



FACULTY OF ENGINEERING DEPARTMENT OF WATER RESOURCES
ENGINEERING
FINAL YEAR PROJECT PROPOSAL
**EVALUATING THE OPERATIONAL PERFORMANCE OF THE ACTIVATED
SLUDGE WASTEWATER TREATMENT PLANT AT UGANDA CHRISTIAN
UNIVERSITY, MUKONO**
BY
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This final year project proposal report is submitted to the department of Water Resources Engineering as a partial fulfilment of the requirements for the award of a Bachelors degree of Science in Water Resources Engineering.

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ABSTRACT

This research study investigated the operational performance of the Activated Sludge Treatment Plant (ASWWTP) at Uganda Christian University (UCU) in Mukono. Given the rapid urbanization and industrial growth in Uganda, effective wastewater management has become increasingly critical. The evaluation focused on the plant's compliance with the national effluent discharge standards by analyzing key indicators which are: Chemical Oxygen Demand (COD), Biological Oxygen Demand (BOD), Total Dissolved Solids (TDS), Total Suspended Solids (TSS), PH and Bacterial Feacal Coliform.

The research methodology indicates a comprehensive analysis of influent and effluent wastewater characteristics, operational parameters like the Hydraulic Retention Time (HRT), the Sludge Volume Index (SVI), Mixed Liquor Suspended Solids (MLSS), the food to microorganism ratio and their compliance with Uganda regulations of efficiency of activated sludge treatment system. This study identifies significant challenges faced by the UCU Activated sludge treatment system, including some infrastructural limitations, outdated technologies and operational inefficiencies that are hindering optimal performance.

According to the research findings and assessment, the performance of the sewage works was found be moderate in achieving pollutant removal. The aeration unit showed some satisfactory characteristics in reduction of pollutants for the parameters under study. However, the clarifier unit exhibited some small defects that impacted the overall final operation. The removal efficiencies were below expectations, and several wastewater quality parameters did not comply with the standards set by Uganda's National Environmental Management Authority (NEMA, 2020). It is recommended that plant operators receive adequate training and that regular maintenance be prioritized. Recommendations for process optimization, including improved aeration and sludge recycling, were proposed. The study provides practical insights towards enhancing wastewater treatment practices in Uganda, in alignment with Sustainable Development Goal 6 on clean water and sanitation.

DECLARATION

I Atyang Ketty Lyte, hereby declare that all the work in this report is entirely comprised of results of my research study proposal from Uganda Christian University Mukono under the supervision Eng. Badaza Mohammed my university research proposal supervisor.

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APPROVAL

This research project proposal report has been studied by my supervisor below and is ready for submission to the Department of Water Resources Engineering.

University Supervisor

Name:

Date:

Signature:

ACKNOWLEDGEMENT

I am deeply indebted to the Almighty God for fueling me throughout my training period. Not forgetting my husband Mr. Mugisa Simon who tirelessly worked to provide for me financially in all ways for the success of this research proposal, my lovely children for always giving me courage not to give up. I am forever indebted to my site supervisors, colleagues and all the site workers at large for accepting to give me all the necessary knowledge always needed for the success of this training. Not forgetting the project coordinator Busitema University Mr. Ben Maseruka Sejjabi who tirelessly made sure I was progressing well by providing all the necessary guidance and courage. I also send my sincere gratitude to my research supervisor Eng. Badaza Mohammed for the tireless work rendered to me to come up with this report.

DEDICATION

I would like to dedicate this report to my dear husband Mr. Mugisa Simon, my children Tuhairwe Jildo Pius, Ayebale Jethro Pius, Alinda Joanah Pius, Ampaire Jedidiah Pius and my niece Kyomugisha Charity. They are my true inspiration in the success of this training. May God bless you all. Not forgetting myself, it's through my hard work and commitment that I was able to come up with this research proposal report.

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Apply Artificial Neural Networks (ANNs) or Multiple Regression Models to predict output performance and adopt use Genetic Algorithm (GA) or other metaheuristics for optimization in the future studies.

Advocate and implement capacity building by providing regular training for plant operators on the latest treatment technologies and operational best practices. This will ensure that the plant staff can operate the system effectively and respond to any unexpected challenges.

Establish a maintenance schedule for the plant's equipment to prevent downtime and reduce the likelihood of failure.

The university management should advocate for stronger regulatory frameworks and ensure that the UCU ASWWTP is regularly audited for compliance with national discharge standards. This will foster continuous improvement in the plant's operation and regulatory compliance.

There should be good and effective collaboration between the Ministry of Water and Environment (MWE) and the National Environmental Management Authority (NEMA) with local institutions like UCU to provide financial support for upgrading wastewater treatment infrastructure and adopting newer technologies.

Further studies on climate impacts and how changes in rainfall patterns and temperature may affect wastewater composition should be considered to adapt the treatment process for future conditions.

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