



FACULTY OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF WATER RESOURCES ENGINEERING

**MITIGATING THE VULNERABILITY OF CRITICAL
TRANSPORTATION INFRASTRUCTURE TO FLOODING
CASE OF NABUYONGA SUB CATCHMENT**

BY

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ABSTRACT

This study examines the vulnerability of critical road infrastructure to flooding and proposes mitigation measures to enhance resilience and protect the River Nabuyonga sub catchment in Mbale city. This was because the immediate impact of floods specifically in urban areas was on the transport system. The study employed an integrated methodology, combining rainfall analysis, hydrologic modeling, and hydrodynamic modeling using software like Personal Computer Storm Water Management Model (PCSWMM) to investigate the hydrological responses in the River Nabuyonga sub catchment with precipitation data and the Digital Elevation Model (DEM) as input to obtain design discharge, HEC-RAS for obtaining flood maps and ArcGIS delineation of the catchment to assess the susceptibility of key transportation assets to varying flooding scenarios. By analyzing historical rainfall data and simulating potential future inundation events, the research identified vulnerable areas, assets and evaluated their criticality to flooding. Most of the studies on transport vulnerability consider topographic properties along with supply and demand side of transport system to access the disruption, but less attention is given to the potential impacts of weather extremes on the performance of transportation network. With that established, therefore, this research was conducted to bridge these critical knowledge gaps by assessing the specific vulnerabilities of its critical infrastructure to flood events, this study seeks to generate a better understanding of the risks faced by the city.

DECLARATION

I IISA JOSEPHINE EMUGE do hereby declare that to the best of my knowledge and belief, that this report is my original work and has never been submitted to any other institute of learning. It is therefore authentic and where any references or secondary data have been used, they have been given due acknowledgement.

Signature 

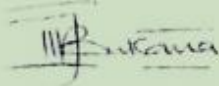
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APPROVAL

This is to confirm that this final year project report was completed under my guidance and is prepared for submission to the Department of Water Resources Engineering, Faculty of Engineering and Technology, Busitema University.

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Signature:



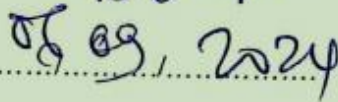
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Date.....



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My beloved parents, siblings and friends, I thank you for your material and moral support. Lastly, to all whom I have not mentioned, I thank you so much may God reward you abundantly.

DEDICATION

I dedicate my report to my parents, siblings and friends whose sacrifice, guidance and support towards my education has exposed me to the world of Engineering, May God bless them.

LIST OF ACRONYMS

CN- Curve Number

DEM – Digital Elevation Model

GIS- Geographical Information System

GPS -Global Positioning System

HEC-RAS- Hydrological Engineering Centre-River Analysis System Digital Elevation Model

HEC-SSP- Hydrologic Engineering Center-Statistical Software Package

IDF -Intensity Duration Frequency

IPCC- Intergovernmental Panel on Climate Change

MCA - Multi Criteria Analysis

MCDA- Multi Criteria Decision Analysis

MLE-Maximum Likelihood Estimation

MOM - Method Of Moments

PCSWMM – Personal Computer Storm Water Management Model

SDG – Sustainable Development Goals

UBOS- Uganda Bureau of Statistics

UNMA - Uganda National Meteorological Authority Uganda Bureau Of Statistics

UNMA- Uganda National Meteorological Authority

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