the facultative pond.....	45
Figure 17: showing the layout of the improved system.....	52
Figure 18: showing a single mass curve	53
Figure 19: Showing some of the activities being carried out along the treatment plant and the stream.....	53
Figure 20: Showing some of the pictures for field work and Laboratory work.....	54
Figure 21: Showing the placement letter to carryout research	55
Figure 22: showing the Laboratory letter.....	56

LIST OF TABLES

Table 1: showing the overview of pollutant removal process (Kayombo 2000).....	14
Table 2: showing the design components of artificial wetland.....	18
Table 3: showing the water quality characteristics	32
Table 4: Showing the percentage removal of pollutants at primary treatment.....	41
Table 5: showing the percentage removals at secondary treatment plant.....	42
Table 6: Showing the percentage removal at tertiary treatment level	42
Table 8: Showing the expected effluent and percentage removal	47
Table 9: showing the temperature data of the area	52
Table 10: Showing the mean rainfall data of the area	53

ABBREVIATIONS/AGRONOMY

NWSC	National Water and Sewerage Cooperation
BOD.....	Biochemical Oxygen Demand
BOD ₅	Five day Biochemical Chemical Oxygen Demand
COD.....	Chemical Oxygen Demand
TSS.....	Total Suspended Solids
TDS.....	Total Dissolved Solids
PH.....	Power of Hydrogen Ions
AW.....	Artificial Wetland
MWE.....	Ministry of Water and Environment
NEMA.....	National Environmental Management Authority
UBOS.....	Uganda Bureau of Statistics
PKN.....	Phosphorous Potassium Nitrogen
WHO.....	World Health Organization
SFW.....	Surface Flow/Free Wetland
SSW.....	Sub Surface Wetland
GPS.....	Global Positioning System
GIS.....	Geographical Information System
UNMA.....	Uganda National Meteorological Authority
WWTP.....	Waste Water Treatment Plant

CHAPTER ONE:

1.0 INTRODUCTION

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

1.1 BACK GROUND

Many developing countries are presently experiencing rapid population and economic growth especially in the urban centers. The provision of services, including wastewater collection, treatment and disposal has however not kept pace with these developments (Masudi, 2014). Thus creating health hazards and affected normal life of flora and fauna. These wastes produce harmful effects on the environment and are generally released in the form of solids and liquid wastes containing organic and inorganic chemicals (B.G.Mahendra1, 2013).

According to the World Health Organization (WHO, 2000) about 2.4 billion people lack access to basic sanitation. Therefore 2 million people die every year from diarrhea diseases (including cholera) associated with inadequate water supply, sanitation and Hygiene and the majority had been children in developing countries.

In Africa, about 80 million people are at risk from water-borne diseases like dysenteries, cholera and 16 million cases of typhoid infections each year are a result of lack of clean drinking water and adequate sanitation (WHO, 1996)

It is foreseen that the urban population in Uganda will increase at a rate of more than 10% per year (UBOS 2014) and thus without appropriate means of wastewater collection and treatment, more cases of cholera and other water borne diseases are likely to remain persistent in the country. This could be avoided by planning for wastewater collection and treatment with Waste Stabilization Ponds alone or in combination with Constructed Wetlands for polishing especially when discharge of the effluents into surface and ground water bodies and re-use especially for irrigation is given priority.

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