THE REPUBLIC OF UGANDA

MINISTRY OF WATER AND ENVIRONMENT

WATER FOR PRODUCTION REGIONAL CENTRE- CENTRAL

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT FOR THE PROPOSED REHABILITATION OF KASENSERO VALLEY DAM IN NALYANKANJA WARD, KYENDA TOWN COUNCIL, MUBENDE DISTRICT, UGANDA

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT

Prepared for:

THE REPUBLIC OF UGANDA

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MARCH, 2023

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ACRONYMS

ACAO	Assistant Chief Administrative Officer
AGI	Agro- Industrialization
AIDS	Acquired Immune Deficiency Syndrome
CAO	Chief Administrative Officer
CBMS+	Community Based Management System Plus
CDO	Community Development Officer
DEO	District Environment Officer
DNRO	District Natural Resources Officer
DWO	District Water Officer
EHS	Environment, Health and Safety
EIA	Environment Impact Assessment
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
ESS	Environmental and Social Standards
FGDs	Focus Group Discussions
GBV	Gender Based Violence
GO	Grievance officer
GoU	Government of Uganda
GRC	Grievance Redress Committee
GRM	Grievance Redress Mechanism
HH	Household
HIV	Human Immuno deficiency Virus
IFC	International Finance Corporation
IUCN	International Union for Conservation of Nature
JTR	Joint Technical Review
Km	Kilometre
LC	Local Council
MoGLSD	Ministry of Gender, Labour and Social Development
MWE	Ministry of Water and Environment
MDLG	Mubende District Local Government
NEA	National Environment Act
NEMA	National Environment Management Authority
NES	National Environment Statute
NGO	Non-Government Organizations
NPHC	National Population Housing Census
NWSC	National Water and Sewerage Corporation
OHS	Occupational Safety and Health
Ops	Operational Procedures
PCDP	Public Consultation and Disclosure plan
PH	Public Health
PPE	Personal Protective Equipment
RAP	Resettlement Action Plan
RGC	Rural Growth Centre
SDG	Sustainable Development Goal
SEA	Sexual Exploitation and Abuse
SGBV	Sexual and Gender Based Violence
SO	System Operator

SSIP	Strategic Sector Investment Plan
STDs	Sexually Transmitted Diseases
ToR	Terms of Reference
UBOS	Uganda Bureau of Statistics
UWSS	Urban Water Supply and Sewerage
VAC	Violence Against Children
WfPRC-C	Water for Production Regional Centre- Central
WHO	World Health Organization
WSS	Water Supply System
WUC	Water User Committee

ACKNOWLEDGEMENT

We, the undersigned, hereby declare that this ESIA Report represents the facts pertaining to the Proposed Kasensero Earth Dam in Mubende District "

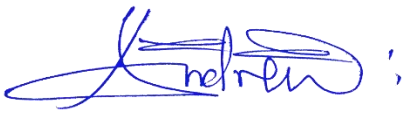
ON BEHALF OF MINISTRY OF WATER AND ENVIRONMENT

Sign:

Dated: _____

DETAILS OF EXPERTS WHO CONDUCTED THE ESIA

Name of Consultant: ANDREW NKAMBO (*CC/EIA/273/23)*

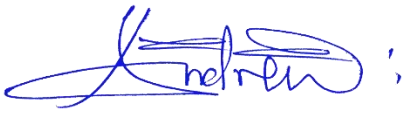
Sign: 

Dated: _____ _____

ESIA TEAM COMPOSITION

Table 1 presents the composition of the Environmental and Social Impact Assessment (ESIA) team that undertook the ESIA for the proposed Kasensero Earth Dam in Mubende District in accordance with the provisions of the *National Environmental Act No. 5 of 2019* of the Laws of Uganda, the *Environmental and Social Impact Assessment Regulations (2020)* and the *National Environment (Conduct and Certification of Environmental Practitioners) Regulations (2003).*

Table 1: Proposed ESIA Team Composition

Name of Key Specialists	Assigned Position	Signature
Mr. Andrew Nkambo, BSc. *Certified Environmental Impact Assessor* ***(CC/EIA/273/22) – Team Member***	ESIA and Ecologist/Natural Resources Management Specialist/Lead Consultant	
Dr. Denis Byamukama, PhD *Certified Environmental Impact Assessor* ***(CC/EIA/073/22) – Team Leader / Member***	Team Leader Water Resources Management / Water Quality Specialist	
Mr. Pius Kahangirwe, MSc. *Certified Environmental Impact Assessor* ***(CC/EIA/159/22) – Team Leader / Member***	ESIA and Environmental / Occupational Health & Safety Specialist	
Contributing Specialists		
Mr. Anthony Begumisa	Sociologist	
Ms. Jackline Abitegeka,	Faunal Studies	
Mr. Vincent Birungi	Biodiversity Specialist	
Mr. Abdu Magidu Menya	Sociologist	
Mr. Roy Ongeyuru	Health, Safety and Environment	
Mr. Michael Sseku	Socio-Economist	
Mr. Simon Njuki	Irrigation Engineer	

EXECUTIVE SUMMARY

ES01: Project Background and Objectives

The government of Uganda through Water for Production department of the Ministry of Water and Environment is making considerable efforts in raising the water for production coverage and availability across the country through construction of multi-purpose reservoirs (earth dams and valley tanks) for domestic water supply, irrigation, livestock watering, rural industries, wild life, fisheries and aquaculture with the objective of increasing agricultural production and productivity, and regulate dependency on rain fed agriculture which is heavily affected by prolonged droughts. Water for production is key to the successful implementation of the Government of Uganda's plan for poverty eradication and climate change mitigation through provision of dams and valley tanks for storing excess flood water during heavy rains for use during the dry seasons.

As part of the initiative, the Water for Production Regional Center Central (WfPRC-C) has prioritized rehabilitation of Kasensero Dam to increase water storage for domestic water supply, aquaculture, livestock watering and irrigation especially during the dry season in the dry cattle corridor district of Mubende..

Mubende is one of the Cattle Corridor Districts of Uganda characterized by livestock production with scarce water and pasture, and are one of the most affected regions in the country. While it is not currently classified as semi-arid, this corridor has many semi-arid characteristics which include high rainfall variability, periodic late onset rains/droughts, historical reliance on mobile pastoralism as an important strategy to cope with resource variability. Kasensero Earth Dam will address the water crisis and provide adequate water which is a pre-requisite for provision of water for production beside the many other accruing benefits. Availability of water makes it feasible for the majority of the population to engage in meaningful agricultural and socio-economic activities that would increase household income and thereby reduce poverty.

The need to address the continuous water supply problems the local populace has been experiencing is another driving force behind the proposed Kasensero Earth dam. Ground water has been viewed as unsustainable and unfriendly to the ecology since it interferes with the region's capacity to recharge and discharge because it dries up the ground (aquiver). Growth and development have been hampered by the absence of a dependable water source in the area.

WfPRC-C therefore, proposed to carry out an Environment and Social Impact Assessment (ESIA) for the proposed Rehabilitation of the Kasensero earth dam in Kyenda Town Council in Mubende District in accordance with the requirements of the National Environment Management Authority (NEMA) for approval before implementation.

ES02: Project description and Location

This report presents the findings of an Environmental and Social Impact Assessment (ESIA) that has been undertaken at the proposed project infrastructure sites and surrounding areas. The proposed Earth Dam has a height of 4m with storage capacity of 201,539m^3 (with a potential increase up to 20,077,559m^3), embarkment length of 152m and would provide water for livestock watering, irrigation, domestic use, reservoir fisheries, flood control, etc. The most appropriate dam shall be an earth fill embankment dam. The valley dam is located in Naryankanja ward, Kyenda Town Council and Mubende district. It is boarded by 3 cells that include Kijuwa, Kyemu and Buterevu

cells. The nearby Wards/parishes earmarked to benefit from the same Kasensero Valley dam include Kagoma ward, Bugonzi parish, Kalonga ward, Kilangwa ward. Kasensero Valley dam is located about 400m off the Mubende - Mityana road from Buterevu Village in Mubende District and about 172 Km West of Kampala through Mityana Town.

ES03: Policy, Legal and Institutional Framework

For the project to achieve its intended objectives, it will operate under various policies, legal and administrative/institutional frameworks. These include laws and policies of Uganda, as well as international treaties and conventions, environmental laws and guidelines with the aim of promoting the positive impacts of the proposed project while minimizing the negative effects. In particular, this environmental and social impact assessment (ESIA) has been carried out in accordance with National Environmental Act (NO.5 of 2019) as well as in consideration of other policies, legal and institutional frameworks relevant to the proposed project. Various policies and laws have been reviewed in relation to the proposed project activities e.g. construction and operational requirements, environmental quality, land use, public health, occupational safety, labour standards and other legal obligations.

ES04: Stakeholder Consultations and engagement

A comprehensive stakeholder engagement was carried out during ESIA specifically with Mubende District Local Government Officials, Kyenda Town Council Officials, Local Community Representatives and Community members among others and a stakeholder engagement plan (annex XI) has been prepared for continuous engagement. The main findings from the stakeholder engagements were largely categorized into two parts i.e. the anticipated impacts (both negative and positive) and general concerns on the project.

Some of these issues included the requirement to engage all the relevant stakeholders, sufficient water supply for production, mode of operation of the earth dam, considering the gender issues by incorporating them into project design and protecting women during the project implementation, employing local community members, no child labor on the project, contractors providing protective personal Equipment (PPE), contractor paying all the workers on time, contractor providing first aid kits, animal watering points among others.

The capacity assessment of the key of the public entities in charge of the Environment and Social Impact Assessment (ESIA) especially in response to monitoring, coordination and supervision of the project implementation activities has been done in compliance with the different entities and their mandates to ensure environment and social safeguards compliance.

ES05: Anticipated potential impacts from the project implementation

The proposed project has potential to significantly improve quality of life in the Kyenda Town Council and the neighbouring towns both during construction and operation phases. Like in other areas, the long-term socio-environmental benefits of a reliable supply of potable water and access to sanitary facilities include reduced morbidity and increased productivity of households along with increased enrolment of children in educational institutions. In addition, project development and operation in the project area will provide considerable economic opportunity and attraction of other services. However, development of the project can also bring with it negative impacts. The key significant negative impacts will arise from construction phase of the Earth Dam and associated

infrastructure. Reason for the ESIA thus to assess, identify and suggest ways to reduce and / or avoid occurrence of such adverse effects during construction and operation of the system component facilities.

Kasensero Earth dam is envisaged to improve water storage targets in Kyenda Town Council and neighbouring community and reduce overreliance on the unreliable rainfall patterns. Further still, the project will also address the focal area of access to clean water as stipulated under the Uganda Vision 2040, National Development Plan III and National irrigation policy as well combat drought to ensure food security and jobs creation. The project also contributes towards achieving SDG *(specifically SDG 6 on clean water and sanitation)*. Several beneficial impacts envisaged will include: Improved quality of water supplied to communities; Improved and increased access to safe water supply; Provision of employment opportunities during construction and operation phases; Transformation of agriculture practice in the area, Improved health and sanitation due to improved water quality and quantity; Address food security in the area, Improved local economies and induced development especially sourcing of raw materials for construction activities; Lead to crop diversification and intensification, Increased house hold acreage, An increase in revenue for the Municipality from water project collections. The project will further, initiate the move away from the status quo of women and children's perpetual carrying of water on their heads from unprotected and distant point water source and allow them to engage in income generating activities and to improve the image of the woman and children.

However, the ESIA findings indicate that direct negative impacts will be mitigated and are limited to the project area where construction of pumpstation, Office block and Reservoir works will be undertaken. Direct negative impacts will include: Accidents due to increased traffic; Minimal destruction of vegetation and crops; increased noise nuisance by construction workers and equipment; increased sediment loads into the surrounding water sources; improper disposal of wastes; other concerns include occupational safety hazards, and HIV/AIDS and other communicable diseases risk of contamination associated mainly with construction labour.

Mitigation measures have been proposed and the developer should ensure that these are implemented such as Maintaining good house-keeping; Screening unsightly aspects from public view including excavations, construction material storage areas, waste storage areas and ablutions, Erecting fencing around construction site to act as a screen minimizing the effect of wind in generating dust emissions; Re-vegetation of all areas of natural vegetation that have been disturbed as a result of construction activities; Proper waste management and containment of storm water especially during rainy season among others.

ES06: ESMP implementation and Costing

An ESMP has been drawn up and presents the actions required to ensure that the mitigation measures proposed in this environmental and social impact study are carried out to a satisfactory conclusion and thus ensure that the environmental risks are reduced to an acceptable level. The ESMP provides a delivery mechanism to address potential adverse impacts, to enhance project benefits and to introduce standards of good practice to be adopted for all project works. The ESMP covers each stage of the project from construction to operation and it includes the environment and social impacts, mitigation measures, objectives, frequency, monitoring indicators and the indicative costs for implementation.

An Environment and Social Management and Monitoring Plan (ESMMP) has also been presented

in this ESIA report to ensure positive impacts are enhanced while negative impacts are mitigated. Resettlement issues are not anticipated as the proposed project component sites have no standing developments with an indicative cost of about (UGX 451,770,000), Uganda shillings Four Hundred Fifty-One Million Seven Hundred Seventy Thousand (with UGX 182,930,000 and UGX 268,840,00 for ESMP Implementation during construction and Operation phases respectively)

Therefore, the proposed project is environmentally and socially feasible for implementation provided the recommended mitigation and monitoring measures are implemented, and the proposed implementation arrangements are upheld.

1 INTRODUCTION

1.1 Background

The government of Uganda through Water for Production department of the Ministry of Water and Environment is making considerable efforts in raising the water for production coverage and availability across the country through construction of multi-purpose reservoirs (earth dams and valley tanks) for domestic water supply, irrigation, livestock watering, rural industries, wild life, fisheries and aquaculture with the objective of increasing agricultural production and productivity, and regulate dependency on rain fed agriculture which is heavily affected by prolonged droughts. Water for production is key to the successful implementation of the Government of Uganda's plan for poverty eradication and climate change mitigation through provision of dams and valley tanks for storing excess flood water during heavy rains for use during the dry seasons.

As part of the initiative, the Water for Production Regional Center Central (WfPRC-C) has prioritized rehabilitation of Kasensero Dam to increase water storage for domestic water supply, aquaculture, livestock watering and irrigation especially during the dry season in the dry cattle corridor district of Mubende. Kasensero dam is an existing colonial dam that was constructed in the 1960s by the British Colonial Administration to provide water for livestock and other uses. The dam has since outlived its design life. The embankment, which is also used as part of access road, is presently in bad condition with significant evidence of slope failure, especially on the upstream face/side, piping through the dam body and extensive siltation. The spillway channel is non-functional thus posing danger of total breach to the embankment.

Mubende is one of the Cattle Corridor Districts of Uganda characterized by livestock production with scarce water and pasture, and are one of the most affected regions in the country. While it is not currently classified as semi-arid, this corridor has many semi-arid characteristics which include high rainfall variability, periodic late onset rains/droughts, historical reliance on mobile pastoralism as an important strategy to cope with resource variability. The age structure of Mubende population is typical of a rural area in a developing county; 57% of the population is below the age of 18 years. It is mainly a peasant agricultural and patriarchal society; heavily dependent on land for survival. The peasantry is an extremely environment degrading population but extremely vulnerable, any changes in the climate for the worse, can be catastrophic. Satellite picture analysis of 1990 and 2005 showed that Mubende District had lost 79% of its forest cover. In 2002, Mubende Municipality was on the brink of an acute water shortage after Katoma swamp, the major water source supplying the area dried up. Since 2006, National Water and Sewerage Corporation (NWSC) had stopped pumping water from Katoma Dam which was being supply by the swamp. The leading cause of massive encroachment on water resources in Mubende district was attributed to prolonged dry spells, increased demand for agricultural land (maize growing), charcoal production and fuel wood demands for the rapid population growth.

Provision of water for production is one of the responses to the adverse effects of climate change to the agricultural sector. The intensity and frequency with which the drought and floods occur require more proactive responses. New approaches to water for production service delivery under the Agro-Industrialization (AGI) Program are therefore needed as a proactive response towards drought and to guarantee food security for the future generation. Given the district's vulnerability to climate change, and its importance for national and local food security, rehabilitation of Kasensero dam will increase agricultural production and productivity, and regulate dependency on

rain fed agriculture which is heavily affected by prolonged droughts in the district. Kasensero dam is an existing colonial dam that was constructed in the 1960s by the British Colonial Administration to provide water for livestock and other uses. The dam has since outlived its design life. The embankment is presently in bad condition with significant evidence of slope failure, especially on the upstream face/side, piping through the dam body and extensive siltation. The spillway channel is non-functional thus posing danger of total breach to the embankment

1.2 Justification of the Project

Uganda's Vision 2040 and National Development Plan III (NDP III) recognize agriculture as being the central sector to the country's food security, economic growth, income enhancement and employment. NDP III, which aims to increase household incomes and improve quality of life of Ugandans, presents Agro-industrialization (AGI) as one of the key programs to deliver its goal. The AGI program identifies lack of irrigation, soil and water conservation practices, and water harvesting (storage) as major constraints to one of its objectives of ''Increasing agricultural production and productivity'. Furthermore, the region experiences intense and prolonged droughts most notably in the cattle corridor districts where Mubende lies, leading to significant livestock water demand and loss of livestock.

Supporting the country's development priorities as highlighted in the NDPIII, calls for more investments in construction of water surface reservoirs like earth dams and valley tanks aimed at increasing agricultural productivity, essential support services for agricultural production and value-chain development within the project area as well as reduce the impacts, foster resilience and enabling people to manage the consequences of climate change.

The construction of Kasensero dam shall contribute towards the cumulative water storage target under Vision 2040, NDPIII and the National irrigation policy as well combat drought to ensure food security and jobs creation. The dam shall contribute 1,243,944m^3 (with a potential increase up to 20,077,559m^3) of water storage. This water shall be used for domestic water supply in Kagoma parish with a population of about 5,402 people, irrigation of 72Ha of coffee (64Ha), banana (4Ha) and horticulture crops (4.1Ha), livestock watering of 5571 cattle, 1606 goats, 401 sheep, 757 pigs and 6,622 poultry; constituting an average water demand of 593,107m^3 in 4dry month, fisheries and aquaculture.

The proposed Kasensero Earth dam is also motivated by the need to resolve the ongoing water supply issues the local population has been facing. Because it dries out the ground (aquiver), ground water has been regarded unsustainable and unfriendly to the ecosystem because it affects the area's ability to recharge and discharge. Lack of a dependable water source in the area has hindered growth and development.

1.3 Need for the ESIA

National Environmental Act (NO.5 of 2019) mandates an Environmental Impact Assessment for all projects or policies that may, are likely to or will have significant impacts on the environment so that adverse impacts can be identified, Avoided, reduced, mitigated or compensated for based on the mitigation hierarchy (i.e., Water storage and Irrigation). The proposed project falls under Schedule 5 of the National Environment Act specifically under Utilization of water resources and water supply (No. 4) and Construction of valley dams and valley tanks where the threshold is 1,000,000 m^3 or more (h) and support facilities (k) which lists projects to be considered for ESIA.

The proposed Kasensero Earth Dam is in the category of projects requiring mandatory Environmental and Social Impact Assessment (ESIA) before implementation.

It is in this regard that in accordance with the National Environment Act (NEA) NO.5 of 2019, the Scoping/Terms of Reference (ToR) were prepared and submitted to NEMA for consideration, which paved way for undertaking a full ESIA for the project. In preparing this report, particular attention was paid to the issues specified in section 10 (1) of the EIA Regulations of 2020 with due reference to Section 13 of the same regulation. This ESIA presents information required for the protection of the environment during the design, construction and operation stages of the proposed project. This will enable NEMA and other lead agencies take a decision on whether to approve the progress of the project in light of the identified environmental and social impacts or not. Specific attention was paid to the Environmental Impact Assessment Guidelines and the specific EIA guidelines for water sector for Uganda.

1.4 Objectives of the ESIA

The main objective of the ESIA was to carry out a comprehensive (full) environmental and social impact assessment for the proposed construction of Kasensero Earth Dam and propose measures to mitigate the adverse impacts while enhancing the positive ones.
The major tasks of the ESIA were:

- A description of the project areas environmental and social baseline conditions of the surrounding, study and assess how these conditions will be affected by the proposed development.
- Identification, assessment and determination of the likely potential impacts (positive and negative) of the proposed project construction, operation phases and recommend feasible measures to avoid, minimize or mitigate the negative impacts.
- To develop an environmental and Social Management Plan/Mitigation plan (ESMP) for the identified negative impacts and an Environmental Monitoring Plan (EMP) for project implementation; and consultation with major stakeholders.
- To compile an Environmental and Social Impact Statement for submission to NEMA for consideration and approval.
- Assessment of national and international legislative, institutional and policy frameworks and guidelines relevant to the project;

1.5 Project Area

The Kasensero Valley dam is a colonial establishment seated on 100 acreage of land estimated to be occupying about 50 acres. The proposed dam has a height of 4m with storage capacity of 201,539m^3 (with a potential increase up to 20,077,559m^3), embarkment length of 152m and would provide water for livestock watering, irrigation, domestic use, reservoir fisheries, flood control, etc. The most appropriate dam shall be an earth fill embankment dam. The valley dam is located in Naryankanja ward, Kyenda Town Council and Mubende district. It is boarded by 3 cells that include Kijuwa, Kyemu and Buterevu cells. The nearby Wards/parishes earmarked to benefit from the same Kasensero Valley dam include Kagoma ward, Bugonzi parish, Kalonga ward, Kilangwa ward. Kasensero Valley dam is located about 400m off the Mubende - Mityana road from Buterevu Village in Mubende District and about 172 Km West of Kampala through Mityana Town. Some coordinate points of the valley dam

Mubende District is bordered by Kyankwanzi District to the north, Kiboga District and Kassanda to the northeast and Mityana District to the east. Gomba District and Sembabule District lie to the

south, Kyegegwa and Kakumiro District to the southwest and Kibaale District to the northwest of Mubende District. Mubende, the district headquarters, is located approximately 172 kilometres (107 mi), by road, west of Kampala, the capital of Uganda, and the largest city in that country. The coordinates of Mubende District are:00 36N, 31 24E.

1.6 Project Components.

The dam shall provide water storage for multi-purpose uses through irrigation, livestock watering, domestic water supply, aquaculture and fisheries production. The project shall consist of the components;

i. Dam
ii. Reservoir
iii. Troughs; 6No. cattle troughs (6 in number) and 3No. goat troughs (3 in number) for small animals
iv. Irrigation system of 72Ha and above
v. Pipe network
vi. 5no. tap stands
vii. Solar abstraction system (hybrid system to run on both solar and hydo-electricity)
viii. Pump house
ix. 3no. 2 stance VIP latrines
x. Office and store building

1.6.1 Activities to be carried out during implementation

The activities to be carried out will include;

i. De-silting of the reservoir
ii. Construction of the dam
iii. Construction of water abstraction system
iv. Laying of the transmission and distribution lines, and laterals for irrigation of 72Ha of land
v. Construction of project structures which include pump control room, 2 stance VIP latrines, Project office and store for the produce
vi. Construction of 6no. cattle troughs
vii. Construction of night storage reservoir
viii. Construction of 5no. tap stands
ix. Installation of hydrant system on 72Ha
x. Socio-economic activities i.e. stakeholder engagements and mobilization
xi. Agronomy activities i.e. training farmers on the good agronomy practices

1.6.2 Equipment to be used during construction and operation

i. Bull dozers
ii. Excavators
iii. Roller/rummers
iv. Dump trucks
v. Dewatering pumps
vi. Surveying equipment
vii. Pressure testing equipment

viii. Pickup double cabins

1.6.3 Mode of operation and maintenance

The operation and maintenance of the project shall be done using the Community Based Management System plus (CBMS+) approach. With the CBMS+ approach, the MWE shall formally outsource a System Operator (SO) with the requisite training, skills, and experience to perform the O&M function of the project. The System Operator shall operate on a contract management arrangement.
The Water users shall pay fees for the water; but the role of the System Operator shall be to collect fees, carry out routine servicing of the water points and manage the Water User Committee (WUC).

1.7 Details of Developer and Investment Cost

The project is being implemented by Ministry of Water and Environment under the Water for Production Regional Centre - Central. The estimate of the combined project investment cost for Kasensero Valley Dam is **9,630,497,561=** (Nine billion six hundred thirty million four hundred ninety-seven thousand five hundred sixty-one shillings only inclusive of VAT). The address/contact person of the Developer is presented below:

Mr. Joseph Wasswa
Regional Manager
Water for Production Regional Center - C
Wakiso Regional Office
Wakiso District Road,
P.O. Box, 80 Wakiso, Uganda
Tel: +256-705422785
E-mail: wfprc-c@mwe.co.ug

1.8 Response to NEMA Approval of Terms of Reference Conditions

SN	REQUIREMENTS	COMMENTS
1.	Provide a comprehensive description of the proposed Earth Valley Dam rehabilitation and the associated Piped Water Supply System, the specific components and associated infrastructure, and the activities that will be undertaken during both the construction and operational phases of the project and the size of the work force.	Addressed under Chapter 3 of this Report
2.	Include in the ESIA, a hydrological investigative report in regard to the potential impacts of the project on water resources within the proposed project area, incorporate in the ESIS mitigation actions to address such impacts.	The hydrological investigative report has been attached as Annex VII of this report
3.	Provide a detailed description of the waste streams that will be generated from the activities of the Earth Valley Dam rehabilitation and the associated Piped Water Supply System, and the measures and equipment that will be put in place to handle such waste.	Addressed under Chapter 8 of this Report

4.	Include in the report other relevant baseline information that is project site specific, on the soils, water, air quality and noise; as well as, clear-colored photographs depicting the current status of the project area and the neighboring environs.	Chapter 5 of this Report considers the baseline information of the project area
5.	Provide clear, colored and well-labelled location maps/images (preferably each covering A-3 size paper and accurate sets of GPS coordinates clearly indicating the site boundaries. Ensure that all GPS coordinates are provided in UTM format.	Addressed under project location and baseline information. Table 5 gives the coordinates of the project area
6.	Provide a clear and legible copy of the site layout plan (preferably on A-3 sized paper).	Attached as Annex VIIII
7.	Carry out comprehensive consultations with all the relevant key stakeholders including Mubende District Local Government authorities, the Directorate of Water Resources Management (DWRM) particularly in regard to the potential impacts of the proposed project on water resources in the project area. The views of the stakeholders consulted should be well documented and appended to the ESIA report.	Addressed and evidenced under Chapter 7 of this Report and then annexes II and III
8.	Include in the ESIA report, comprehensive analysis of alternatives/options to the selected project location, design and technology, among other aspects	Addressed under Chapter 6 of this Report
9.	Carry out a comprehensive evaluation of the negative environmental impacts associated with the proposed project activities and the relevant mitigation measures to minimize the identified negative impacts and environmental management/monitoring plans that relate to the identified environmental impacts of the proposed project.	Addressed under Chapter 8 of this Report
10.	Make reference to all the relevant provisions of applicable policies, laws, regulations, guidelines and standards, in particular, the National Environment Act, No.5 of 2019.	Addressed under Chapter 2 of this Report
11.	Append to the ESIA report authentic copies of land ownership and acquisition documents.	Attached as Annex IV
12.	Indicate the actual total project (investment) cost including costs of works, machinery/equipment and land where applicable; and these should be submitted by a Certified Valuer and Valuation Certificate attached to the ESIA.	Addressed under Chapter 1, section 1.9 and Annex IX
13.	In line with Regulation 49 (2) of the National Environment (Environmental and Social Assessment) Regulations S.I. No. 143/2020, pay a non-refundable administration fee of thirty percent (30%) of the total fees payable on submission of the Environmental and Social Impact Statement	Attached as the First page of this Report and Annex X of this report

1.9 Structure of the report

This Environmental and Social Impact Assessment report is concise and limited to the significant environmental issues. It focuses on findings, conclusions and recommended actions, supported by summaries of the data collected and citations for any references used in interpreting the data. The report contains, but not limited to the following major contents:

1) Cover Page (Title of the proposed project, Location, Name, Address and information of the developer)
2) Table of content
3) Declaration by ESIA team and their details
4) List of acronyms
5) Executive Summary
6) Introduction
7) Policy, Legal and Administrative/Institutional Framework.
8) Description of the Proposed Project.
9) Description of methodology and techniques used in the assessment and analyses of project impacts,
10) Baseline conditions of the physical, biological and socio-economic environment of the project area, including results of relevant studies and other geophysical and geotechnical studies.
11) Description/Assessment of the Environment and social impacts of project activities.
12) Analysis of Alternatives.
13) Environmental and Social Impacts and Mitigation Measures.
14) Chance finds procedure to facilitate the handling of any unknown or known Physical Cultural Resource(s).
15) Grievance Redress Mechanism to facilitate the handling of any complaints that may arise during project implementation.
16) Environmental and Social Management Plan (ESMP) matrices detailing measures for addressing potential negative environmental and social impacts of the project. In addition, the ESMP should clearly identify institutional arrangement, roles, responsibilities, implementation schedules and costs in addressing the mitigation measures proposed in this ESIA, including capacity building requirements; and
17) Propose an E&S Monitoring Plan with clear monitoring indicators and institutional roles to be used in tracking the implementation and compliance of the proposed mitigation measures;
18) Inter-Agency and Public/NGO Consultation.
19) List of References.
20) Appendices:
    - The Environmental and Social Impact Assessment team.
    - Approved Scoping Report/Terms of Reference
    - Land title/agreements
    - Records of Stakeholder meetings
    - Data and Unpublished Reference Documents.
    - Map, drawing and pictorial complement, especially to convey information on the project affected area and proposed project activities.

- Chance Finds Procedure
- Grievance Redress Mechanism
- Monitoring check-lists.

2 POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

2.1 Introduction

Key legislation governing an ESIA study in Uganda includes the National Environmental Act NO.5 of 2019 of the laws of Uganda and the Environmental Impact Assessment Regulations (2020). The National Environmental Act established NEMA and entrusts it with the responsibility to ensure compliance with ESIA process and procedures in planning and execution of development projects. The procedures require that a project proponent prepares an ESIA report with a clear assessment of relevant potential impacts, based on Terms of Reference (ToRs) developed from a scoping exercise. This requires that the ESIA addresses potential direct and indirect socio-environmental impacts during the pre-construction, construction, operation and decommissioning phases and an environmental and social management plan (ESMP) has also to be prepared.

Policies, legal and institutional framework considered relevant to this proposed project are discussed in this section. Various laws here reviewed relate to minimum acceptable construction, operational requirements, environmental quality, land use, public health, occupational safety, labour standards and international legal obligations.

2.2 Policies relevant to the Proposed Project

Table 2 below presents the Policy framework related to the project.

Table 2: Policy framework related to the project

Policy	Goal	Relevancy
The National Environment Management Policy 1994 (NEMP)	The key policy objectives include the enhancement of the health and quality of life of Ugandans and promotion of long-term, sustainable socio-economic development through sound environmental and natural resource management and use; and optimizing resource use and achieving a sustainable level of resource consumption.	Regarding the planned Kasensero Valley dam Irrigation Project, aspects of Environmental Assessment will be integrated into the project with the objective of ensuring sustainability in the project.
The National Development Plan 2021-2025	It underscores the country's medium-term strategic direction, development priorities and implementation strategies. According to the NDP, the share of agriculture in GDP has been declining which represents significant structural transformation in the economy	In that case, a number of interventions to be pursued under the project are aimed at addressing some of the pillars in NDP III which are all geared towards socio-economic transformation and improvement in the livelihoods at household levels.

The Uganda Vision 2040	Uganda Vision 2040 is anchored on the national shared vision which is attaining "A Transformed Ugandan Society from a Peasant to a Modern and Prosperous Country within 30 years". However, it is clear, agriculture is the main stay of the Ugandan economy employing 65.6% cent (UBOS, 2017) of the labor force and contributing 21% to the GDP. Despite these, agricultural contribution to the GDP has been declining but remains very important to provide a basis for growth in other sectors	For Uganda to shift from its current largely peasantry economy in most of the households to an industrialized and urban society, it must be propelled by multi-sectoral development interventions such as the project seeks to address electricity, water supply and agricultural production which therefore makes the project consistent with the GoU Vision 2040.
The Uganda Agriculture Policy, September 2013	The policy outlines six principles to guide the sector, which entail pursuance of a private sector led and market-oriented economy; zoning to promote the most suitable commodities per area and provision of government support for such commodities to enhance commercialization, development of value chains for these commodities and food security.	The policy principles are important aspects of the planned Valley dam irrigation project which focuses on increasing production and commercial agriculture, development of value chains for the produce of the irrigation scheme and capacity development of farmers of all categories with the support of government.
National Water Policy, 1999	The policy objective of this instrument is to sustainably manage and develop the water resources of Uganda in a coordinated and integrated manner so as to secure/provide water of an acceptable quality for all social and economic needs.	Allocation of water to meet irrigation demand in the project will be done considering the economic, social and environmental values and uses of water by its various users especially downstream communities.
The National Agriculture Policy (2013)	Uganda's agricultural sector policy highlights the country's high potential in agriculture which it seeks to exploit in order for it to realize its overall development and poverty reduction objectives. Uganda expects to attain middle-income country status by 2020 and to reduce its poverty levels to 5% by 2040. The National Agricultural Policy provides the framework within which the sector	To have a sustained positive impact on overall economic growth, poverty reduction and food security, the agricultural sector must grow at a rate of 5.6%.

	expects to contribute towards achieving these targets.	
The National Land Use Policy	The overall policy goal is to achieve sustainable and equitable socio-economic development through optimal land management and utilization in Uganda.	In the planned project, women are key beneficiaries in its agricultural activities and therefore, where land is to be taken up for project infrastructures, opinion of women have to be factored in compensation as well as during allocation of resources of irrigations interventions.
The Occupational Health and Safety Policy	This policy will be especially relevant for Occupational Health and Safety (OHS) of the Project and associated transmission line construction crews and subsequently, maintenance personnel	The policy will also have relevance in mitigation measures that protect the workers and the public from adverse health and safety impacts as a result of project construction and subsequent operation and maintenance activities.
The National Gender Policy, 1997	The GoU adopted a National Gender Policy of 1997, a tool to guide mainstreaming gender interventions into the development process and planning in sectors of economy. The gender policy is to facilitate Uganda's gender mainstreaming programs in all sectors of the economy.	The valley dam irrigation project will mainstream gender dimensions into its activities, plans and policies with objective of seeking economically empower the women in particular at household level.
National Irrigation Master Plan for Uganda (2010-2035)	The Overall Objective of irrigation development in Uganda is: "Poverty Alleviation and Economic Growth as a result of the sustainable realization of the country's irrigation potential mitigating the effects of climate change and contributing to the transformation of Uganda society from a peasant to a modern and prosperous country".	These objectives of the Irrigation Master Plan will be in line with the aspirations of Valley dam Project especially, its irrigation component.
The National HIV/AIDS Policy, 2004	The policy provides the principles and a framework for a multi-sectoral response to HIV/AIDS in Ugandan's world of work.	The requirements of this policy are expected to be fulfilled by the Project in that, its contractors are to have an in-house HIV Policy, workers sensitization, conducting VCT, provision of free condoms as well as other supportive measures for prevention and management of HIV, including its gender dimensions.

2.3 Legal Framework related to the Project

Table 3: Legal framework related to the project

Legal Framework	Relevancy	Requirement
The Constitution of the Republic of Uganda; 1995; amended as at 15th February 2006, Government of Uganda.	The State shall promote sustainable development and public awareness of the need to manage land, air and water resources in a balanced and sustainable manner for the present and future generations. The right to a clean and healthy environment is enshrined in Article 39 of the Constitution of Uganda, 1995.	ESIA report will be prepared for NEMA's consideration before implementation of the project. This ESIA has been prepared which amongst others, outlines anticipated environmental and social negative impacts of the project and outlines measures for addressing such concerns through its ESMP.
The National Environment Act; No.5 of 2019	Schedule 5 of the National Environment Act, No. 5 of 2019 lists projects to be considered for environmental impact assessment. Under that categorization, the proposed project falls Section 4(h) & (k).	The proposed development falls under Schedule 5 of the National Environment Act No.5 of 2019, Section 4(h) & (k) (i.e., Construction of valley dams and valley tanks where the threshold is 1,000,000m^3 or more). ESIA report will be prepared for NEMA's consideration before implementation of the project.
The Occupational Safety and Health Act, 2006	The Act provides for the prevention and protection of persons at all workplaces from injuries, diseases, death and damage to property.	An ESMP has been prepared and the Contractor will ensure the workplace is registered under the Ministry.
The Land Act, Cap 227	Section 74 (i) states that where it is necessary to execute public works on any land, an authorized undertaker shall enter into mutual agreement with occupier or owner of the land in accordance with Act.	WfPRC-C and the district acquired and secured land for the infrastructure
The Employment Act, 2006	This Act spells out general principles regarding elimination of forced labor, discrimination in employment, sexual harassment and provisions to settle grievances. It further provides that, a child under the age of twelve years shall not be employed in any business, undertaking or workplace.	No doubt, this law will oblige the project to ensure no employment of children below the age of 18 years in the project activities.
Workers' Compensation Act, 2000	This requires compensation to be paid to a worker injured or acquired an occupational disease or has been harmed in any way in the course of his/her work.	The developer shall ensure that all contractors and sub-contractors provide personal protective equipment (PPE) to employees to minimize accidents and injuries and ensure workers safety onsite.

The Water Abstraction Regulations, 1998	The Water Abstraction Regulation in Section 18 provides for the establishment of a controlled mechanism through issuance of permits to regulate the amount of water abstracted by users. The Regulation requires that a water abstraction permit either for ground or surface water abstraction are pre-requisites for motorized and/or abstracting of quantities above 400m^3/day for persons involved in construction (damming, diverting surface water).	Irrigation and associated considerations may require abstraction permits from DWRM after detailed feasibility is conducted.
Public Health Act, Cap 281	Provision of clean and sanitary premises; Protection of public health and Prevention of public nuisance.	The developer will ensure provision of sanitary facilities to workers and proper management of waste. Public health and hygiene are key in the project implementation with regard to handling of waste arising from the project as well as agro-chemicals use, including use of pesticides.
The Local Governments Act, Cap 243	Provides for the system of local governments based on the decentralization of district for the enforcement of environmental law.	The developer will work closely with the District Water Officer (DWO), District Environment Officer (DEO) and Sub-County Community Development Officer in carrying out monitoring activities to ensure no damage onto the environment and social amenities.
Environmental Impact Assessment Regulation, 2020	According to sections 19-20 of the NEA, all projects that have or are likely to have a significant impact on the environment are required to undergo an EIA process prior to implementation.	ESIA report will be prepared for NEMA's consideration before implementation of the project.
The National Environment (Wetlands, River Banks and Lake Shores Management) Regulations, 2000	Regulation 12(1) prohibits any person from carrying out an activity in a wetland without a permit issued by the Executive Director of NEMA.	Water source protection measures have been proposed to protect the wetlands and streams within the catchment area.
The National Environment (Waste Management) Regulations, 2020	Regulation 5 (8) stipulates that (1) A person who generates waste, a waste handler or product steward has a duty of care and shall take measures to ensure that waste is managed appropriately and securely in	Waste management options have been proposed in this ESIA report and all waste shall also be disposed of in a gazette premise by the Local Government.

	accordance with the Act, these Regulations, any other applicable law, environmental standards and conditions of the licence; (b) waste is managed in a manner that does not cause harm to human health or the environment.	
The National Environment (Noise Standards and Control) Regulations, 2000.	Regulations 6 & 7 sets permissible noise levels, Part III calls for the control and mitigation of noise; Regulation 9 specifically prohibits the generation of noise and Part IV provides for a license for noise in excess of permissible levels.	All construction activities should be carried out between 7am – 6pm by the Contractor as working hours. No construction activities to be carried out at Night. Noise levels should also be monitored and not to exceed 85dB as per Regulation.

2.4 Institutional Framework and capacity Assessment of public entities in charge of ESIA

Table 4 below presents the institutional framework.

Table 4: Institutional framework and capacity assessment of public entities involved in the management of the project

Institution	Role	Capacity Assessment
Ministry of Water and Environment	▪ Development of legislation, policy formulation, sector coordination and guidance, and monitoring and evaluation.	▪ Will coordinate and guide the project implementation since WfPRC-C is under MWE
Directorate of Water Resources Management (DWRM)	▪ Issue water abstraction permits. ▪ Ensure environmental compliance of large scale water resources related project activities with the water regulations, guidelines and procedures.	▪ Issued the abstraction permit after application had been made by WfPRC-C
National Environment Management Authority (NEMA)	▪ Coordinate, inspect, supervise and monitor project activities to ensure that the environment and natural resources are not depleted but managed sustainably.	▪ ESIA has been prepared and submitted to NEMA for review and approval. ▪ Will issue the certificate of approval with clear conditions for the project implementation.
Directorate of Environment Affairs (DEA)	▪ Coordinate, inspect, supervise and monitor the environment and natural resources. ▪ Ensure that environmental policies and laws are respected while implementing water resources related projects.	▪ Will be involved in the supervision of the project implementation to ensure adherence and compliance to the existing policies
Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)	▪ Is mandated amongst others and specific relevance to this project, to support the development of infrastructure and use of water for agricultural production and to develop and promote collaborative mechanisms nationally, regionally and internationally on issues pertaining to the sector.	▪ Will play a vital role in supporting the project implementation in form of offering technical guidance on the irrigation infrastructure.
Local Authorities	▪ Facilitate and/or coordinate activities of the developer in their areas of jurisdiction. ▪ Mobilize local communities and key stakeholders to participate in EIA consultations and/or public hearings.	▪ Offered their concerns and expectations of the project during the consultations and engagements ▪ Demanded to be part of the project implementation as part of owning up the project
Ministry of Gender, Labour and	▪ The department of Occupational Health and Safety (OHS) is responsible for inspecting and	▪ The contractor and System Operator will be required to

Social Development (MGLSD)	registering the workplace and monitoring of conditions under which employees on the project are subjected.	apply for the work place registration certificates
Developer / WfPRC-C	▪ Apply for Surface Water Abstraction Permits from DWRM. ▪ Compensate local Project Affected Persons (PAP) for any loss or negative effect of the project before implementing the project. ▪ Implement mitigation measures and actions to protect the environment and monitor implementation of proposed measures in the specific site-ESMPs.	▪ Applied and obtained the Water abstraction permit from DWRM ▪ Will implement and supervise the implementation fo the mitigation and enhancement measures proposed in the ESMP ▪ Facilitsting and budgeting for the ESMP implementation
Contractor	▪ The Contractor(s) must include in their schedule of works, all proposed mitigation measures. ▪ The Contractor(s) must have designated personnel (Supervising Consultants) to monitor environmental, safety and health matters during construction works, and report regularly to WfPRC-C. ▪ It is recommended that the Supervising Consultant Team include an Environment Management Specialist, who must be responsible for the day-to-day guidance of the project activities on environment and social compliance to the requirements of the Contract and legislation.	▪ Will be involved in the ESMP implementation on top of the construction works ▪ Recruit both environmentalists and Sociologists who will be responsible for the ESMP implementation and compliance. ▪ Acquire the Work place registration certificate from Ministry of labour, Gender and Social Development
System Operator	▪ Maintain and operate the earth dam and other installed water infrastructure in compliance with the signed Memorandum of Understanding (MoU) between the Local Government and the Ministry of water and Environment. ▪ Collect charges from the water consumers ▪ Do any repairs where necessary on the earth dam	▪ Will acquire the Work place registration certificate from Ministry of labour, Gender and Social Development. ▪ Will collect charges from the water consumers ▪ Will do any repairs where necessary on the earth dam

3 DESCRIPTION OF PROPOSED PROJECT

3.1 Introduction

The dam shall provide water storage for multi-purpose uses through irrigation, livestock watering, domestic water supply, aquaculture and fisheries production. The project shall consist of the components;

i. Dam
ii. Reservoir
iii. Troughs; 6no. cattle troughs and 3no. goat troughs for small animals
iv. Irrigation system of 72Ha and above
v. Pipe network
vi. 5no. tap stands
vii. Solar abstraction system (hybrid system to run on both solar and hydo-electricity)
viii. Pump house
ix. 3no. 2 stance VIP latrines
x. Office and store building

3.2 Location of Project Site

The Kasensero Valley dam is a colonial establishment seated on 100 acreage of land estimated to be occupying about 50 acres. The proposed dam has a height of 4m with storage capacity of 201,539m^3 (with a potential increase up to 20,077,559m^3), embarkment length of 152m and would provide water for livestock watering, irrigation, domestic use, reservoir fisheries, flood control, etc. The most appropriate dam shall be an earth fill embankment dam. The valley dam is located in Naryankanja ward, Kyenda Town Council and Mubende district. It is boarded by 3 cells that include Kijuwa, Kyemu and Buterevu cells. The nearby Wards/parishes earmarked to benefit from the same Kasensero Valley dam include Kagoma ward, Bugonzi parish, Kalonga ward, Kilangwa ward. Kasensero Valley dam is located about 400m off the Mubende - Mityana road from Buterevu Village in Mubende District and about 172 Km West of Kampala through Mityana Town. Some coordinate points of the valley dam

Table 5: Coordinates of some of the points around the Dam

POINT	COORDINATES	
	LATITUDE	LONGITUDE
1	0.492212N	31.530332E
2	0.492217N	31.530305E
3	0.489443N	31.529124E
4	0.488700N	31.528107E
5	0.489507N	31.526613E
6	0.489487N	31.526603E
7	0.492525N	31.528588E
8	0.492555N	31.528607E

Mubende District is bordered by Kyankwanzi District to the north, Kiboga District and Kassanda to the northeast and Mityana District to the east. Gomba District and Sembabule District lie to the south, Kyegegwa and Kakumiro District to the southwest and Kibaale District to the northwest of Mubende District. Mubende, the district headquarters, is located approximately

172 kilometres (107 mi), by road, west of Kampala, the capital of Uganda, and the largest city in that country. The coordinates of Mubende District are:00 36N, 31 24E.

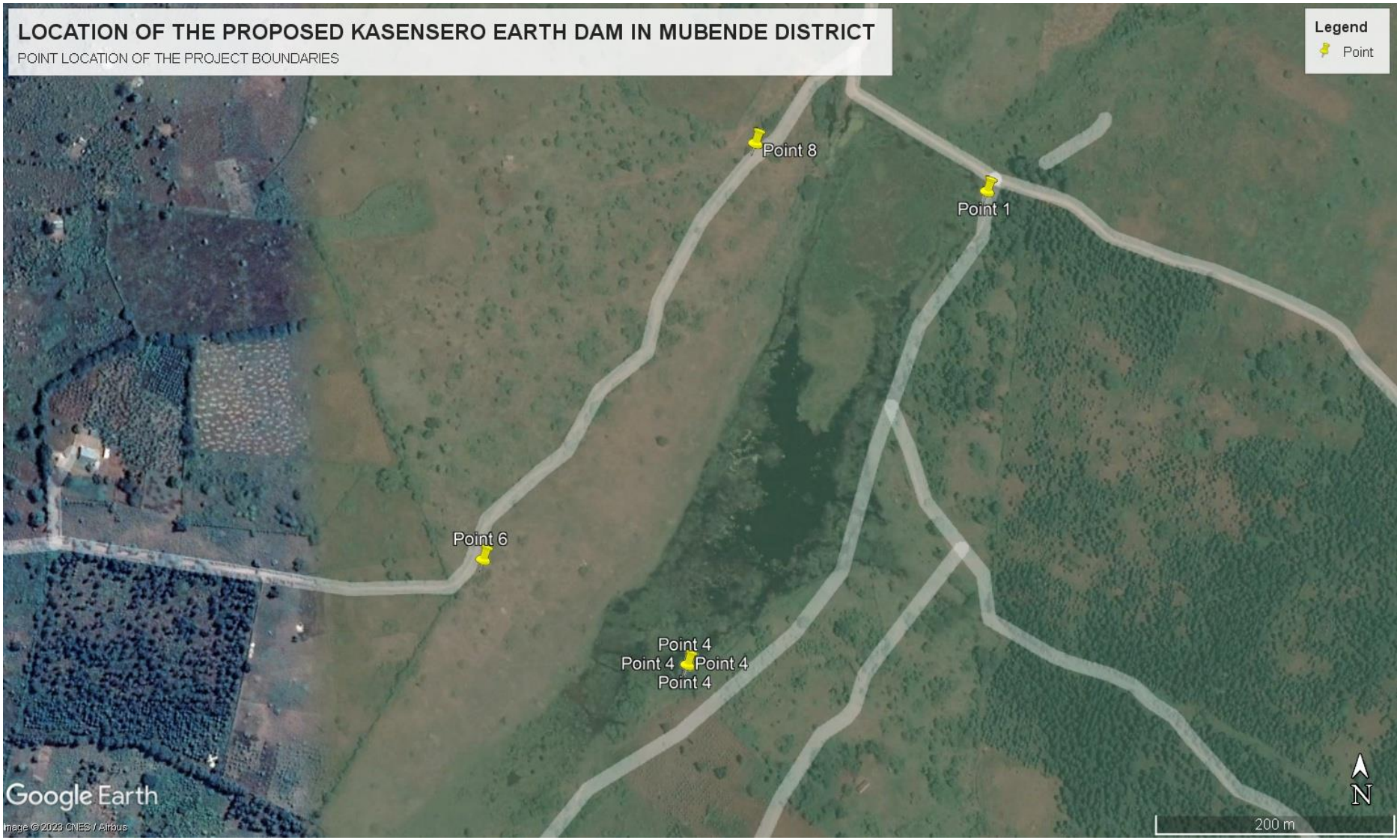

LOCATION OF THE PROPOSED KASENSERO EARTH DAM IN MUBENDE DISTRICT
POINT LOCATION OF THE PROJECT BOUNDARIES
Legend
Point
Point 8
Point 1
Point 6
Point 4
Point 4
Point 4
Point 4
Google Earth
Image © 2023 CNES / Airbus
N
200 m

Figure 1: Google Earth Map showing the location of the Kasensero Dam

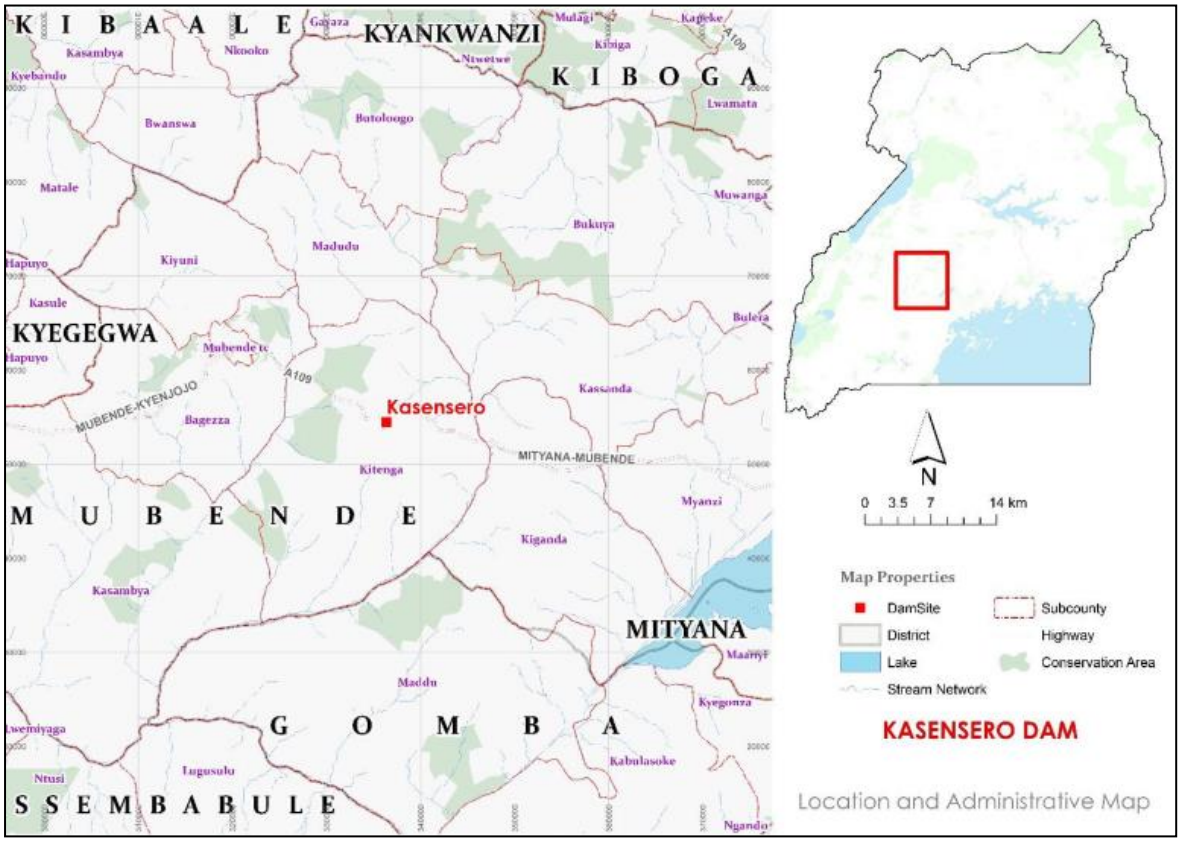


Figure 2: Location and administrative map of Kasensero dam site in Mubende District

3.3 Description of the main project components

3.3.1 Dam

Kasensero dam has a height of 4m with storage capacity of 201,539m3 (with a potential increase up to 20,077,559m3), embarkment length of 152m and would provide water for livestock watering, irrigation, domestic use, reservoir fisheries, flood control, etc. The most appropriate dam shall be an earth fill embankment dam. The valley dam is located in Naryankanja ward, Kyenda Town Council and Mubende district. It is boarded by 3 cells that include Kijuwa, Kyemu and Buterevu cells. The nearby Wards/parishes earmarked to benefit from the same Kasensero Valley dam include Kagoma ward, Bugonzi parish, Kalonga ward, Kilangwa ward. Kasensero Valley dam is located about 400m off the Mubende - Mityana road from Buterevu Village in Mubende District and about 172 Km West of Kampala through Mityana Town.

Plate 1: A view of the Kasensero Valley Dam

A good recommended earth dam should consist of the following key structures

a) Foundation

It will consist of either earth or rock and provides a support for the embankment and resists both vertical and horizontal loads. It also resists under seepage on the flow of water beneath the dam.

b) Core or Membrane

It holds back the free water of the dam reservoir. It is located either at the Centre or upstream from the Centre of the dam. In case of rock fill dams, the core is provided on the upstream face. To resist the under seepage, the core is extended down into the foundation till an impervious layer of sufficient thickness is reached. The extension of the core into the foundation is termed as a *cut off.*

c) Shell

It provides structural support for the core and distributes the load over the foundation. The dams which are constructed of the same materials are called homogeneous dams. Small dams can suitably be constructed as homogeneous dams if the available materials are suitable.

d) Transition Filter

In core dams, a *transition filter* between the core and shell is generally provided to prevent the migration of the fine-grained core materials into the pores of the coarse-grained shell materials. In case of difference in particle sizes of the materials of the core and shell is small, the transition filter is omitted but in case of clay cover and rock or gravel shell, a transition filter is necessarily provided.

e) Internal Drain

An *internal drain* is provided on the downstream side of the dam to carry away the seepage through the core and cut off, and also to prevent the saturation of the upper part of the downstream shell by rain on the dam.

f) Toe Drain

A *toe drain* is provided at the downstream face of the shell. A *riprap* or *grating* is provided to cover the upstream face to prevent erosion or wash by waves.

The dam shall provide water storage for multi-purpose uses through irrigation, livestock watering, aquaculture and fisheries production. The project shall consist of the components;
General items
Embankment works
Construction of intake structure
Electromechanical works
Pumping mains
Storage reservoir
Distribution network
Livestock water system
Irrigation scheme
Construction camps and scheme buildings

3.3.2 Water Offices and store building

The water offices will be located within the Kasensero dam land after the district leadership granting permission to project development. The office block will comprise of the Manager's Office, Commercial Officer's Office, Store, Eco-San toilets and other components. Disinfection facilities are part of the Water Supply System.

3.4 Project Phases

3.4.1 Mobilization Phase

This phase will involve mobilisation of the construction human resource, equipment, construction materials, erection of temporary worker's camp and storage yard. The location of the project temporary camp will be agreed upon with the local leadership, landowners and contractors or its sub-contractors.

3.4.2 Construction Phase

Upon completion of preliminary activities and onsite investigations, actual construction of the project components and facilities will start which will involve:

- Setting out to demarcate rights of way, work areas, clearing limits. Access paths, detours, bypasses and protective fences or barricades should all be in place before construction begins.
- Excavation of trenches for water pipe transmission and distribution;
- Trench sheeting and bracing to protect collapsible trench side walls;
- Placing concrete to bases of foundations;
- laying of main water pipes;
- Backfilling, disposal of overburden and surface restoration to at least match the condition that existed prior to the water works construction.

All project activities under this phase are supposed to be carried within the boundaries of the identified project sites without disturbing or obstructing the people from carrying out their activities. To ensure this, the contractors and the sub-contractors will seal off the different site perimeters (where necessary) with corrugated iron sheets or other suitable material during project implementation. In case of trenches, proper barricade have to be applied to warn and protect the people of impending dangers of falling into open pits and trenches.

3.4.3 Demobilization Phase

Demobilisation phase will involve clearing of the project sites of all construction and unwanted material. The disposal of any unwanted material will be done by the contractor. The waste materials may include packaging, wood, steel crates, cardboard, wrapping materials, construction debris, boxes, sacks, drums, cans and chemical containers, etc. Damaged areas will need to be restored before commissioning the project. Upon completion of the contractor's obligations, the contractor will hand over the project to MWE, WfPRC, the client and the Operator.

3.4.4 Operation Phase

This will involve employment of operators both skilled and unskilled, operation of the water supply system and sanitation facilities, maintenance of the facilities put in place, etc.

3.4.5 Construction Method

The actual choice of construction method and resources will be the Contractor's responsibility as dictated by the site conditions, productivity and construction schedule. The choice has a bearing on the cost implication. In all construction activities safety of operations is paramount. It entails carrying out of construction activities and operation of equipment by experienced personnel under supervision of experienced and qualified staff and use of well serviced construction equipment in good working condition. Safety on site will be managed by close supervision of the contractor's Health & Safety Officer and the Engineer's construction Supervision staff of the site activities with regard to the working environment in accordance with the applicable Environment, Safety, Health and Social Safeguard Policy.

a) Plants and Equipment

Because of the nature of the construction activities that will be undertaken, a number of plants and equipment will be used to execute the assignment by the contractor or the sub-contractor(s) and these will include among the following: Graders, Vibrators /Rollers, Water Trucks, Bulldozers, Front End Loader, Vehicles, Containers, Excavators, Water Pumps, Mechanical Tool Boxes, Civil Plate Compactors, Dump truck, Concrete Mixer, Crane and Compactor.

b) Earthworks

The earthworks including site clearance, general filling and excavation, and trenching can be carried out either by manual labor or mechanical equipment where large quantities are involved.

c) Concrete works

Concrete production is expected to be by the use of concrete mixers and/or manual production for the small works and where use of a mixer may be impractical.

d) Structural Steel

The lifting of heavy structural steel sections will be by cranes. The steel sections will be joined by either bolts or welding.

e) Reinforcement Steel fixing

Various sizes of reinforcement steel bars will be cut to required lengths and bent to design shape either manually or by machines and will be placed and fixed for the works by manual labour.

f) Masonry

All masonry work is to be by manual labor using the necessary hand tools.

g) Pipe laying

Pipe laying is expected to be carried out by manual labor using the necessary hand tools and pipe lifting equipment for the heavy pipes.

h) Electro-Mechanical Installations

All electro-mechanical installations are to be carried by manual labor using the necessary hand tools and mechanical lifting equipment.

i) Implementation Schedule

The main objective is to determine a total duration of the project, which equals a "critical path" of events that determine the total duration. The anticipated implementation schedule is as per Table below

Table 6: Proposed Project Implementation Schedule

Activity	Duration (Months)
Tendering Process	4
Tender Evaluation	
Contract Negotiation and Award	
Construction of Works	12
Defects Liability Period	06
Total	**22**

j) Estimated Number of Workers

The contractor is expected to employ about 120 workers on the site both skilled and unskilled. However, this number may keep on fluctuating depending on the need and availability of resources. The project is also expected to employ about 30 workers during the operation phase. These will be basically plumbers, supervisors, office attendants, engineers and managers

3.5 Quality Assurance

It is the responsibility of the supervising consultant to ensure that the desired quality of work is achieved. The materials supplied for the works should not deviate from those specified. At each stage during the construction process, samples of materials have to be taken to the Materials Laboratory for testing to ensure conformance to the specifications

4 ESIA METHODOLOGY

4.1 Introduction

This section outlines the methodology that was used to assess the environmental baseline and to identify, predict and assess the environmental impacts of the project on each relevant environmental component. It also covers the methodology for the identification of mitigation and monitoring measures that were recommended to address these impacts and identification of relevant stakeholders. The methodology consists of a review of Uganda's institutional arrangements, regulations and policies. Environmental impacts of the proposed project were predicted in relation to environmental receptors and natural resources while comparing prevailing pre-project conditions and post-project situations.

The requirement for environmental impact assessment in Uganda is set out by the *National Environment Act No. 5 of 2019* and the *Environmental and Social Impact Assessment Regulations of 2020*. This process was guided by the Environmental Impact Assessment (EIA) Guidelines (NEMA, 1997) and the process is schematically presented in Figure 3. In addition, safeguards implementation has to comply with the requirements of investment project financing and the World Bank Group Environmental, Health, and Safety (EHS) Guidelines for general Construction and Decommissioning as well as the EHS guideline for Water and Sanitation.

4.2 Impact Assessment Approach

The significance of environmental and social impacts was established based on the comparison with the baseline situations in the project area. Generally, the environmental and social impact study involved various methods including:

- Review of relevant literature and secondary baseline data on legislation, policies and guidelines, bio-physical environment, including among others, area land use, sensitive receptor systems and ecology likely to be affected.
- Field studies included flora and fauna species counts, receptor systems baseline data including baseline noise and air quality measurements. Water quality analysis was done at pre-determined locations to set an environmental baseline and establish status;
- An inventory of activities in the neighbourhood likely to be affected by proposed project;
- Safety and health impacts on workers during construction and operation, protection from injury and adequacy of sanitation provisions for the workers;
- Consultations with stakeholders, including the regulatory agencies, and the local community;
- Study and analysis of engineering designs and drawings for civil solutions to be implemented by the developer, including safety measures;
- Prediction and analysis of environmental and social impacts resulting from the project activities such as water abstraction, pump house, distribution lines, reservoir tanks, water offices, sanitation facilities etc., and proposing appropriate mitigation measures, and preparation of an Environment Management Plan (EMP) for implementation by relevant stakeholders;
- Preparation of E&S Scoping report/Terms of Reference Report and ESIA Report and presentation to NEMA by the developer for review and approval.

Figure 3 shows the ESIA process that has been followed.

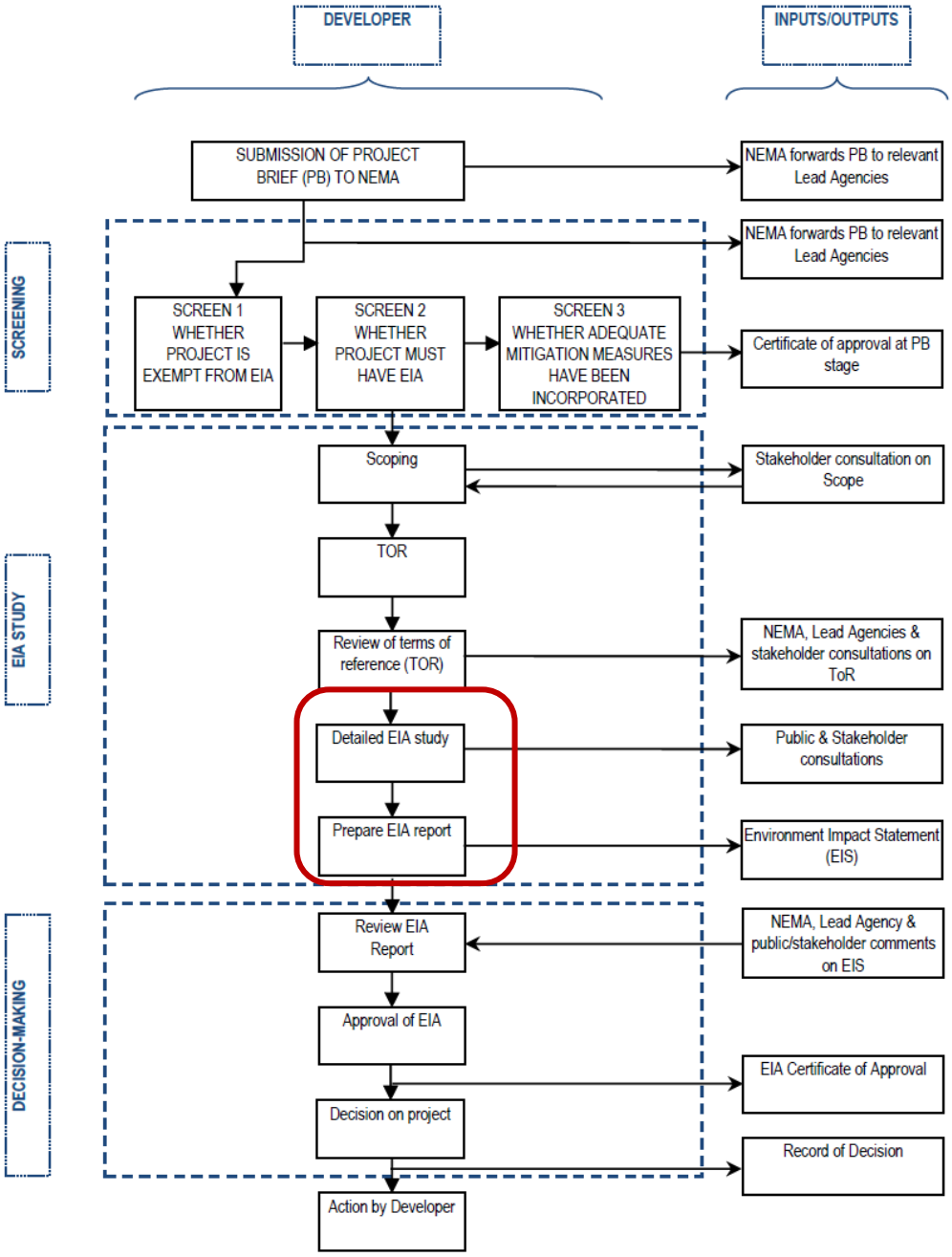


Figure 3: ESIA process that was adopted as provided for under the Laws of Uganda

4.3 Physical Environment

Baseline noise levels and air quality were measured, not only to inform construction contractors about pre-construction conditions existing at proposed sites, but also the first annual environmental audit. These were determined through the following actions:

4.3.1 Land Surface and Visual Impact Assessments

Under the land surface investigations, the character and resources of the landscape, including effects on the aesthetic values of the landscape, caused by changes in the elements, characteristics, character and qualities of the landscape was investigated. The visual amenity,

including effects upon potential viewers and viewing groups caused by change in the appearance of the landscape as a result of the development, was also considered.

The landscape and visual impact assessment methodology is applicable, both to the assessment of short-term impacts during the construction of the Project, and to the long-term impacts once completed. The landscape character and resources are considered to be of importance in their own right, and valued for their intrinsic qualities regardless of whether they are seen by people or not. Impacts on landscape are therefore considered as distinct from impacts on visual amenity as perceived by people. For purposes of clarity, Landscape Impacts relate to the effects of the Project on the physical and other characteristics like fabric, character and quality of the existing landscape, whereas Visual Impacts relate to the effects on views from visual receptors (e.g. residents, workers, visitors to the area, etc.) at specific viewpoint locations. The key steps of the methodology for the assessment were as follows:

- The project study area was determined using maps and aerial photos data and field observation.
- Local landscape character areas within the study area were identified.
- The sensitivity of each landscape and potential visual impact was assessed.

The magnitude of change in the character of each landscape character area and the magnitude of change in the view at each viewpoint location was predicted.

4.3.2 Air Quality measurements

Baseline air quality was measured using a pair of digital MX6 iBrid™ portable gas meters (Industrial Scientific-Oldham) and a Microdust 880nm digital aerosol monitor (Casella®). Measurement points or locations were selected basing on presence of potential receptors (such as construction sites for the pumpstation, sanitation facilities etc.) and an averaging period of 8 hours was used. For gaseous emissions.

- The equipment was powered on and left in measuring mode for the first two minutes to allow zeroing and self-calibration. This was followed by ten minutes of measurement to allow digital readings to stabilize before they could be recorded.
- Measurements were conducted at each of the selected points to determine whether there would be any gaseous emissions detected.
- Values for Lower Explosive Limit (LEL), Carbon monoxide (CO), Oxygen (O_2), Hydrogen sulphide, H_2S, volatile organic compounds (VOCs) will be noted.

For particulate matter.

- The equipment was allowed for two minutes for zeroing down and thereafter, it captured the samples for five minutes with interval of 10 seconds.

For every sampled point, a GPS coordinate was noted.

4.3.3 Ambient Noise Measurements

Baseline noise measurements were undertaken at locations around the proposed facility sites (i.e. at production well and construction site for the pumpstation) with potential receptors. Measurement of ambient noise levels were carried out using a precision integrating sound level meter, with an active range of 0-130 decibels (dB) and complying with IEC 651 and ANSI S4 standards. A Casella CEL-621C digital noise logger will set to record for a sample period of 10 minutes at each of the selected locations. The assessment procedure involved recording the LA_{MAX} and LA_{MIN} decibel levels. Measurement points were recorded using a GPS receiver and the noise sources together with the ambient environment at each location noted. The obtained results have been compared against the National Environment (Noise Standards and Control) Regulations, 2003. The regulations require that persons to be exposed to occupational noise exceeding 85 dBA for eight hours in a day should be provided with requisite hearing protection.

4.4 Biological Environment

4.4.1 Flora

Transect walks were taken along the project areas where construction will take place; and notes were made of the vegetation along the stretch. While some plant species were identified on site, specimens of others were collected, pressed, dried, and mounted on thick paper or board and taken for confirmation at the Makerere University Herbarium. The relative abundance of each species was assessed and scored on a DAFOR scale. D=Dominant; A=Abundant; F=Frequent; O=occasional; R=Rare. Additional information was obtained through consultation with communities on the local names, use and importance of some plant species. An inventory of the impacted trees was also taken. The IUCN Red List was utilized for categorization of species. Some of the tools that were used included: Plant press, Secateurs, Ivy tags, Measuring tape, Diameter tape and camera.

4.4.2 Fauna

The surveys used both desktop reviews and field surveys

Literature review

Literature was consulted to understand the documented fauna in the project area. This included scientific publications, unpublished reports at the Mubende DLG, online sources, international NGOs portal like WCS websites, government agencies like UWA, NFA and other international sources such as the Global Biodiversity Information Facility (GBIF).

Field sampling

Field assessments were undertaken by the biodiversity expert through reconnaissance visits to the project area, identification of sample points from the BH to the reservoir and the associated right of way pipe networks

Stakeholder engagements

During the field visit and field sampling, the biodiversity expert informally consulted the community within the project area on some of the fauna species within the landscape. This aimed at documenting information on the fauna which the consultant may not be able to get during sampling. Inquiries were made on faunal groups or species occurrence (ever seen alive or dead) that occur in the project area

Therefore, field sampling was conducted using known and internally approved scientific methods and international best practices (World Banks Environmental and Social Standards-ESS). Fauna found or living in the project area were registered and or recorded. The methods used per taxon included the following;

a) Avifauna (birds) survey

Apart from the Borehole and reservoir sites, line transect method was used to sample birds. The method provides and encompasses most species and can be used to survey a number of birds together. Here multiple counts can be obtained by counting in the same study site repeatedly in the same season or by counting multiple study sites once.

It is highly adaptive and can be used in terrestrial and freshwater systems. The method can be used to survey individual species, or groups of species. The method is also efficient in terms of the quantity of data collected per unit of effort expended, it is can be used to examine bird-habitat relationships and can be used to derive relative and absolute measures of bird abundance.

During sampling, the biodiversity expert walked the pipeline right of way and other distribution networks (in this case considered as transects) recording birds on either side of the route/line. Birds identified by sight or sound 50m (rough estimate). The sampling would last for 30mins per sampling point. Birds seen were counted and recorded. A few records were made of species found. To be present in the area outside the time of count.

All bird counts were made with the help of an 8*42 binoculars and where there was any doubt about identification, reference was made to a field guidebook such as Birds of East Africa (Stevenson et al., 2020) and the bird atlas of Uganda (Carswell et al., 2005). Habitat and species categorisation followed the following criteria:

A- Conservation status

Birds were classified according to their conservation status i.e., whether they are species of global conservation concern (IUCN 2021), or regional (Bennun & Njoroge 1996) or Nationally by the Wildlife Conservation Society (WCS 2016). These categories are indicated as;

- CR Critical (Globally or Regionally or Nationally)
- EN Endangered (Globally or Regionally or Nationally)
- VU Vulnerable (Globally or Regionally or Nationally)
- NT Near-threatened (Globally or Regionally or Nationally)
- RR Regional Responsibility (Regionally)
- LC Least Concern (Globally or Nationally)

B-Migratory classifications

Bird species with migratory tendency were also considered as derived from the Uganda Bird atlas (Carswell et al. 2005). There are two categories of migrant species as considered below.

- Afro-tropical migrants (AM), these complete their migration journey within Africa
- Pale-arctic migrants (PM), these breed in Palearctic region between May and August but found in Uganda in the northern winter (October and March).
- However, some species can be both Afro-tropical and Pale-arctic migrants

b) Butterflies

Pallards sweep net method was employed to sample butterflies along the pipeline route and within the project area. The method was used to document the species richness, as well as estimate their relative abundance. The method was used because of time-efficiency, but also the negative effects that maybe brought about during handling of individuals are avoided (Martins, 2016).

Species richness was based on recorded species presence or absence at the different sites that were sampled. The observer recorded the species encountered as he moved along the main transmission and distribution networks. A species list was then generated from the records of the survey. Abundance estimation was assessed by counting and recording the number of individuals of the different butterfly species

c) Herpetofauna (Amphibians and Reptiles)

A combination of scientifically tested methods was used to collect information on herpetofauna as described by Heyer et al 1994, and Olson et 1997. The methods include the following

a) *Audio Encounter Surveys (AES):* This method uses the species-specific calls/Sounds/ advertising calls made by breeding males. The identity of the amphibian species heard calling and their numbers were estimated and recorded.
b) *Dip netting*: Using a dip net, ponds, pools and streams and other water collection points were dip netted. Adult amphibians and tadpoles encountered were also recorded
c) *Opportunistic Encounters*: Herpeto-fauna species encountered opportunistically while moving in the project area recorded in order to accumulate a complete species checklist for the project area
d) *Visual Encounter Surveys (WES):* The method involved moving through the modified habitats watching out for, and recording surface-active herpetofauna species. WES were complimented by visual searches, by examining under logs, leaf litter, in vegetation and crevices. Species encountered and their numbers were recorded and where possible photographed

d) Mammals

Mammals were sampled using four main methods;

a) *Direct observations/Opportunistic encounters*: All mammals seen or opportunistically sighted while moving in the project area were identified, counted and recorded;
b) *Use of Signs e.g., footprints and or dung or calls*: Mammal species whose footprints and dung was seen and is recognisable, were recorded for their presence;
c) *Use of Sherman Live traps*: The method uses baited traps, set and left in place over night before they are m0oved to a different sampling site. Trapping was used to survey small mammals. Live traps have been successfully used to detect patterns of richness, composition, and abundance of small mammal communities (Thorn and Peterhans, 2009), and;
d) *Local consultations*: The Biodiversity expert also help informal discussions with the community members who were found working in the project area, about the availability of mammal species in and around the project area.

4.4.3 Conservation Status of Species

The conservation status of each species was obtained from the 2020 published IUCN redlist data and the National redlist of Uganda's threatened species (Wildlife Conservation Society, 2016). Through examining published distribution records and literature, assessments of the limits of distribution range of the different species, new records, lack of records of expected species, was undertaken.

4.4.4 Impact analysis

The potential impacts likely to arise from implementation of the proposed project were evaluated based on a four-point scale. The scale definitions were adopted to the local level addressed in this study (Table 7). The impacts were evaluated against four criteria intensity, geographic extent, duration and likelihood (Terrapon-Pfaff et al., 2017). *Intensity* refers to the level to which an impact has effects on the livelihood of the local population, G*eographic extent* describes the scale of the area affected, *Duration* defines the time span the impact continues to affect the livelihoods from the time it emergences and onwards and *Likelihood* relates to the probability of the occurrence of an impact.

Table 7: Definition of significance criteria in the expert survey

Criteria	Scale	Definition
Magnitude/Intensity	No	No impact / livelihoods not affected
	Minor	Low impact / no substantial effects on livelihoods
	Low	Moderate impact / moderate effects on livelihoods
	Moderate	High impact / substantial effects on livelihoods
	High	Very high impact / very extensive effects on livelihoods
Extent	Within Limited Area	Communities along the proposed water supply system
	Local	Within Butagaya S/C and Jinja District
	Widespread	Outside Jinja district
Duration	Momentarily	0-1 year
	Short-term	2-5 years
	Medium-term	5-15 years
	Long-term	20 years
	Irreversible	Permanent
Likelihood/Probability	None	Impact will not occur / has not yet occurred
	unlikely	Impact is unlikely to occur / has not yet occurred
	Likely	Impact is likely to occur / has not yet occurred
	Most Likely	Impact is most likely to occur / has already occurred
	Definite	Impact will definitely occur / impact has occurred

Significance evaluation

Based on the outcomes of the expert survey, the impact significance was determined. To this end, the results for each criterion were translated into scores, which were the aggregated into a final significance score. In the *first step*, the evaluation results were translated into numerical values taking the confidence levels into account. As no commonly accepted method exists for this process It is recommended to divide each level of the scale into three intervals based on the certainty level (Table 8). In this way, the final value for each of the criterion also depends on the certainty of the expert judgments.

Table 8: Rating scales for the criteria assessment in the expert survey

Symbol	No	minor	Low	Moderate	Very High
M=Magnitude	0	2	4	6	10
P=Probability	0	1	2	3	5
E= Extent	0	1	2	3	5
Duration	Momentarily (0-1 year); Short-term (2-5 year); Short-term (2-5 years); Medium term (5-15 years); Long term (15-20 years); Irreversible (Permanent)				

In the *second step*, the scores of each criterion and for each impact were aggregated into a final score, which could then be translated into a significance level. Various arguments exist for or against different methods of aggregation, but no commonly accepted aggregation rule exists.

In this study, to aggregate the criteria scores, it was decided to draw on risk assessment research which stresses the importance of the probability of an event followed by the extent of its consequences, applying the following aggregation rule:
Significance= $L_i \times I_i + G_i + D_i$, Where;$L_i$ =Likelihood of impact *i*, I_i =Intensity of impact *i*, G_i = Geographic extent of impact *i*, and D_i =Duration of impact *i*

The values for intensity (*I*), duration (*D*) and geographic extent (*G*) are added together and then multiplied by the value assigned to the likelihood (*l*) criteria, resulting in a range of scores between 0 and 75. The main weakness of the aggregation function is the risk that an impact rated unlikely to occur, but which could have irreversible consequences, could be overlooked. To avoid this risk, the results must be carefully assessed by the researcher after the aggregation to avoid relying solely on the numerical outputs. Once the final scores for each impact are calculated, they must be translated into impact significance levels. We differentiate between four significance levels (very high/high/moderate/low), which are based on the score ranges listed in Table 9.

Table 9: Significance levels and scores for the expert survey

Significance	Scores	Description
Very low	0-15	impact or impact of very low order
Low	16-30	Only very limited effects; social, cultural and economic activities of communities continue unchanged
Moderate	31-45	Medium level impact affecting a limited number of people in a small area for a limited time span
High	46-60	Probable impact with high effects on the livelihoods of communities, affecting many people or having a long-term effect
Very High	61-75	High probability and very high level of effects in a widespread area and with long-term effects on the livelihoods of communities

4.5 Socio-Economic Environment

A detailed social impact assessment and evaluation of the positive and negative, direct and indirect, immediate and long term, and permanent and temporary impacts due to the construction and operation of the water supply facilities and associated works was carried out. An assessment of the impacts identified in either qualitative or quantitative terms, according to their inherent nature and the availability of adequate data to enable predictive analysis was undertaken. Specific activities undertaken included:

a) Land use in site zone of influence: Types of land use were established from observation and consultation with Local/district Planning Authorities on existing land use.
b) Existing infrastructure (water, sanitation, power, telephone): Their presence was established by observation and consultation with relevant utility companies. Potential impact of line during construction on any such existing facilities has been predicted.
c) Settlement patterns including induced unplanned development: Population numbers, characteristics and dynamics were analyzed to predict potential induced developments.
d) Circulation patterns (people and livestock): These were established by observation with the aim of identifying any potential severance of access when existing paths get blocked by construction works.
e) Social cohesion was established from community consultations and literature review to predict any disruption of social ties during or after project construction.

f) Population demographics: Population numbers, education levels, age, gender disparities, access to factors of production, disease burden, income sources and expenditure were established from a social survey and consultations.
g) Community structure: were established from observation, surveys and community consultation.
h) Employment characteristics: were established from social surveys, consultations and review of existing local and national census or labour reports/surveys undertaken by Uganda Bureau of Statistics (UBOS)
i) Local economy and income distribution: were determined through a socio-economic survey by a socio-economist, observation and interviews.
j) Social services: Presence or lack and efficacy of existing services were determined through a socio-economic survey, observations and community consultations.
k) Sociologist established any unique ethnic or tribal customs, traditions/ethos and values which might be affected by the construction works in the project area, we looked out for known sites of significant historic, cultural merit (locally, regional or internationally). A "chance finds procedure" has been prepared.
l) Public health: Potential public health and occupational Health &Safety (OHS) impacts during construction were outlined. Measures to manage dust plumes from excavations, construction; noise levels from construction equipment during construction were developed. Other impacts established included risk of exposure to hazardous substances without adequate protection (skin contact); disease vectors, machine-related accidents and inadequate sanitation, HIV/AIDS.
m) Gender analysis: was carried out to identify potential gender impacts. The SWOT tool was applied during community consultations to reveal expected opportunities that can be evaluated.

4.6 Impact Assessment and Evaluation Method

The purpose of this section is to predict and make an assessment of the impacts on the environment that may potentially arise as a result of the implementation of the proposed project. An assessment of these impacts was made on the basis of information gathered during the environmental baseline study of the project area, which included several field visits to the project sites/area and its surroundings, as well as a desk study of relevant existing documents and information pertaining to the project and information describing the nature and design of the proposed project. From this, mitigation measures have been drawn up to be recommended for incorporation into the design and implementation of the project so as to minimize, compensate for or avoid the occurrence of anticipated potential impacts.

The potential positive and negative impacts were discussed below in terms of the various environmental components. The potential impacts that could occur during the construction and operation phases are categorized and assessed as follows:

i. Type of impact – whether direct or indirect;
ii. Status/Direction Positive or negative;
iii. Duration - Temporary (1 year), short term (1-3 years), medium term (3 -5 years) long term (> 5 years - L) or permanent;
iv. Intensity/Magnitude - Low, medium or Major;
v. Extent: within limited area (1km radius from site), local (up to 5 km) or wide (> 5km radius, district wide, regional or global)
vi. Probability of occurrence: Low (25%), Medium (25-75%) or High (>75%); and
vii. Overall Assessment- Negligible, Minor, Medium or Severe/Significant

Based on the project details and the baseline environmental status, potential impacts as a result of the construction, operation and decommissioning of the proposed project were identified.

We therefore propose an impacts analysis criteria that takes into account the magnitude or intensity of impacts based on project activities and sensitivities to receptors in the project areas that were identified in the environmental and social baseline.

Table 10: Impact Assessment and Evaluation

Criteria	Description
Type of Impact	▪ Direct - An impact that appears immediately as a result of an activity of the project. For example, the loss of vegetation is a direct impact of site clearing. The direct impacts would be experienced mainly during the construction process, and include effects on the physical environment, health and safety of the construction workers. ▪ Indirect - An impact that is related to the project but that arises from an activity of the project at a secondary level. For example, the demand for supplies and services may cause indirect impacts on the local economy by increasing indirect employment opportunities.
Status	▪ Positive ▪ Negative
Duration	The lifetime of the impact; this is measured in the context of the life-time of the proposed development. Whether the Impact will be: ▪ Intermittent – not occurring at all times. ▪ Temporary-only for a short period. ▪ Short term - the impact will either disappear with mitigation or will be mitigated through natural process in a span shorter than the construction phase. ▪ Medium term - the impact will last for the period of the construction phase, thereafter it will be entirely negated. ▪ Long term - the impact will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter ▪ Permanent
Intensity	Whether or not the intensity (magnitude) of the impact would be high, medium, low or negligible (no impact). An attempt to quantify the impacts on components of the affected environment to be described whether destructive to alter its functioning or harmless: ▪ Negligible ▪ Low - where impact alters the affected environment in such a way that natural processes of functions are not affected in any significant way. ▪ Moderate - where the affected environment is altered, however, function and process continue, albeit in a modified manner. ▪ High - where function or process of the environment is seriously altered and disturbed to the extent where it temporarily or permanently ceases.
Spatial Extent	The physical and spatial size of the impact; a description of whether the impact would occur on a scale described as follows: ▪ Site - whether the impact will be within limited locale of the project site / study area affecting the whole or measurable portion of the area. ▪ Local - whether the impact will affect the environment or communities along the border of the study area or in the extended area adjacent to the site or perhaps outside the immediate environment. ▪ Regional - whether the impact extends beyond the study area affecting areas on a regional scale.

Likelihood	The probability or likelihood of the impacts actually occurring. The impact may occur for any length of time during the life cycle of the activity, and not at any given time. The probability that a certain impact will in fact realize: ▪ Uncertain - insufficient information to determine its probability. Because the precautionary principle is followed, this increases the significance of the impact. ▪ Improbable - the impact is unlikely to occur. ▪ Probable - the impact could possibly happen, and mitigation planning should be undertaken. ▪ Highly probable - it is most likely that the impact will occur at some or other stage of the development. ▪ Certain - the impact will take place regardless of any prevention plans, and only mitigatory actions can be relied on to contain the effect.
Sensitivity	▪ Degree of change effected on natural processes or people's livelihoods; the sensitivity of the receptor of the impact to change ▪ Very low ▪ Low ▪ Moderate ▪ High

Table 11 below presents a quantitative format for ranking impacts based on parameters above, summarised as magnitude and sensitivity.

Table 11: Quantitative rating of impacts

Significance			Sensitivity			
			Very low	Low	Medium	High
			1	2	3	4
Magnitude	Very low	1	1 Negligible	2 Minor	3 Minor	4 Minor
	Low	2	2 Minor	4 Minor	6 Moderate	8 Moderate
	Medium	3	3 Minor	6 Moderate	9 Moderate	12 Moderate
	High	4	4 Minor	8 Moderate	12 Moderate	16 Severe

Table 12 below presents the overall impact rating criteria, with illustrations of such impacts.

Table 12: Overall Impact Rating and Description

Overall Impact Rating	Description of Impact	Significance

Severe	▪ Non-compliance with national policy, environmental laws and regulations; WB Safeguards Policies and International Treaties on Environment ▪ Highly noticeable, irreparable effect upon the environment and the people ▪ Significant, widespread and permanent loss of resources and livelihoods ▪ Major contribution to a known global environmental problem with demonstrable effects ▪ Causing mortality to individuals of a species classified as globally or regionally endangered ▪ Major exceedance of water/air quality and noise standard quantities representing threat to human health in long and short term ▪ Causing widespread nuisance both on and off site ▪ Extensive property damage or loss, ▪ Widespread effects on livelihoods.	>12
Moderate	▪ Frequent breaches of national regulations, WB Safeguards Policies and International Agreements and Treaties including water/air quality and noise guidelines, wetlands and river banks regulations causing localised nuisance both on and off site ▪ Noticeable effects on the environment and the population, reversible over the long term ▪ Localised degradation of resources restricting potential for further usage ▪ Sub-lethal effects upon a globally or regionally endangered species with no effect on reproductive fitness and/or resulting in disruption/disturbance to normal behaviour but returning to normal in the medium term ▪ Elevated contribution to global air pollution problem partly due to preventable releases ▪ Unplanned immigration flows ▪ Increased traffic in sensitive environments ▪ Increased serious crime rates ▪ Widespread physical resettlement, affecting livelihoods	6 – 12
Minor	▪ Noticeable effects on the environment and the population, but returning naturally to original state in the medium term ▪ Slight local degradation of resources but not jeopardising usage ▪ Disruption to normal behaviour of a globally or regionally endangered species returning to normal in the short term ▪ Small contribution to global air problem through unavoidable releases ▪ Elevation in ambient water/air pollutant levels greater than 50% of guidelines ▪ Infrequent localised nuisance ▪ Population increase not expected to stress existing infrastructure	2 – 4

Negligible	▪ No noticeable or limited local effect upon the environment and the population, rapidly returning to original state by natural action ▪ Unlikely to affect resources to noticeable degree ▪ No noticeable effects on globally or regionally endangered species ▪ No significant contribution to global air pollution problem ▪ Minor elevation in ambient air pollutant levels below guidelines ▪ No reported nuisance effects. ▪ Temporary or intermittent changes to livelihoods or life quality aspects	< 2

4.7 Identifying Mitigation Measures and ESMP Preparation

The ESIA team identified and described in detail possible mitigation measures considering all the project implementation phases. Measures and actions to address negative impacts favor avoidance and prevention over minimization, mitigation or compensation. Measures proposed are in compliance with the Ugandan legislation and other development partners (such as World Bank).

We would ensure that our outcomes are well defined and are measurable events with performance indicators, targets and acceptable criteria that can be tracked over defined periods, with estimates of the resources (including human resource and training requirements) and responsibilities for implementation.

The ESMP format is flexible to ensure the integration of project specific mitigating, enhancing and monitoring requirements. The ESMP's scope and level of details are proportional to the number and complexity of the measures required to ensure the project's environmental and social sustainability. The following components constitute the minimal contents of an ESMP:

a) *Objectives of the ESMP* - This section specifies that the ESMP aims to bring the project into compliance with applicable national environmental and social legal requirements and the Bank's safeguards policies and procedures. The other objective of the ESMP is to outline the mitigating/ enhancing, monitoring, consultative and institutional measures required to prevent, minimize, mitigate or compensate for adverse environmental and social impacts, or to enhance the project beneficial impacts. It shall also address capacity building requirements.
b) *Context the ESMP* - briefly describes project activities and major environmental and social components that are likely to be affected positively or negatively by the project. It describes and analyze the physical, biological and human conditions prevailing in the project area, highlighting relevant environmental and social issues among others.
c) *Beneficial and Adverse Impacts* - This section focuses on beneficial impacts that can be enhanced to improve the project environmental and social performance as well as on adverse impacts that require mitigation measures to be minimized or compensated.
d) *Enhancement/Mitigation Measures and Complementary Initiatives* - This section proposes feasible and cost-effective measures to address the impacts previously defined, in order to accrue project benefits through enhancement measures or to reduce potentially adverse environmental and social impacts to acceptable levels (mitigation measures).
e) *Environmental and Social Monitoring Program* - A monitoring program aims to ensure that mitigation and enhancement measures are implemented, that they generate intended results and that they are modified, ceased or replaced when inappropriate.
f) *Consultations* - The implementation and monitoring of some of the mitigation or enhancement measures may require that consultative mechanisms are used. In such

cases, the ESMP first identifies for which measures consultations would be undertaken as well as the goals and expected outcomes of these consultations. Then the ESMP specifies the target groups, appropriate consultative processes, consultation frequency, reporting methods and result disclosure procedures.

g) *Responsibilities and Institutional Arrangements* - The implementation of enhancement and mitigation measures and the completion of the monitoring program require to clearly establish responsibilities among the various organizations involved in project implementation and operation. The ESMP proposes support to the organizations that may have insufficient capacities to fulfill their obligations. This support could be provided through various means including technical assistance, training and/or procurement.

h) *Estimated Cost* - This section estimates the capital and recurrent cost associated with the various proposed measures (enhancement and mitigation), the monitoring program, consultations, complementary initiatives and institutional arrangements. The cost of each mitigation and enhancement measure shall be estimated, including the cost for environmental and social capacity building.

i) *Implementation Results Schedule and Reporting* - The ESMP includes a results matrix, an implementation schedule taking into account all activities related to the proposed measures (enhancement and mitigation), the monitoring program, consultations, complementary initiatives and institutional arrangements.

j) *Conclusion* - The conclusion summarizes the main expected environmental and social impacts and mitigation and enhancement measures that would ensure that the project meets the Bank's safeguards requirements. It also specifies the environmental and/or social loan conditions or covenants that are part of the project loan agreements.

k) *References and Contacts* - The documents consulted to prepare the ESMP are listed. In addition, the persons to contact for comments or further information shall be mentioned in the ESMP.

4.8 Identifying Monitoring Measures & Monitoring Plan

Monitoring planning includes baseline monitoring, impact monitoring and compliance monitoring. Monitoring points, measures, frequency, cost, reporting format, responsible agency and implementation agency would be identified. Monitoring measures proposed are in compliance with the Government of Uganda legislation and Safeguard Policies of the AfDB. The table below provides a summary template for Monitoring Requirements.

Table 13: Summary Template for Monitoring Requirements

Phasing	Mitigation Measure	Parameters to be Monitored	Location	Measurements	Frequency	Responsibilities	Cost
Pre-Construction Phase							
Construction Phase							
Operation and Maintenance Phase							

A monitoring program aims at ensuring that mitigation and enhancement measures are implemented, that they generate intended results and that they are modified, ceased or replaced

when inappropriate. Further, it allows assessing compliance with national environmental and social policies and standards. A monitoring program shall include two parts:

a) *Surveillance activities* - The surveillance aims to ensure that the proposed mitigation and enhancement measures are effectively implemented during the construction phase.
b) *Monitoring activities* - These activities consist in measuring and evaluating the project impacts on some environmental and social components of concern and to implement remedial measures, if necessary.

The program defines as clearly as possible the indicators to be used to monitor the mitigation and enhancement measures that need to be assessed during project implementation and/or operation. The monitoring program would also provide technical details on monitoring activities such as methods to be used, sampling locations, frequency of measurements, detection limits, and definition of thresholds that will signal the need for corrective actions. The process for establishing a monitoring programme would consist of the following actions:

- Specific management and monitoring objectives;
- Identification of the scope of monitoring;
- Recommend appropriate monitoring environmental and social aspects and technology;
- Specify how the information collected should be used in decision-making;
- Define the spatial boundaries and select map scales and sites for observation, measurement or sampling;
- Select key indicators for direct measurement, observation or sampling;
- Define how the data will be analysed and interpreted and how it should be presented in monitoring reports;
- Define the precision and accuracy required in the data;
- Consider compatibility of data to be collected with historical data and with related contemporary data;
- Set minimum requirements for monitoring.

5 DESCRIPTION OF THE ENVIRONMENT AND BASELINE CONDITIONS

5.1 Project location

The Kasensero Valley dam is a colonial establishment seated on 100 acreage of land estimated to be occupying about 50 acres. The proposed dam has a height of 4m with storage capacity of 201,539m3 (with a potential increase up to 20,077,559m3), embarkment length of 152m and would provide water for livestock watering, irrigation, domestic use, reservoir fisheries, flood control, etc. The most appropriate dam shall be an earth fill embankment dam. The valley dam is located in Naryankanja ward, Kyenda Town Council and Mubende district. It is boarded by 3 cells that include Kijuwa, Kyemu and Buterevu cells. The nearby Wards/parishes earmarked to benefit from the same Kasensero Valley dam include Kagoma ward, Bugonzi parish, Kalonga ward, Kilangwa ward. Kasensero Valley dam is located about 400m off the Mubende - Mityana road from Buterevu village in Mubende District and about 172 Km West of Kampala through Mityana Town. Some coordinate points of the valley dam are shown in table 5 above.

Mubende District is bordered by Kyankwanzi District to the north, Kiboga District and Kassanda to the northeast and Mityana District to the east. Gomba District and Sembabule District lie to the south, Kyegegwa and Kakumiro District to the southwest and Kibaale District to the northwest of Mubende District. Mubende, the district headquarters, is located approximately 172 kilometres (107 mi), by road, west of Kampala, the capital of Uganda, and the largest city in that country. The coordinates of Mubende District are:00 36N, 31 24E.

Plate 2: A View of Kasensero Valley dam Area

5.2 Physical environment

5.2.1 Topography

The project area is in central Uganda but has characteristics of Central western Uganda being neighbour to Sembabule District. It is therefore characterised by short and undulating hills with wide valleys with expansive savannah to the south with some sharp hills to the east. On average

the district of Mubende lies at an altitude of 1,372 to 1,448 metres above sea level. Due to the fairly dry climate (the project area is within Uganda's cattle corridor), the valleys are mostly dry and the wetlands there in are mostly seasonal. Further to the south west which is the project area there lies zones of tors and innselbergs. The areas of infill that are associated with the rivers Katabalanga and Nabakazi are in the sub counties of Kasambya, Kitenga and Kiganda.

Plate 3: The undulating hills around the project area

5.2.2 Climate

Mubende district has a tropical climate with moderate rainfall and temperature. The rainfall pattern is bi -modal with two seasons and the annual rainfall varying between 560 mm to 1,272 mm. The months of March to May and September to November receive very heavy and well-distributed rains of up to 1,200 mm. There are two dry seasons from June to July and December to February. This therefore, provides for two crop growing seasons. The high altitude ensures favorable climate with medium annual temperatures ranging from 17.2 degrees to 29 degrees centigrade.

5.2.3 Geology and Soils

The geology of the Mubende area is dominated by the Singo Batholith, a generally massive, coarse-grained porphyritic biotite-granite. The oldest lithological units underlying the Mubende area are the east-west striking, steeply dipping biotite-muscovite to cordierite-muscovite-sillimanite gneisses of the Archaean Basement Complex, which occur to the south and north of the project area. The Singo Granite has been intruded into a broad band of Paleoproterozoic metasediments of the Buganda-Toro System that overlie the Basement gneisses. Other, minor, intrusives include: sericitized granites, purple to yellow and fine to coarse-grained; and quartz-damourite rocks, essentially structureless, composed of quartz, yellow-green to purple damourite and books of muscovite

The Buganda-Toro rocks include basal conglomerates grading into sandstones, cordierite-muscovite-biotite schists with intercalated amphibolites, plus sandstones and shales, that have undergone greenschist to amphibolite facies metamorphism. They are overlain in turn by silicified shales, conglomerates and sandstones of the Singo Series, possibly of Karagwe-Ankolean age. Overlying the Singo Series in a few isolated occurrences are conglomerates and sandstones of the Mityana Series that may be part of the Neoproterozoic Bukoban System.

Plate 4: Soil type around the project area

5.2.4 Kasensero Earth dam Catchment

A catchment delineation was done to the position of the proposed dam to define boundaries of the study area and/or to divide the study area into sub-areas as illustrated in the figures below. For this study, the Digital Elevation Model (DEM) based automatic catchment delineation was undertaken in ArcGIS software, using the Arc HYHDRO Extension. The catchment area occupies 15.01.km$^{2.}$ The catchment is big enough to replenish the reservoir even in moderate dry months and yet not too big to enable a reasonable size of spillway and freeboard. As a first indication towards the minimum size of the catchment area. the storage required should be equal to 5% of the mean annual rainfall on the catchment area.

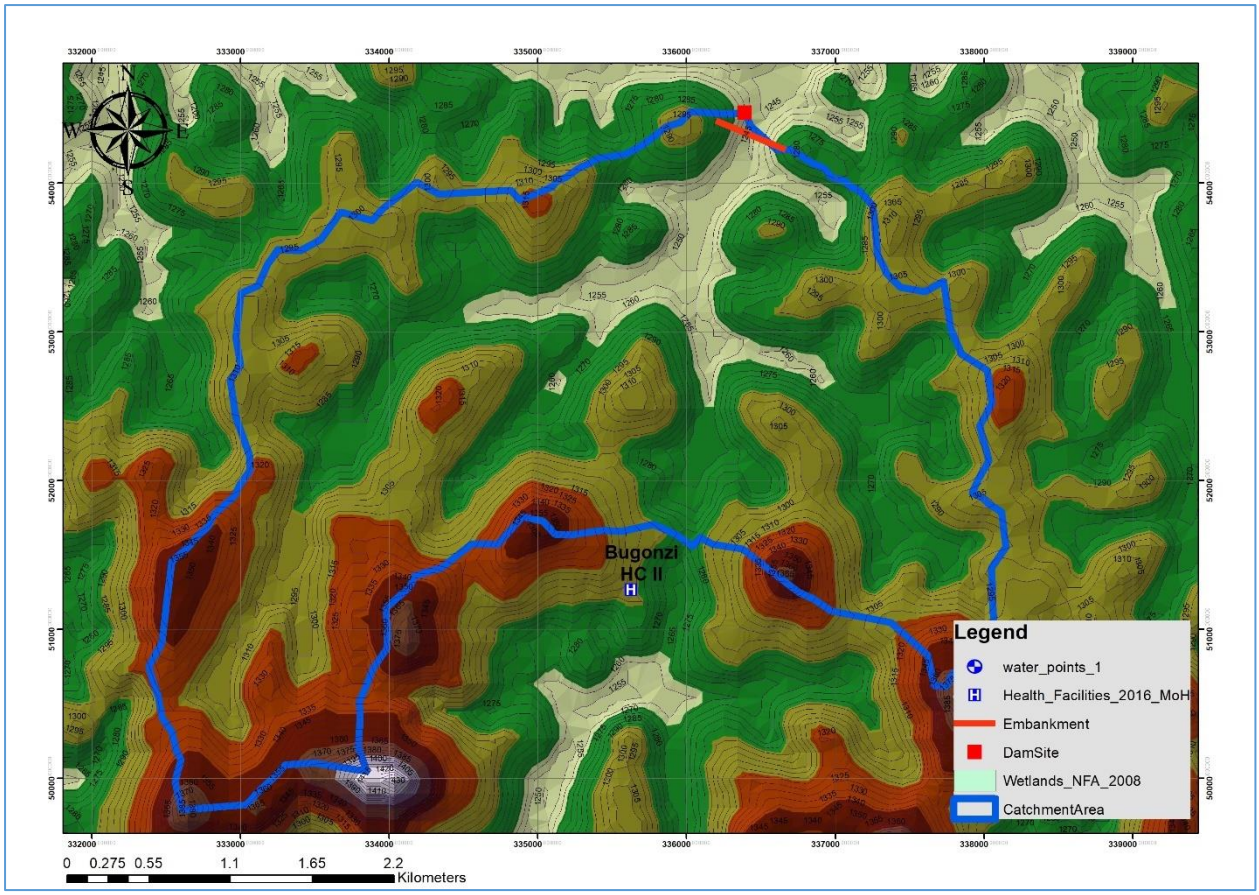


Figure 4: The delineated Kasensero earth dam Catchment

5.2.5 Noise Levels

There are no cases of noise pollution at the proposed project location sites. Thus, the project sites indicate a generally pristine environment with respect to ambient noise. However, as would be expected due to the increased human activities and construction activities noise levels are likely to increase. The levels are based on land use Category D (Residential plus Industry or small-scale production and commerce) for which daytime and night limits are 60 and 50 dBA, respectively according to The National Environment (Noise Standards and Control) Regulations 2003.

5.2.6 Air Quality

Proposed project sites currently have no ongoing activities that contribute to air emissions thus an indication of a free environment (generally pristine environment) from key air pollutants such as COx and NOx. The proposed Earth Dam can be easily accessed by a foot path, however now a road infrastructure will be graded to open up access to the lake by vehicle.

5.3 Biological Environment

5.3.1 Flora

Mubende largely crosses settled and built-up areas interspersed in rangelands with modified equatorial type, wooded savannah mosaic, savannah grassland, supporting an active agro-ecosystem. Due to deforestation, natural areas of vegetation now rarely survive, and these occur mainly in permanent wetlands areas. For the most part, the Project Site crosses through

an area previously mapped as Dry Acacia Savannah, dominated by Acacia-Cymbopogon-Themeda complex floristic characters. The landscape in the Project Site is highly transformed from original natural state and in contrast, hosts few remaining species. Very little remaining natural vegetation cover of conservation importance remains, due to extensive human activities. There is no characterisation of rare and/or restricted-range species. The conservation value of species found was rated as below average, with no restricted-range or endemic species. No Red List species have been recorded within the Project Site. The Project Site also does not fall into a recognised International Bird Area or Key Biodiversity Area for Uganda. Generally, there is no important conservation areas or species recorded around the project site. Overall, the vegetation structure has been significantly altered to very low status vegetation, currently formed as detailed below. The results shown here have been assessed using GIS.

Table 14: Vegetation Formation

No.	Vegetation type	% Coverage
1	Farmlands (cultivated land and grazing lands)	79
2	Remnant Forest	4
3	Wetlands (including Riparian Thicket with Caparis, Lantana and Vernonia)	4
4	Woodlots (mainly Pine sp. and Eucalyptus sp.)	1
5	Transformed (by urban settlement: trading centre/village/homestead)	12
	Total	100

The Project Area is described as hosting low tree-bush and stands of remnant forest, composed of *Acacia sieberiana*, *Acalypha bipartite*, *Acanthus pubescens*, *Artocarpus heterophylla*, *Cynodon dactylon* among others. However, much of this vegetation has since been severely degraded; yet in some areas along the road reserves, residual trees remain and many of the primary forest tree species are still present, represented by saplings or seedlings. This area is also composed of Combretum savanna dominated vegetation and covered by *Combretum molle, Combretum collinum, Terminalia glaucescens and Acacia hockii* with tall grasses, with *Cyperus papyrus* in wetlands. These areas are dominated by the grasses, herbaceous climbers, trees and shrubs, composed of *Acalypha bipartite*, *Acanthus pubescens*, *Adenostemma caffrum*, *Artocarpus heterophylla*, *Croton macrostachyus*, *Cyperus papyrus*, *Digitaria ternate*, *Eleusine indica*, *Eucalyptus sp.*, *Galisonga parviflora*, *Markhamia lutea*, *Pavonia urens*, *Pennisetum purpureum*, *Phoenix reclinata*. Herbaceous and grass species dominate the species mix, showing a landscape and area that is often disturbed.

Plate 5: Vegetation cover around the Earth dam.

5.3.2 Fauna

In general terms, the project area has a wide range of medium-sized and large mammals. There was generally low faunal species diversity and abundance at all the project sites probably due to disturbance that already exists from communities fetching water from those water points, cultivation, watering animals and tree woodlots that provides very few micro habitats for exploitation by different species and communities. The project area lies in a landscape that is heavily influenced by human activities specifically cultivated areas, farmlands and plantation woodlots such as eucalyptus which tend to be poor habitats for birds and other vertebrates. No other wildlife species among global, regional or national threatened wildlife, endangered endemics, was identified in the area.

Plate 6: Water snails in the project area

Plate 7: Egrets and crested crane among avifauna species spotted around the project area

5.4 Socio-Economic Environment

5.4.1 Demography

According to the NPHC 2014, Mubende District has a population of 684,348 people comprising 346,654 males and 337,694 females. This has increased in comparison to the 2002 census, which put the population of the same District at 423,422 people. Kiyuni Sub-County, where the power distribution line will traverse, has a total population of 39,858 people. Currently the population density is at 121 people per sq. km, compared to 100 persons per sq. km in 2002. This increase is attributed to immigration by settlers from densely populated Districts and the high fertility rates in the District. The population of Mubende District is currently projected to be 601,466 people. The local population is expected to increase in areas where construction will be undertaken and the community expressed fear about the likely increase in occurrence of broken marriages, because of married women and young girls being lured into sexual acts by construction workers.

5.4.2 Telecommunications

Mobile telecommunications have eased the burden of communication significantly in Uganda since the communications sector was opened to private operator participation. All the major mobile telephone operators (MTN, Airtel and Orange) have services within the project areas.

5.4.3 Socio-economic activities

Agriculture is by far the main economic activity in the Project Area of Mubende District. Over 70% of the population depends on subsistence farming as the main source of livelihood. The rest of the population depends on employment income, trading and cottage industries. Maize so far, is the major crop produced in the district, both as food crop and cash crop, followed by matooke, cassava, beans, sweet potatoes, groundnuts, Irish potatoes and sweet bananas. Like elsewhere in the district, it was observed that the Project Area has similar farming patterns, with maize being the most common crop grown by households, as the following shows: 'The main economic activity is farming, and major crops include maize, coffee, beans and bananas. Other economic activities include small-scale industries (agro-processing), retail business, fuel vending, both in small jerry cans and pump stations, grain stores and boda boda transport. Most of these activities are undertaken by the population living in the trading centres. According to the

Mubende DDP 2015, piggery is also a profitable venture in this area, and the district is one of the key sources of pork supply for the growing market in Kampala.

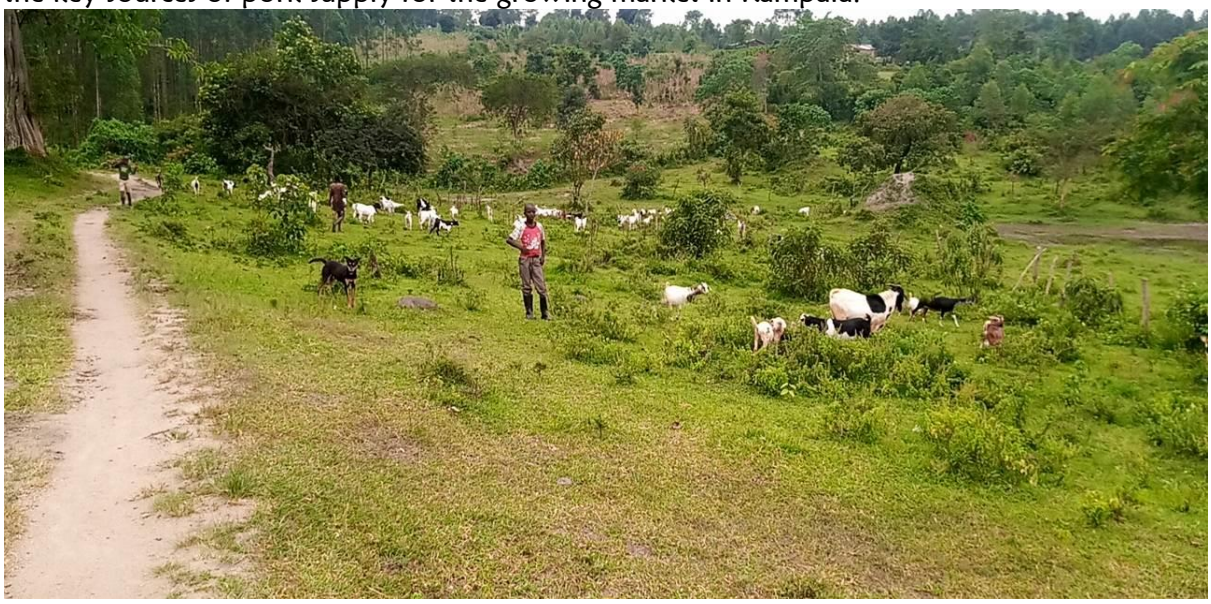


Plate 8: Goat rearing as one of the socio - economic activities in the area

5.4.4 Power source

The main source of energy for domestic needs in Mubende is firewood for cooking and kerosene/paraffin for lighting, for most households that can afford it. Other energy sources for lighting in the Project Area include solar energy, generators and UMEME in the Towns. It was observed that there are activities undertaken, such as maize milling, battery charging, welding and hair salons that are powered by diesel power generators.

5.4.5 Institutions

There is education (nursery, primary, secondary and tertiary), religious (mosques, churches) and health (hospitals, clinics, health centres, drug shops, pharmacies) institutions in Mubende project area.

5.4.6 Ethnicity and Religion

The Mubende District is composed of people of different social and ethnic origins with majority being Baganda 36.1%, followed by Banyoro 14%, Banyankole 11.4%, Bakiga 10.7%, Bafumbira 9.9%, Banyarwanda 6.8%, Bakhonzo 3.1%, Batoro 2.5%, Basoga 0.7% and others 4.6% (DDP. 2016-2021.). Mubende is not exclusive on the influence of various religion denominations, thus there exists followers of Christianity, Islam and some have jealously preserved their African traditional religion. The majority are Christians 87.1% (Catholics 45.5%, COU 31%, and other Christians 9.8%), followed by Islam 9.6% and others 3.4%.

5.4.7 Cultural Heritage

Although the Mubende District is in Buganda Kingdom, it also hosts the historical home of the great Bunyoro Kitara Empire with the seat of King Ndahula, the Chwezi and site for Queen and Priestess Nakayima, at the popular tree on Mubende Hill. The main custodian of the cultural heritage in the Buganda Kingdom is headed by his majesty the Kabaka of Buganda. The different ethnic groups enjoy a wealth of cultural values and traditions in forms of Clan systems, language, dressing, folklore, foods, music, dance, drama and crafts. There has been changing

cultural values due to the influence of western cultures and education. No sites of cultural importance were encountered along the road reserve in the Project Site. In regard to the impact on culture.

5.4.8 Gender analysis

Gender is interpreted as the socially ascribed roles and responsibilities of men and women in society; it has gravely affected development as it takes the responsibility for imbalances in access to services, benefit from the proceeds and control over capital resources away from women and girls. The situation has further been aggravated by the fact that the Mubende. District economic base is unreliable, due to dependency on the subsistence agriculture sector. There is growing unemployment and under-employment levels, with little recognition of the contribution of women to development. Mubende District Local Government has over the years made efforts to develop interventions that can help in addressing issues of persistent inequality reduction, vulnerability and risk reduction, homelessness, social protection and gender imbalances. Most of the interventions have been directed to gender inequalities, abject poverty and HIV/AIDS epidemic that have continued to place a huge burden on the District, Lower Local Governments, community and household resources, which in turn have endangered human capacity and productivity.

5.4.9 Land use

The following land use categories were documented around Mubende district;

- Agriculturally based activities (both subsistence and commercial) about 80%;
- Private forest estate (e.g., individual, community and commercial forest estates) about 8%;
- Sites for settlements and industries about 10%;
- Public utilities (including roads, power transmission and water systems) about 1.2%; and
- Earth material extraction (stone quarrying) about 0.8%.

Agriculture was the major land use activity in the Project Area combining both crop and animal rearing. Crops like maize, cassava, bananas, beans, sweet potatoes, mangoes and coffee are grown for home consumption and for sale. There are also many farmers in the area who rear cattle.

The housing structures are a mixture of both permanent and semi-permanent settlements which are semi scattered within the villages and trading centres of Mubende.

Private forest plantations were common and contained mainly softwood plantations of Eucalyptus sp. and Pines sp., especially within Mubende District. Harvested timber poles are being produced as an alternative source of income. Wood is also harvested to produce charcoal, for sale locally and at main trading centres. Mubende district do not have any Physical Development Plans in place, hence trading centres are growing haphazardly, while a few rural growth centres have maintained the frontage of the buildings in line with the road reserve.

Plate 9: Eucalyptus woodlots, farmlands and crop cultivation among land use activities in the area.

5.4.10 Land Tenure

The main land tenure systems in the area include: Mailo, Customary, Freehold, Leasehold and public land. The most common land tenure system includes customary land and mailo with some areas having public land, especially institutions. Many of the rural roads lack recognisable road reserves and can be categorized as community access routes with reserves that are fully utilized by the communities.

6 PROJECT NEED AND ANALYSIS OF ALTERNATIVES

6.1 Introduction

This Section evaluates available options to the proposed action, so as to arrive at the most environmentally friendly alternative, which maximizes economic, social and technical benefits resulting into minimal or insignificant environmental impacts.

6.2 Project Need

Mubende is one of the Cattle Corridor Districts of Uganda characterized by livestock production with scarce water and pasture, and are one of the most affected regions in the country. While it is not currently classified as semi-arid, this corridor has many semi-arid characteristics which include high rainfall variability, periodic late onset rains/droughts, historical reliance on mobile pastoralism as an important strategy to cope with resource variability. The age structure of Mubende population is typical of a rural area in a developing county; 57% of the population is below the age of 18 years. It is mainly a peasant agricultural and patriarchal society; heavily dependent on land for survival. The peasantry is an extremely environment degrading population but extremely vulnerable, any changes in the climate for the worse, can be catastrophic. Satellite picture analysis of 1990 and 2005 showed that Mubende District had lost 79% of its forest cover. In 2002, Mubende Municipality was on the brink of an acute water shortage after Katoma swamp, the major water source supplying the area dried up. Since 2006, National Water and Sewerage Corporation (NWSC) had stopped pumping water from Katoma Dam which was being supply by the swamp. The leading cause of massive encroachment on water resources in Mubende district was attributed to prolonged dry spells, increased demand for agricultural land (maize growing), charcoal production and fuel wood demands for the rapid population growth.

Provision of water for production is one of the responses to the adverse effects of climate change to the agricultural sector. The intensity and frequency with which the drought and floods occur require more proactive responses. New approaches to water for production service delivery under the Agro-Industrialization (AGI) Program are therefore needed as a proactive response towards drought and to guarantee food security for the future generation. Given the district's vulnerability to climate change, and its importance for national and local food security, rehabilitation of Kasensero dam will increase agricultural production and productivity, and regulate dependency on rain fed agriculture which is heavily affected by prolonged droughts in the district. Kasensero dam is an existing colonial dam that was constructed in the 1960s by the British Colonial Administration to provide water for livestock and other uses. The dam has since outlived its design life. The embankment is presently in bad condition with significant evidence of slope failure, especially on the upstream face/side, piping through the dam body and extensive siltation. The spillway channel is non-functional thus posing danger of total breach to the embankment

The proposed dam will address the need to resolve the ongoing water supply issues the local population has been facing. Because it dries out the ground (aquiver), ground water has been regarded unsustainable and unfriendly to the ecosystem because it affects the area's ability to recharge and discharge. Lack of a dependable water source in the area has hindered growth and development.

6.3 No Project Alternative

Analysis of the "no project option" as an alternative provides an environmental baseline

against which impacts of the proposed action can be compared. This alternative means that the Earth Dam sites will be left in their original state. The alternative ignores all positive impacts likely to be realized in the project area and throughout the region due to the proposed Earth dam like Transformation of agriculture practice in the area, sustainable and optimal use of irrigation water resources, creation of employment to both skilled and unskilled labour, better livelihood opportunities and induced development, address food security, crop diversification and intensification, considerable economic opportunity for material/ equipment suppliers, construction contractors and other project-relevant professionals.

This option implies that the existing situation prevails (status quo remains) i.e., no implementation of the proposed Kasensero Earth Dam. This option is mostly applicable in situations where the proposed project area is in ecologically or socially sensitive areas and the negative impacts will be of significance and no proper mitigation measures can be formulated to eliminate or minimize the impacts to manageable or acceptable levels. The land on which the Earth Dam infrastructure will be constructed is not ecologically sensitive and no households will be displaced. The community in the project area has been engaged and are willing to make land available for this project as they are in agreement it will address their dire need and access to water. Town Council local leaders will engage the owners of land especially the land for new proposed reservoir.

The No Project Option is the least preferred option from both the socio-economic and environmental perspective because the Town Council and surrounding areas would be deprived of increased accessibility to suitable water for Production in addition to the socio - economic benefits especially during construction i.e., provision of jobs for skilled and non-skilled workers.

6.4 Alternative dam location

If the planned project would cause significant environmental issues that could not be fairly and efficiently managed, a different site might be taken into consideration. The proposed mitigation measures, however, are thought to be sufficient to reduce the impacts to levels that do not call for considerable environmental harm. The suggested location is also deemed appropriate due to its extensive bedrock and contributing catchment area as described in section 5.2.4.
The overall catchment area of Kasenero dam is 15km^2, which is then divided into smaller sub catchments namely S1 -S7 characterized by different soil type and land use pattern delineated using GIS features in ArcGIS providing Digital Elevation Model (DEM) of STRM with resolution of 30 m in a coordinate system of Universal Transverse Mercator (UTM). The delineated six sub catchments are depicted in

Table 15: sub catchment parameters

Subbasin	Area (sqkm)	Micro Catchment Slope%	Lat	Long_	Elev	ElevMin	ElevMax	Longest Flow Path(m)
1	1.79	8.79	0.49	31.53	1271.94	1245.00	1313.00	1857
2	0.46	8.65	0.48	31.52	1272.44	1250.00	1315.00	1303.26
3	0.20	8.03	0.48	31.53	1264.94	1250.00	1298.00	342.13
4	1.55	9.01	0.47	31.53	1287.69	1255.00	1361.00	2071.33
5	1.80	10.24	0.47	31.52	1296.60	1255.00	1360.00	2623.48
6	3.40	8.40	0.47	31.54	1290.42	1255.00	1380.00	3566.85
7	5.87	8.89	0.47	31.51	1303.74	1255.00	1421.00	5246.63

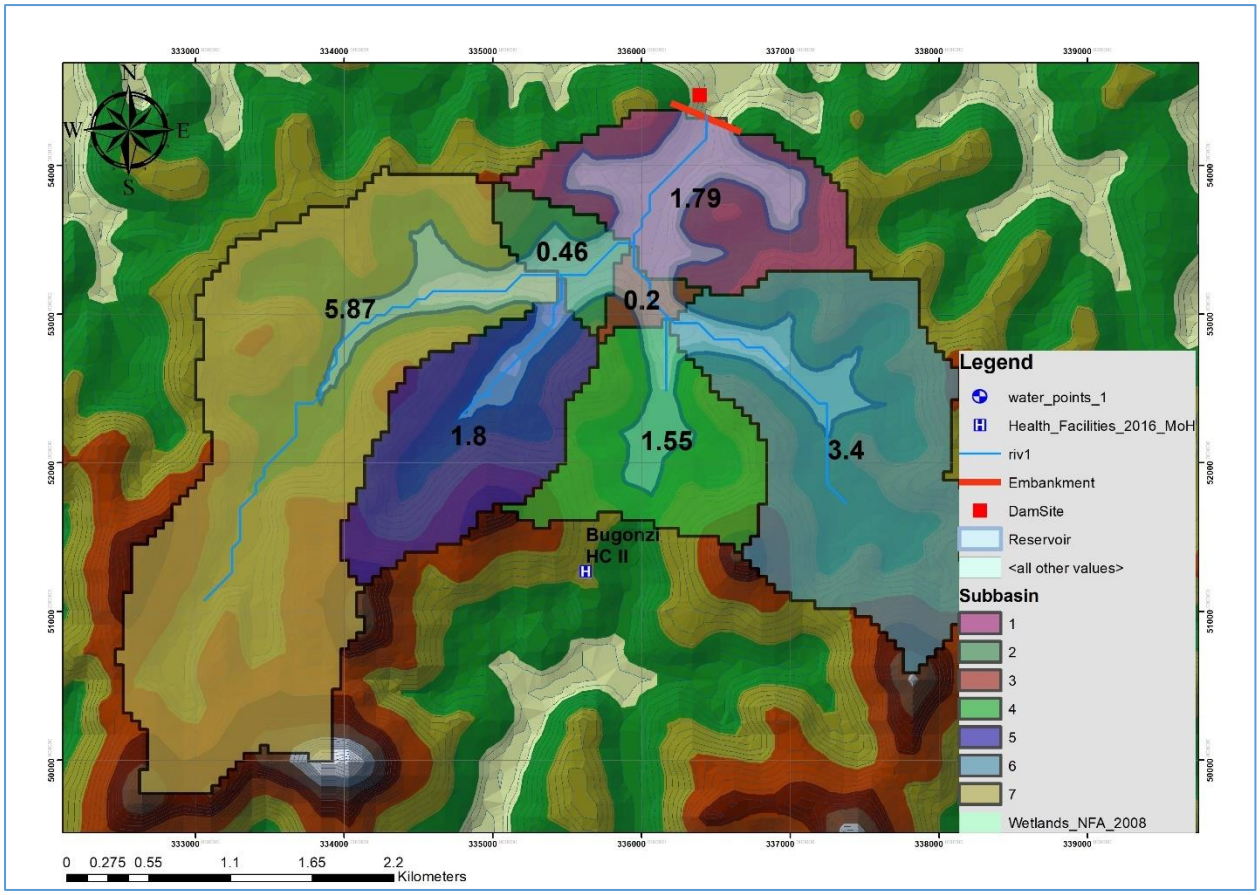


Figure 5: Delineated sub catchments for Kasenero dam

As a result, this solution (of looking for another possible location) is not thought to be practicable.

6.5 Alternative Design and Technology

The advocate would also have chosen to use other quarrying dam techniques and equipment. Several quarrying techniques are categorized. Gravity dams have a number of alternatives, including but not limited to concrete dams, rock-fill dams, sand dams, and subsurface dams. Some of the parameters used to choose the suggested alternative are displayed as below.

- ❖ Availability of local materials
- ❖ Handling of construction materials
- ❖ Foundation condition
- ❖ Cost of construction

There is a wide range of construction and furnishing materials which can be sourced locally for example sand, aggregates, bricks, etc. During construction, certified equipment and modern technology will be used, e.g., Water pipes, Storage Reservoirs, metal bars and fittings that meet the Uganda National Bureau of Standards (UNBS) requirements. Implementing the Earth Dam according to approved designs will be a priority as it will lead to the provision of improved quality and quantity of water supplied, reduced morbidity and increased productivity of households; and increased agricultural production, better livelihood opportunities and induced development and employment opportunities. Therefore, it will be paramount that WfPRC-C and the Operator ensure that the Earth Dam has the following in place:

- Enough area recommended for fencing in order to prevent vandalism of the infrastructure and for the safety of hydraulic structures and installations of the

pumpstations.
- Well-designed drainage system at the dam facilities
- Consideration of noise and traffic generated by the trucks to and from the site during the construction, solid waste management itself at the site both during construction and operation (especially at the offices premises)
- Security mechanisms including fire safety mechanisms and security guard at all the Eart infrastructure facilities
- Well-designed access route from the main road

6.6 Environmental and Social Considerations

The potential impact of the Earth dam infrastructure on the landscape and ecology were considered, this was mainly from the field studies. These factors have been subsequently addressed within the interactive process of environmental assessment and the findings presented in this ESIA report.

- **Noise and proximity of housing:** The proposed Earth dam infrastructures were judged to lie distant from homesteads and settlements but within the commercial centre of the project area; that adequate separation distances could be achieved to avoid noise nuisance during both the construction and operation phase given the nature of the development. Construction activities for the Earth Dam should be carefully controlled. In addition, apart from the vehicle movements, the noise in this kind of project is minimal.

- **Land ownership:** Kasensero dam is seated on government land (the land title is at the district) with an acreage of 50 acres. During colonial time, this dam land was 100 acres but due to population increase over time 50 acres of this land has been encroached by the neighboring community. The transmission lines will pass along road reserves but where peoples land will be affected, local leaders and the local communities have been engaged. Resettlement Action plan (RAP) shall be conducted for survey, valuation and subsequent compensation for those whose property will be affected during the construction especially the transmission lines and for some of the water infrastructures. However, there are no resettlement and displacement issues anticipated.
- **Community Opinion:** Dams elsewhere in Uganda have not attracted local concern and resentment among the local residents. Likewise, in the case of the Kasensero Earth Dam, the development would not have much significant negative impact on the dwelling and settlements. The communities and the local leaders consulted welcomed the proposed project.

6.7 The Action Alternative as Described in this ESIA

This option implies that WfPRC- C continues with the implementation of the proposed project as per the project designs and recommendations by different stakeholders. We have made a comprehensive Environmental study for the proposed project area. Details of the study are the subject of this ESIA report. The study has found no significant issues (environmental, economic or social) to stop the implementation of the project. Mitigation measures for the identified negative impacts of this alternative have been thoroughly discussed throughout this Report. If they are implemented as proposed, the project will not do any damaging to the environment. It is here thus we recommend that this alternative is the most appropriate.

7 STAKEHOLDER CONSULTATION AND ENGAGEMENT

7.1 Introduction

Consultation with relevant stakeholders and regulatory institutions was carried out to ensure participation of relevant stakeholders, as recommended by the National Environment Act, No.5 of 2019, EIA Regulations (2020), and conduct of Environmental Practitioners (2001) and guidelines for EIAs in Uganda. The consultations aimed to identify and take note of environmental and social concerns and views of all the stakeholders at an early stage so that appropriate mitigations are incorporated in the final implementation plan for the proposed project.

Stakeholder meetings were held at Mubende District, Kyenda Town Council. The consultation process ensured that their concerns were captured and have been addressed during ESIA. A wider intensive consultation process was carried out during the Environmental and Social Assessment. Informal conversational interviews and observations were the key data collection methods applied. The consultation process ensured that their concerns were captured and addressed. A wider intensive consultation process was carried out during the Environmental and Social Assessment. In general, the majority of stakeholders supported the project and found it to be beneficial.

7.2 Objectives of Public Disclosure and Consultations

The primary purpose of the stakeholders' consultations was to provide an overview of the project to the relevant agencies, stakeholders and all the communities where the Kasensero Earth Dam components are to be located and therefore impact on the communities. It further helps them to understand how the WfPRC-C and the project team will operate to the highest possible environmental, social, health and safety standards prior, during and after the construction of Earth Dam the related infrastructure.

The specific objectives of the Consultations were;

i) obtain an understanding of the number and types of stakeholders in the socio-economic study area
ii) To provide information about the project and to tap stakeholders' information on key environmental and social baseline information in the project area
iii) To provide opportunities to stakeholders to discuss their views, opinions and concerns
iv) To manage expectations and misconceptions regarding the project
v) To discuss potential impacts and verify significant or major environmental, social and health impacts identified.
vi) To inform the process of developing appropriate mitigation and management measures as well as institutional arrangements for effective implementation.
vii) inform stakeholders about the engagement process and grievance management
viii) provide a mechanism for ongoing stakeholder engagement and ways in which the stakeholders can continue to participate in the stakeholder engagement process
ix) Ensure regulatory requirements and project standards are met.

Stakeholder consultations and public participation during the ESIA process were conducted in line with the requirements of the National legislation and regulations. According to the National

Environment (Environmental and Social Assessment) Regulations, 2020, Part III under section "*Procedure for Undertaking Scoping and Environmental and Social Impact Study*", Sub-section 16; "*Stakeholder consultation during the environmental and social impact study"*, stakeholder consultation is crucial during the ESIA study.

7.3 Stakeholder identification and analysis

7.3.1 Stakeholder Identification

A stakeholder may be defined as 'any individual or group who is potentially affected by the project or can themselves affect the project. To develop an effective stakeholder involvement programme, it is necessary to determine exactly who the stakeholders are based on their roles, influence, objectives and priorities specific to the project. The ESIA team formulated a stakeholder matrix and identified key stakeholders who were engaged during the study. A stakeholder engagement plan was drafted and populated with additional stakeholders during the ESIA study (as attached in annex XI). The study targeted individuals, groups/institutions and communities that have a stake in the priority water project. Thus, only such entities as identified in the stakeholder analysis were selected to participate in the consultation process.

When identifying and prioritizing stakeholders, the following aspects were considered:

(i) Who could be adversely affected by environmental and social impacts?
(ii) Who are the most vulnerable among the potentially impacted, and are special engagement efforts necessary?
(iii) Which stakeholders can best assist with the early scoping of concerns and impacts?
(iv) Who strongly supports or opposes the changes that the project will bring and why?
(v) Who is it critical to engage with first, and why? (IFC 2007) Stakeholders were then identified:

7.3.2 Stakeholder analysis

The stakeholder categories and sub categories identified are presented in table below

Table 16: Stakeholder Matrix

Group	Stakeholder	Description and key attributes
Funder	AfDB	✓ To ensure that the Banks Operational Safeguards have been observed and implemented as appropriate. ✓ Support the project with funding
National Level Stakeholders	Ministry of Lands Housing and Urban Development (MoLHUD)	✓ Approves all reports presented by the consultant regarding valuation
	Ministry of Gender, Labour and Social Development (MoGLSD)	✓ Protection of human rights and vulnerable social groups. ✓ Occupational and community health and safety of roads. ✓ Approval and monitoring of the social safeguards ✓ Approval of permits like workplace permits, OHS

	Ministry of Water and Environment (MWE)	✓ Overall mandate to monitor, assess and regulate water resource ✓ Monitor and guide the use of wetlands for sustainability and other water bodies within the project areas ✓ Approval of the Water abstraction permits ✓ The implementer of the Project ✓ Overseeing and monitoring the project activities
	NEMA	✓ Regulation of the environmental aspects of the project(s). ✓ Legally mandated to handle certain critical environmental issues ✓ Provide the necessary permits and approvals for quarries, borrow pits and other auxiliary sites ✓ Work closely with the project team to handle all matters related to environmental protection ✓ Overall clearance of ESIA and other project briefs about the project facilities. ✓ Monitor and supervise the ESIAs compliance
Local Governments	District (Mubende District Local Government)	✓ Mobilize various stakeholders including the communities/beneficiaries ✓ Monitoring and supervision support for the implementation of the projects. ✓ Offer security to the project team (RDCs Office) ✓ Review the ESIA and give comments (Environment Office)
	Kyenda Town Council (Technical and political staff)	✓ Make decisions that may affect the project, ✓ Offer support and supervision of the project ✓ Help in the identification of the location of the water and sanitation facilities.
	Local Councils	✓ Mobilize communities ✓ Offer support in the planning, implementation and operation of the project ✓ Offer support in the identification of the locations of the water and sanitation facilities ✓ Monitoring of the projects ✓ Provide social justice to vulnerable communities ✓ Incorporate information about the project in their teachings, gatherings/meetings for acceptance especially regarding water and hygiene-related information.
Different Community groups,	Traders, landlords, tenants, business people, affected persons (Landowners who offered land for the project)	✓ Develop construction (works) schedules in their respective areas. ✓ Participate in the scheduled meeting regarding the project activities and progress ✓ Identify mitigation measures of the environmental and social issues

		✓ Monitor the progress of the project activities ✓ Input in the planning and identification of water and sanitation facilities.
Public Utilities (suc as roads, electricity and/or telecommunication network, …)	Institutions that may be affected as a result of the project implementation	✓ Develop construction (works) schedules in their respective areas. ✓ Participate in the scheduled meeting regarding the project activities and progress ✓ Identify mitigation measures of the environmental and social issues ✓ Monitor the progress of the project activities ✓ Input in the planning and identification of water and sanitation facilities.

7.4 Methodology for stakeholder engagements

Different methods were espoused to undertake the stakeholder engagements on this project. These were taken up depending on two major premises; the type of information required and the number of participants involved in the data collection process. These methods were used to inform the development of an appropriate water supply system within this proposed project area. Here-under are the methods that guided the stakeholder engagement process;

7.4.1 Formal meeting with the Stakeholders

The project had an inception workshop where all the stakeholders were invited as a start meeting to inform all the stakeholders about the project. MWE/WfPRC-C organized the meeting to inform all stakeholders about the project, its objective, the intended activities, the project extent, and the related studies to be undertaken, including the Engineering Design and ESIA, Photographic Surveys, source of water among others. The main object was to solicit, potential impacts and possible mitigation measures and also solicit initial community responses. The stakeholders were able to express comments and queries during this meeting.

Plate 10: The team of Consultants, WfPRC officials interacting with the DPO of Mubende

Plate 11: Stakeholders' meeting with Kyenda Town council leadership and the community

7.4.2 Key informant interviews; .

Key informant interviews (KIIs) were held with individuals who were assumed to have specific information related to the project. Some of these were pre-set while others were identified during the interactions with other stakeholders. Some of such stakeholders included; The Chief Administrative Officer's (CAO) office of Mubende, Local Council 5 (LCV), the District Production office, the District Water Engineer, Community Development Officer (CDO), Environmentalist among others.

7.4.3 Key findings from stakeholder consultations

In relation to the project, the main findings from the engagements and public participation were largely categorized into two parts; the envisaged impacts (Both negative and positive) and general concerns on the project. The main findings from the engagements are presented below; For example, according the local leaders and community members, the rehabilitation of the Earth dam is expected to have the following benefits:

- Transformation of agriculture practice in the area
- Sustainable and optimal use of irrigation water resources
- Employment during construction and operation of the Earth Dam
- Eradication of poverty and improved livelihoods of the local people
- Crop diversification and intensification
- Serves to address food security and water for animals in the areas of the project
- Ensure environmental sustainability

However, some concerns were raised as regards to the project and these include:

- Destruction of crops especially during construction works
- Contamination of water from runoff water off project sites
- Land conflict issues could arise,
- Dust and vehicle emissions,
- Increase in noise and injuries on duty,
- Increased spread of communicable disease especially during construction phase,

- Poor waste management practices at construction sites

However, there were also issues that rotated around the following during the community consultation meetings;

- *Signing of the Compensation Data Capture Forms by the PAPs* - Signing such forms does not relinquish one's rights to land and improvements. It only depicts that such PAP was present during the data collection and affirms all that is recorded on such form. However, issues of compensation and resettlement are not anticipated since the secured land has no encumbrances.
- *Property to be assessed* - Land, structures (or improvements) and Perennial crops will be assessed. However, the project designs were developed in such a way that there is no physical displacement of PAPs.
- *Connection to water for irrigation for individual farmers far away from the built system* - Upon completion of the pipe line system, households will be encouraged to apply to the operator for water connection and water pipes will be extended.

Stakeholder engagements will continue throughout the implementation and operational stage with different stakeholders. It is likely that more relevant agencies and stakeholders will be identified during these phases, and will be engaged accordingly.

7.5 Public Disclosure and Consultation Plan

Public Consultation and Disclosure (PCDP) is a key element in the engagement and essential for collective involvement of stakeholders in the proposed development. Disclosure refers to the provision of relevant and adequate project information to enable stakeholders understands risks, impacts and opportunities of the project. Consultation is an inclusive and appropriate process that provides stakeholders with opportunities to express their views which should be considered, responded to and incorporated into the decision-making process. In the context of the proposed development, stakeholder consultation aimed at:

- Generating good understanding of the project;
- Enabling stakeholders to engage and participate in proposed project design;
- Understanding what local community expectations throughout the life of the project;
- Optimizing local benefits of the project;
- Developing effective mitigation measures and management plan;
- Characterizing environmental, health and socio-economic impacts of the project.

Grievance Redress Mechanism (GRM) as a key element of the PCDP to actively identify, manage and follow up grievances received to ensure that appropriate resolutions and actions are taken by relevant authorities. A GRM has been prepared and annexed to this ESIA report.

7.6 Public Consultations and Sensitization

Consultation and participation is a process through which stakeholders influence and share control over development initiatives, and the decisions and resources that affect them. It is a two-way process where the executing agencies and developers, policy makers, beneficiaries and affected persons discuss and share their concerns in a project process. The specific aims of the consultation process were to:

- Collect individual responses reflecting knowledge and attitudes towards the project;
- Conduct informal discussions with earlier identified opinion leaders to enrich the social survey
- The main objectives of community consultations were to:
- Provide clear and accurate information about the project to the communities;

- Obtain the main concerns and perceptions of the population and their representatives regarding the project;
- Increase the effectiveness and sustainability of income restoration strategies, and improve coping mechanisms;
- Identify local leaders with whom further dialogue can be continued in subsequent stages of the project.

7.7 Public Disclosure and Consultation Plan

Public Consultation and Disclosure (PCDP) is a key element in the engagement and essential for collective involvement of stakeholders in the proposed development. Disclosure refers to the provision of relevant and adequate project information to enable stakeholders understand risks, impacts and opportunities of the project. Consultation is an inclusive and appropriate process that provides stakeholders with opportunities to express their views which should be considered, responded to and incorporated into the decision-making process. In the context of the proposed development, stakeholder consultation aimed at:

- Generating good understanding of the project;
- Enabling stakeholders to engage and participate in proposed project design;
- Understanding what local community expect throughout the life of the project;
- Optimizing local benefits of the project;
- Developing effective mitigation measures and management plan;
- Characterizing environmental, health and socio-economic impacts of the project.

The proposed project is within the jurisdiction of Mubende District Local Government headed by a Local Council V (LCV) Chairman and Chief Administration Officer (CAO) who is the political head and technical head respectively. Various district offices whose functions would be relevant to the project include offices of Natural Resources/Environment, District Health Inspector, District Planner, Community Development Officer, District Health Officer, District Water Officer and District Engineer. Equally important are village-level local council administration (LC I and LC III). Leaders at these levels of local administration are closer to residents and therefore important in effective community mobilization, sensitization and dispute resolution given that the proposed project is going to benefit communities.

Like stakeholder identification, public consultations and information disclosure is a continuous process throughout the ESIA exercise. Key Informant Interviews(KIIs) and Focus Group Discussions (FGDs) were utilized for Public Consultation and Disclosure Plan (PCDP). Key stakeholder concerns were also identified so that they could be considered in the implementation of the project. Key issues identified are outlined in Table 12 below.

Grievance Redress Mechanism (GRM) as a key element of the PCDP to actively identify, manage and follow up grievances received to ensure that appropriate resolutions and actions are taken by relevant authorities especially MWE, Mubende District Local Government and Kyenda Town Council.

In order to ensure transparency and accountability, a GRM shall be established by the Project Support Team in line with the guidance provided in the ESMF. The GRM shall have a clear set of goals and objectives and a well-defined scope for its interventions, especially geographical area coverage to ensure its accessibility and effectiveness. A set of procedures for receiving, recording, and handling complaints shall be available in the GRM. This will be managed by a National Grievance Redress Committee (GRC) consisting of a MWE/WfPRC-C Chair, the Project's Environmental Focal Point, the chair of the community mediation board, a member of a

recognized non-government organization, and a community leader. The GRC members shall be qualified, experienced, and competent personnel who can win the respect and confidence of the affected communities.

GRCs shall also be established at District and Lower Local Government Levels as appropriate. For easy accessibility, GRCs shall also be formed at or closer to project implementation site at Mubende District. Grievances shall be first reported and handled at the lowest level or project site, and referred to the next level if not resolved. The GRM shall include procedures for:

- recording, registering, and sorting grievances;
- conducting an initial assessment of grievances;
- referring grievances to appropriate units or persons;
- determining the resolution process;
- making decisions, including parameters and standards for accurate and consistent decision making;
- directing relevant agencies responsible for implementing decisions;
- notifying complainants and other affected parties of eligibility, the resolution process, and outcomes;
- tracking, monitoring, documentation, and evaluation; and
- a Grievance Log, that shall summarize all grievances registered, resolution reached, and feedback provided.

Depending on the nature and the severity of the complaint/s, the GRC in consultation with the Project Affected Persons (PAPs) or Complainant, shall identify and decide on an approach for grievance resolution. Where appropriate, complainants shall be given the choice of selecting an affordable approach with which they are comfortable and confident and that is beneficial to them. For construction-related complaints, it will be the Contractor's responsibility to address them. Usually, these kinds of complaints are described as environmental and social impacts and include issues related to dust, flooding, blasting (noise, vibration, and evacuation), lost access, and dangers to life, damage caused to public roads from heavy machinery, deteriorating water quality and quantity, damage to property and crops, soil erosion, workers misbehavior, defilement/child abuse, and others.

7.8 Feedback from All Stakeholders Engaged

Many of the comments captured from stakeholders presented views on the expected benefits and concerns on the adverse impacts the proposed project may have on the environment and the existing activities. A summary of key environmental and social issues and recommendations raised by stakeholders are presented in Table below 17.

Table 17: Stakeholder Consultation and Engagement for Kasensero dam, Mubende District

No.	Names	Designation	Contact
1	Ntombi Michael Muhereza	Chairman LC V	0785744668
2	Tumusiime Leonard	CAO	0772452620
3	Kateregga Dickson	Civil Engineer	0772387014
4	Ndagire Maria	DCDO	0772617274
5	Kisakye Fredrick William	DPMO	0772474306
6	Anthony Guma	District Councilor-Kyenda T.C	0772959702
7	Kateeba Ronald	Civil Engineer-MWE	0706245576
8	Musiimenta Ann Mary	Sociologist	-

Table 18: Key environmental and social issues and recommendations raised by stakeholders

No	Name of Stakeholders	Comments	Opportunities	Suggestions
DATE: 27/01/2023				
Mubende District.	CAO	Appreciated the initiative to rehabilitate the dam and welcomed the team and cleared it for community engagement.	The district is already set to support the dam rehabilitation and restoration activities.	The communities around the dam will now have chance not to lose their animals to draught and may as well expand their farms.
	LCV	Commended the project in the areas and pledged support but stressed the need for the MWE to officially write to the district about the project so that they operate with mandate.	Farmers around the dam are all eager to tap into the benefits the dam presents once rehabilitated.	Partnership in the redevelopment of such project is essential. Also suggested that farmers were willing to contribute once mobilized towards the dam rehabilitation.
	DPMO	The dam has a lot of potential to serve the community. It can serve several purposes beneficial to the communities including enhanced water storage, supply and utilization through the year. He requested for other small dams drilled in other water scarce areas like Kigando S/C, Bubanda and Kalonga MWE, the district and consultants should plan for adequate sensitization about the project Addition facilities like sanitation, public animal feeders/drinkers should be part of the rehabilitation plan	The dam can support a good number of users for a long time because of its capacity.	Rehabilitation of smaller dams in the neighbouring sub counties could be more impactful than this one dam.
	DCDO	The project will enable members of this community to engage in productive agricultural activities by irrigation during the dry months to enhance their livelihood and this will improve the livelihoods of people	Improve food security, household nutrition, incomes and also share knowledge.	Embrace inclusive planning with all stakeholders.

		It will solve problems associated with moving long distances in search for water among women and children		
Kyenda Town council	LCIII & LCIs	The dam had long been neglected and its rehabilitation is much recognised. This dam has got a lot of potential once given priority. It supports irrigation, animal feeding, SMEs, water for domestic use.	Livelihood activity diversification and induce innovative survival skills.	The rehabilitation of the dam should not delay. Urgency is very essential
Community around the dam	Crop farmers	Water for Irrigation especially during the dry spell will helps farmers adapt to smart farming to suit the dry seasons.	The dam will offer opportunity for alternative livelihoods and survival.	Establish an irrigation and animal drinking sections to enable farmer progress.
	Animal grazers	The Dam utilization needs to be controlled to ensure no water is not wasted but productively benefits the farmers and domestic users.	Once the dam is rehabilitated animal diseases are likely to be controlled. Thus, improvement in the quality of animal products.	Build better water points for animal water for drinking.
	Other	It will Promote tourism and enhance study Environment. Promote fish farming It will attract industries	The dam will provide water for industrial establishments and provide room for study	Better fish species should be introduced into the dam

All the stakeholders consulted supported the project on the basis that it would solve the water scarcity problem that serious affects the entire community. However, concerns of ownership and sustainability of the project were mentioned, locals are also worried of possibility of being displaced from land they have settled on for years, and expect the authorities to mitigate all project related negative impacts such as destruction of crops, Increased spread of communicable diseases, HIV/AIDS spread in the area and any other negative impact as would be realized.

7.9 Grievance Redress Mechanism

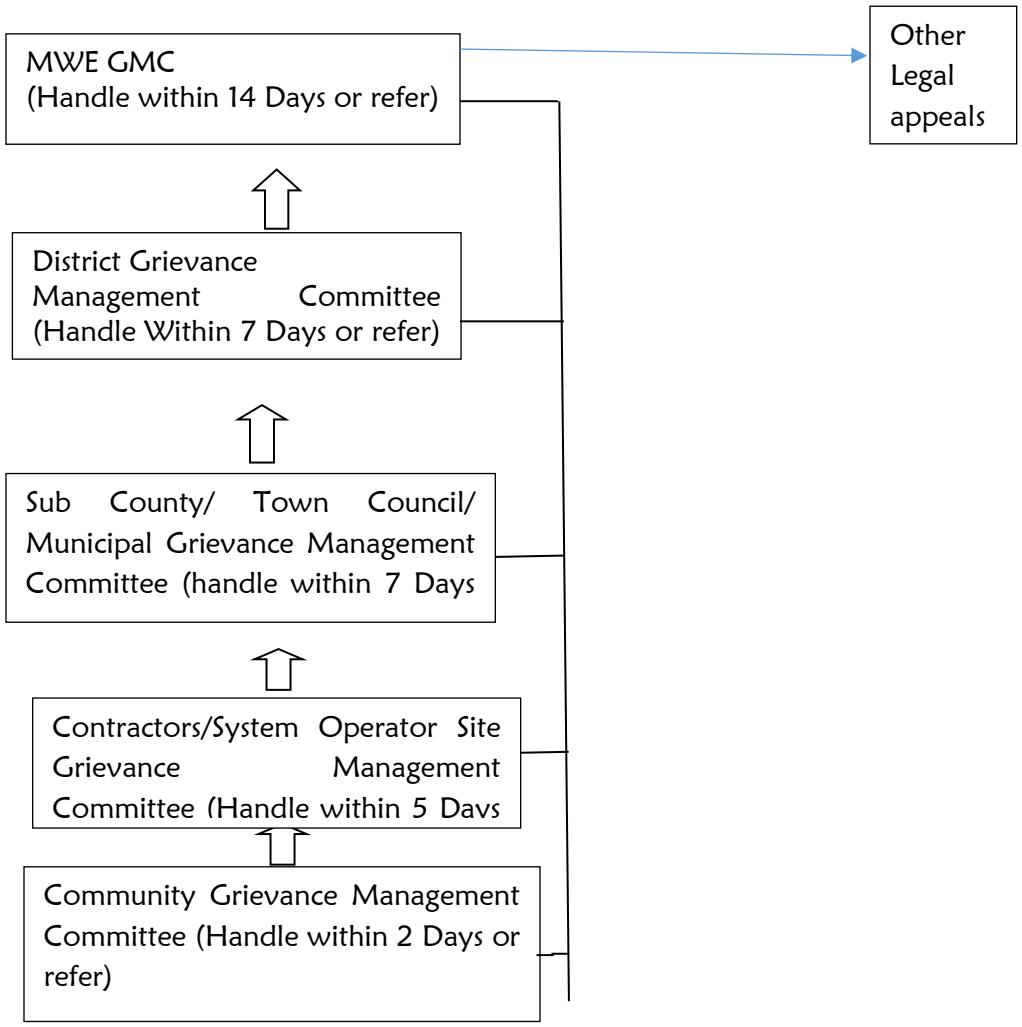
In accordance with the Employment Act (2006), the MWE/WfPRC-C shall ensure that the Contractor and the operator have provided contracts to all workers and representatives of local communities and have established a GRM and grievance redress committee with workers' and local communities' representation. It is the responsibility of the Contractor(s) to ensure that Workers GRMs and with redress and appeal processes and institutions is in place and shared with MWE/WfPRC-C before the commencement of the Construction Phase and during the operation phase.

The steps in grievance handling for the PAPs and the community in general are outlined in Table below and once received, all grievances will be responded to in a maximum of 19 days.

Table 19: Grievance handling steps

#	Step	Responsibility
1	Receive Grievances and Provide PAPS with a Grievance Acknowledgement Form	MWE, RAP Implementation Consultant, and GMCs
2	Grievance Registration and Acknowledgement	MWE, RAP Implementation Consultant, and GMCs
3	Grievance Sorting and Logging in database and tracking system	MWE, and RAP Implementation Consultant
4	Grievance Assignment	MWE
5	Grievance Processing and Feedback (30 days)	MWE, RAP Implementation Consultant, and GMCs
6	Corrective Actions, Grievance Follow Up and Closure	MWE

7.10 Flow of Appeals or Referral of Grievances and Timelines



Grievance Types

The Project grievance mechanism classifies grievances into five types, as described in the following sections.

- **Cadastral Survey Grievances**

Cadastral Survey Grievances may require the Cadastral Surveyor to rectify errors in the initial surveys, subdivision of plots, or boundary markings.

- **Valuation Grievances**

Valuation Grievances arise out of compensation package disagreements and may include the values determined for land, crops & trees, buildings, and other structures as well as errors of omission.

- **Family and Land Ownership Disputes**

Family and Land Ownership Disputes usually include:

- Disagreements between spouses
- Disagreements between the HoH and other family members
- Inheritance uncertainty in cases where the HoH recorded during the surveys has since passed away
- Oppression of widows or children by family members
- Competing land ownership claims

- **Legal Grievances**

Legal Grievances require legal support services as part of RAP Implementation and they include:

- Processing Letters of Administration for deceased cases (where the legal owner or the HoH that was recorded during the surveys has since passed on)
- Incapacitated PAPs
- Absentee PAPs requiring Power of Attorney
- Cases requiring Guardianship Orders
- Misidentification of ownership
- Processing family consents

- **Gender Based Violence (GBV), Sexual Exploitation and Abuse (SEA) and Violence Against Children (VAC) related grievances**

As per the WB Good Practice Note (GPC) on Gender, "gender-based violence is an umbrella term for any harmful act that is perpetrated against a person's will and that is based on socially ascribed (i.e. gender) differences between males and females. It includes acts that inflict physical, sexual or mental harm or suffering, threats of such acts, coercion, and other deprivations of liberty. These acts can occur in public or in private). Women and girls are disproportionately affected by GBV across the globe".

The Project will apply a series of differentiated measures to ensure engagement of women in Project activities and more specifically, to ensure open and easy access to the grievance mechanism for Project Affected Women. Therefore, the following measures will be implemented:

- Focus group and one on one discussions with Project Affected Women including discussions specifically related to accessing the grievance redress mechanism and raising awareness of any GBV risks

- As part of the financial management program, attendees will be sensitized on the GBV
- Establishment of a grievance redress mechanism with procedures and channels to enable confidential reporting of GBV incidents
- Engage with LC1s and other community members to raise awareness on preventing and reporting GBV.

Grievance Database Management and Tracking

All received grievances shall be registered and logged into the grievance register for further management and tracking. An acknowledgement receipt shall be issued to the complainant. MWE shall keep written records of all complaints for effective grievance management.

All decisions reached at the different resolution levels shall be communicated to the complainant and other stakeholders by the Chairperson of the respective Grievance Redress Committee (GRC). It will be the responsibility of the Grievance Officer (GO) to deliver the communications. Evidence of communication of decisions to complainants shall be acknowledged by way of signing a dispatch form or acknowledgement of a file copy.

Agreed corrective action will be undertaken by the responsible agency/ part for example a Local government, MWE, contractor or authorized sub-contractors in close consultation with the complainant within the agreed timeframe and completed action recorded in the grievance database. To verify satisfaction, the Grievance Committee will upon receipt of a completion report from the GO verify that corrective actions have been implemented. A signature of the complainant will be obtained on the consent form. If the complainant is not satisfied with the outcome of corrective action, additional steps may be undertaken to reach agreement or an appeal will be lodged by the complainant.

As part of the broader community engagement process, MWE shall also report back periodically to communities and other stakeholder groups as to how the contractor/System Operator has been responding to the grievances it has received (i.e., time to respond, percentage of closed/resolved cases, number of complaints monthly).

8 POTENTIAL IMPACTS AND MITIGATION MEASURES

8.1 Introduction

Key potential environmental and social impacts of the project for each stage of the project cycle are assessed in this chapter and an Environmental and Social Management Plan (ESMP) is provided in Chapter 9. The ESMP seeks to translate mitigation measures into actions. Prediction and analysis of possible positive and negative impacts of construction of the Earth dam and reservoir works in neighbouring Nalyankanja are discussed. Impact analysis involved determination of nature of impact, its magnitude, extent, duration of potential impacts. For the proposed development, potential positive and negative impacts were identified both for the construction phase and operation phases. Throughout this report, impacts have been characterized as:

a) "Positive" when they;
   - Enhance socio-economic welfare e.g., health, employment,
   - Enhance quality of existing environment.

b) "Negative" when they;
   - Reduce socio-economic welfare of people,
   - Reduce quality of existing environment,
   - Reduce economic value e.g., of surrounding property.

A sustainable and optimal use of irrigation water resources including the other project facilities or infrastructure like the water supply system, animal watering provisions, and transformation of agriculture practice may generate interrelated improvements in Livelihoods, food security, economic and social welfare of the community. However, in addition to the many possible beneficial impacts, adverse impacts may arise from these improvements.

The impact of irrigation and other project components like the water supply system or Earth dam on water for production depends on the quality and quantity of the Earth dam; the proportion of population covered; and the utilization of the dam facilities by the population. In this chapter, prediction and analysis of possible positive and negative impacts of construction and operation phases of the water extraction is presented, with main focus on the proposed construction of the Earth dam. Table 20 below provides a summary of the Positive benefits that will be realised as a result of implementation of this project.

Table 20: Over view of Positive Impacts of the Proposed Project

No.	Impact	Remarks
1.	Increased access to clean water	▪ Elimination of current water shortages. ▪ Improvement of water quality. ▪ Reduction of the time spent and distance travelled to fetch water, which would signify an improvement in the general living conditions of the people. ▪ Improvements in public and household sanitation. ▪ Awareness of personal hygiene. ▪ Overall improved health conditions for the beneficiary population.

		▪ Income generating activities for the poor will increase as result of availability of reliable supply of water in public places e.g. commercial water service providers.
2.	Transformation of agriculture practice	▪ Transform its economy from largely peasantry and subsistence agriculture to modern economy Improvement of water quality. ▪ Improvements in household income and livelihoods ▪ Improvements in public and household sanitation. ▪ Increased access of water for livestock watering
3.	Employment opportunities and increased household incomes and revenues both during construction and operation phase	▪ The use of appropriate labour-intensive methods for some of the construction activities (e.g., construction of the earth dam, office block and Reservoir) would present employment opportunities for local people and generate direct income benefits to local households. ▪ Some people will be employed in the digging of the transmission and distribution networks, sand and stone quarries, and sale of earth materials to the proposed project and in the service sector around the project site. ▪ During operation, plumbers, security guards, managers, supervisors will all be required for the installed water facilities
4.	Income to material/ equipment suppliers and contractors	▪ Earth materials needed for construction, for example, aggregate (stones and sand) will be obtained from quarry operations. ▪ Number of equipment and materials (such as gravel, bricks, plumber, steel reinforcement and cement for civil works) will be sourced locally within Mubende district and the neighbouring districts.
5.	Increased Public Revenue / Taxes	▪ People who have never worked on such projects would acquire such skills, which they would use to seek employment in future. ▪ The Project would provide grassroots management opportunities for the local people to both be involved in the management of the water supply and protect their local environment.
6.	Boost to the local economy	▪ Provision for direct employment opportunities to the workforce thus contributing towards alleviation of poverty and income generation for the local community; ▪ Stimulation of business activities related to contracting works for local entrepreneurs (sub-contractors); ▪ Providing trading opportunities for local communities and other small enterprises in the area; ▪ Providing opportunities for provision of basic and other services for the contractors and immediate community. The project will consider employment of locals.
7.	Crop diversification and Intensification	▪ Improvements in household income and livelihoods ▪ Available information indicates that, the local population in the areas of Mubende are largely engaged in Maize production despite the climatic limitations affecting the crop. Once the irrigation scheme is operational, it is expected that, the famers will take up horticultural production thereby diversifying their income base

8.	Gender Benefits	▪ The expected reduction in water collection distances and times will be particularly beneficial to women and children, especially girls, who bear the burden of fetching water and have to walk long distances or queue for long periods. ▪ It will mean more opportunities for girls to attend schools and more time for women to engage in other economically and educational beneficial activities and also reduce on the cases of gender based violence.
9.	Health Benefits	▪ Direct health benefits of the project to the affected population will result in a reduction in the incidence of water-related diseases particularly diarrhoea, typhoid, intestinal worms, skin and eye problems, and dysentery and cholera. ▪ Loss of productivity resulting from sickness related to water-borne diseases and expenditure on related medical care will therefore reduce.
10.	Improved service delivery	▪ The proposed project would result in bringing improved water and sanitation services closer to the people.
11.	Eradication of poverty and improved livelihoods of the local people	▪ The proposed project would result in an increase in the volume of water for production (through water supply to the population but also through irrigation and livestock watering) which could result in improved livelihoods of the local people. ▪ Water is indispensable for survival and improving the quality of life – for health (drinking, eating and bathing) and for economic development (agro-processing and business). The project would, therefore increase productive activities through reduced sick days and time saved in fetching water.
12.	Combat HIV/AIDS, malaria, typhoid, and other diseases	▪ The awareness campaigns for public health, hygiene and sanitation particularly targeted at women and girls would be widened to include measures for tackling HIV/AIDS and other diseases such as schistosomiasis and diseases related to excreta contaminated water and poor hygiene (cholera, typhoid, and diarrhoeal diseases).
13.	Ensure environmental sustainability	▪ Implementation of catchment and water source protection measures would ensure reliability to the water source.
14.	Develop a global partnership for development	▪ The Project would provide opportunities for the GoU through MWE/WfPRC-C to aim at achieving the Sustainable Development Goals (SDG) specifically SDG 6.
15.	Increase in investment in the area standard of living	▪ MWE/WfPRC-C will invest heavily in the construction and operation of the Kasensero Earth Dam which would involve use of locally available materials. ▪ The business community could take advantage of the proposed development to establish businesses that would otherwise be impossible without safe piped water.

8.2 Positive Impacts during Construction Phase

Few impacts of construction phase for example construction of the new pumpstations are permanent and majority of the environmental impacts attributed to construction works are temporary in nature, lasting mainly during the construction phase or quite often little beyond the

construction period. However, certain conditions could lead the impacts (positive or negative) to continue even after the construction phase for longer duration.

a) Employment opportunities

The design, feasibility and planning phase provided financial benefit and employment for local consultants. This was a positive but short-term and reversible socio-economic impact. Contract provisions for construction require most of the labour force (at least 60%) to be drawn from the local population with particular emphasis on youth and women. Since construction is estimated to go on for about a year, this phase will provide short-term job opportunities for local people. The project is estimated to employ around 50 workers during the construction phase.
Furthermore, indirect opportunities for employment will be stimulated in the other sectors related to construction, such as manufacturers and providers of local raw materials and finished products and providers of services. It is also anticipated that indirect employment opportunities will be created within local communities through the provision of services to the construction teams, such as the sale of food and beverages.

Impact enhancement

The contractor should involve local leaders in recruitment process to ensure full and fair participation of local communities. Wherever feasible, local people should be considered for job opportunities commensurate with their level of skills. Adequate occupational health and safety standards should be provided to ensure the work environment is conducive. A training programme for artisans (builders, carpenters, plumbers) in the project area could be facilitated by the project to ensure skills transfer during the construction period and maintenance of the earth dam during the operation.

b) Income to material/ equipment suppliers and contractors

Although some of the equipment and materials required for the project will be sourced nationally or even internationally to ensure quality is achieved, a number of equipment and materials (such as gravel, bricks, lumber, steel reinforcement and cement for civil works) can be sourced locally within Kyenda Town Council or Mubende district and the neighbouring districts. Local suppliers of materials and equipment involved in the project will benefit financially. This is a positive but short-term and reversible impact.

Enhancement measure

Earth materials needed for construction, for example, murram; aggregate (stones and sand) will be obtained from quarry operations. Conscious or unwitting purchase of these materials from unlicensed operations indirectly promotes environmental degradation at illegal quarry sites and can cause medium to long-term negative impacts. It should therefore be a contractual obligation for contractors or/and the Sub Contractors to procure construction materials from quarries legitimately licensed by the respective district authorities.

c) Acquisition/improvement of skills

People who have never worked on such projects would acquire such skills, which they would use to seek employment in future, and as a benefit from the capacity building incorporated in the program, the implementing authorities would have adequate capacity for managing the

environmental and social assessment and permitting processes. The Project would provide grassroots management opportunities for the local people to both be involved in the management of the water supply and protect their local environment.

Enhancement measures

The Local leaders will play a vital role in screening and recommending those seeking for employment to weed out wrong elements who may instead cause serious setbacks to the project in terms of offering labour both skilled and unskilled.

d) Increased Public Revenue / Taxes

The implementation of the project will increase revenue and taxes for both the central and local authorities. This includes indirect taxes resulting from the construction project such as Value Added Tax (VAT) on materials and services, Pay As You Earn (PAYE) for construction workers and other formally employed persons who will form by far the majority of created employment opportunities) as well as revenue to pension funds such as National Social Security Fund (NSSF).

e) Impacts on Local Capacity

The scale of the construction of the project with the logistics involved and speeds of construction that will be required, while maintaining construction, health and safety standards will involve considerable management and planning skills and will contribute to capacity building within the country's engineering and construction sector. Co-operation between international suppliers of specialized equipment and contractors and local contractors and sub-contractors and companies will result in the transfer of skills and will also build additional local capacity.

f) Boost to the Local Economy

The workforce will get most of their food and other necessities from the surrounding area and this will provide a market for the local agricultural producers, and craft producers and other small businesses (local shops). This will in turn increase the incomes of the local people, which can be invested in other (productive) activities and be used for paying school fees, medical expenses and other domestic needs. The project will stimulate local economic activities by:

- Provision for direct employment opportunities to the workforce thus contributing towards alleviation of poverty and income generation for the local community;
- Stimulation of business activities related to contracting works for local entrepreneurs (sub-contractors);
- Providing trading opportunities for local communities and other small enterprises in the area;
- Providing opportunities for provision of basic and other services for the contractors and immediate community. The project will consider employment of locals.

g) Capacity Building

It is expected that for the construction of the earth dam, some degree of capacity building will be provided (organised and un-organised) through the transfer of new technologies and new skills to (un-skilled) labour. This will happen through on-the-job training as well as through exposure to modern water quality practices, management and logistics procedures. Local sub-contractors and companies will also benefit from the transfer of skills and will also build additional local capacity.

Enhancement Measures

To maximise capacity building for local communities, programs and technical training courses as well as on-the- job training will be provided in specific skills areas for suitable candidates from local communities to enhance minimum levels of education and the possibility of being employed during operational phase.

h) Infrastructure

The community will benefit from an improved road network, as the construction activities will necessitate roads to be graded in some cases to improve access especially to the Earth dam and other project components/facilities.

Enhancement measure

The communities along the road should be sensitized and encouraged to be cooperative when this kind of infrastructure, for example, new access roads will be established.

i) Rise in value of land and property

The value of land within the project area could go up due to the likely increase in activity in the area due to the construction and operation of the project.

j) Enhancement of Tree Species Diversity

Environmental management best practices dictate that the proponent makes sure that after construction is over, the environment is restored. The proponent could increase the biodiversity of the project area through landscaping projects that would engage the neighbourhood and afforestation with native, non-invasive species. The initiative's sustainability would be ensured by regular auditing of this activity.

k) Increase in land value

Because to the availability of water and the enhanced infrastructure, the dam will attract people to invest in and stay in the area. As more people are encouraged to stay in the project location, the value of property will also increase.

8.3 Positive Impacts during Operational Phase

I. Improved health status of households of the project host communities

The provision of an adequate, safe water supply and sanitation has positive impacts on the health of users by greatly reducing the incidence of communicable enteric and infectious related diseases, which, in many instances occur in communities due to lack of adequate sanitation and potable water supply. Both potable water supplies as well as safe disposal of human excreta are needed to break the chain of transmission diseases. Changes in water supply may affect different groups of disease in different ways; one group may depend on changes in water quality, another on water quantity and availability and another on indirect effects of standing water which is related to sanitation. Therefore, improvement in water supply in several of the poor informal settlements will directly contribute to improved public health within the project communities and their livestock.

Enhancement measures: Educate users on the proper use, regular cleaning and effective maintenance of both the household and public facilities through stakeholder engagement, social and risk management.

II. Educational enrolment and attendance

Operation of the earth dam will lead to considerably increased and consistent access to safe water for the project host communities. In relation to increased provision of potable water supply, time savings are the most immediate and easily measured benefits although its magnitude will depend on the conditions prevailing before the construction of the piped water supply. Consequently, time spent on searching and waiting for water by women and children will be saved. This will enable children, especially the girl child to regularly and promptly attend school, while mothers will get more time to prepare their children for school. Assuming other factors are available (such a scholastic material, teachers) school attendance and performance will improve.

III. Acquisition of new skills

Most water related projects and infrastructures like earth dams are built through the labour of local residents who are directed by a small cadre of sub-professional or supervisory personnel from outside the community. Community participation can also have a great impact on the effectiveness and sustainability of water supply and sanitation programs. It can also help to minimize many of the potential negative environmental impacts associated with them. Therefore, there will be need for the system operator to recruit and train some of the local members in the operation and maintenance of the earth dam facilities. During construction phase, the client together with the local leaders will identify and nominate local members to be trained by the contractor in the operation and maintenance of the earth dam facilities.

Enhancement measures: Where the required skills are available locally, the local people should be given first priority commensurate to their level of training.

IV. Improvement in household economic status

The increased provision of water from the Earth dam has positive beneficial impact on health and ultimately directly and indirectly on productive and economic benefits.

- ***Livestock and poultry keeping:*** Improved water supply would lead to an increase in poultry and livestock keeping in homesteads. A permanent water source near or on the farm will permit an increase in cattle and improve the production of milk and beef. Those farmers who previously felt water to be a crucial constraint preventing them from keeping such livestock as grade cows and pigs, poultry like chicken or expanding their activities in this regard, may find it feasible to do so.
- ***Small- Large scale gardens:*** The increased provision of water supply from the Earth dam may have positive beneficial impact on the irrigation of small-scale gardens around homes if there is excess water available and it can be used for irrigation of small-scale garden plots near each household or tap. This will have positive beneficial *impacts* on increasing agricultural productivity and perhaps also improving nutrition status of households.
- ***Small scale industries:*** The ample availability of piped potable water supply may lead to improvements in the small-scale industrial development and increased production.

Enhancement measures: Water supply should be set taking into consideration the different levels of users. The users should also be educated to avoid wasteful use of the resources through the stakeholder engagement, social and Environment risk management.

V. Employment opportunities

Operation of the constructed Earth dam will create additional long-term technical and non-technical job opportunities for professionals, casual labourers, etc. Staffing of about 50 recruits will be required in the Town Council to operate the constructed Earth dam by: Operating the system in accordance with the service standards; Maintaining the system; Developing the system; Billing the consumers; Collecting revenue; Receiving applications for and making new connections; Repairing and maintaining to the earth dam system or associated assets; Attending to all customers; keeping records of the operations of the system; and writing status and E&S reports for the operations of the system.

Enhancement measure: Wherever feasible, local qualified people will be considered for job opportunities. Adequate occupational health and safety standards should be provided to ensure the work environment is conducive.

VI. Transformation of agriculture practice in the areas:

The proposed Kasensero earth dam Project is consistent with GoU strategic development enshrined in its Vision 2040 in which, the country strives to transform its economy from largely peasantry and subsistence agriculture to modern economy through irrigation and livestock watering. In this Vision, Uganda aspires to transform the agriculture sector from subsistence to commercial agriculture through mechanization and introduction of modern irrigation systems which is what is being planned under this project.

VII. Sustainable and optimal use of irrigation water resources:

The project provides opportunity to promote agricultural development strategies through sustainable use of the country's fresh water resources through measures such as irrigation coupled with catchment management interventions. Available information indicates that, with even full exploitation of irrigation potential only 14.1% of Internal Renewable Water Resources will be utilized. To mitigate rampant country wide seasonal local scale water shortages, GoU plans to put in place water reservoirs as planned under this project. This project will be relevant in that water will be provided for irrigation and animal watering within the project area.

VIII. Serve to address food security in the areas of the project:

The planned irrigation project, is a timely intervention by GoU to address water scarcity which has chronically affected crop production in Mubende District. It is well known that Agriculture is major source of livelihood in the district. Therefore, the planned irrigation intervention is timely in addressing water needs for crop production and addressing food security a situation which is worsening by over-reliance on traditional rain-fed crop production. Irrigation and animal watering will lead to increased food production in the area hence food security.

IX. Promotion of gender equality and empowerment of women and the girl child

The proposed project would free women and girls of the burden of having to spend a lot of their time collecting and carrying water on a daily basis often from sources distant from their houses since there is a component of extending safe water to the Earth dam host communities. This reduction in burden would allow women and girls time for other activities including involvement in economic ventures that could contribute to reducing poverty and furthering their education (thus increasing school enrolment).

X. Attainment of the Sustainable Development Goals; SDGs

The effect of providing safe water and hygienic sanitation services would help in the attainment of all other Sustainable Development Goals (infant mortality, poverty reduction, improved health and increased school enrolment rate).

XI. Crop diversification and intensification:

Available information indicates that, the local population in the areas of Mubende are largely engaged in Maize production despite the climatic limitations affecting the crop. Once the irrigation scheme is operational, it is expected that, the famers will take up horticultural production thereby diversifying their income base. This diversification implies diverse sources of income at household and improved livelihoods as well.

XII. Environmental sustainability

The skill for managing the earth dam facilities would result in building social capital which could be extended to better manage the local environment and water resources. The project would include environmental awareness which could be deployed to manage the environment better

XIII. Improved household acreages:

In most rural areas, crop production systems using rudimentary cottage labor and equipment have for long typified agricultural production in the proposed project areas which in a way has kept it plunged in food insecurity, limited production and productivity, limited household acreages summing to poor household incomes. In addition, the irrigation technology to be introduced will likely be one which is more adaptable can be customized to household levels. The project is envisaged to assist farmers clear their lands alongside a host of farming husbandry support services which will bring about improved production at household levels.

XIV. Combat HIV/AIDS, malaria, and other diseases

The Project would result in prevention of vector borne diseases related to water sources (such as guinea worms, Onchocerciasis, and schistosomiasis) and diseases related to excreta contaminated water and poor hygiene (cholera, typhoid, and diarrhoeal diseases) due to the increased provision of safe and clean water. Safe drinking water, personal/household hygiene and improved sanitation would reduce infant/child morbidity and mortality; improve their nutritional status and their ability to perform better in schools. The marginal price of improved hygiene and sanitation promotion would make them cost effective health interventions.

8.4 Negative Impacts during pre-construction and construction

a) Land acquisition for infrastructure and loss of structures/property

This will include permanent land acquisition for the construction of the Earth dam and other project infrastructures like office block, pipeline network and trenching to the detriment of land owners. The land-take would be permanent where all the project components would be constructed and temporary along the pipeline network. However, both the transmission and distribution lines would be confined to the road reserves where possible.

Another important distinction in defining impacts is between permanent land acquisition and permanent land restrictions, which are defined as follows:

- **Permanent land acquisition** involves the project acquiring all land including land registration and title processing. This is the case for land required for the Earth dam, and reservoirs.
- **Permanent land restriction** involves limitations imposed on the land which prohibits building any structures or cultivating perennial crops and trees within the corridor.

However, any existing household retains land use/ownership rights and cultivation of seasonal crops within the easement corridor, or any other land uses. Land use restrictions decrease land use potential which decreases the land value. It is this diminution (reduction in value) that is compensated

Mitigation Measures

- The district local Government authorities were engaged and offered land for the development. No grievances were reported and or are envisaged.
- MWE shall ensure that this land and any impacted assets are compensated for in accordance with the provisions of the Land Acquisition Act.
- Land owners that require compensation (where possible) as Project Affected Persons should be compensated before commencement of the project activities

b) Loss of vegetation flora and top soil

The existing vegetation and top soil will be cleared to give way to the construction process on all sites. The study team discovered that the project area will cover a small space and therefore limited flora of significant impact will be affected. However, clearing of this vegetation will lead to permanent loss of vegetation cover and likelihood of soil erosion due to removal of top soil. The project activities are likely to destroy vegetation with subsequent loss of some shrubs and grasses from the area of operation albeit on a small scale. This is likely to cause loss of habitat and disturbance to faunal communities in the affected sites but at an insignificant level.

Proposed Mitigation Measures

- After construction, there should be landscaping and re-vegetation. The premises will be planted with vegetation/grass and ornamental trees.
- Minimize vegetation clearance by clearly demarcating work areas.
- Provide environmental awareness training to all employees.
- Rehabilitate all disturbed areas

c) Fauna

Dredging within the dam and depositing material within the vicinity of the scheme may disturb fauna by blocking access to feeding grounds, breeding grounds or injury from moving or dredging vehicles. The flood mitigation proposed area does not harbor a lot of wildlife accordingly all mammals encountered were of least concern. Disturbance or loss of protected/endangered animal species/communities and their habitat due to construction activities (noise, dust, fumes, pollution, vehicles).

Mitigation / Enhancement Measures

- Minimise un-authorised access to the wetland area and reduce disturbance to the fauna habitat
- Monitor for the two key species periodically to determine changes in ecosystem
- Project work force must do a pre-work site survey to ensure no fauna is harmed during dredging. Any fauna found on site before the day's activities is to be relocated a safe distance away from project activities
- Sensitize workers to respect wildlife and not engage in killing animals or consuming wild eggs
- Maintain vehicle speeds at 30km/hr to avoid road kills
- No works in an area once a nest is observed. Communication to MWE should be done immediately and UWA engaged to remove, where activities would damage the fauna nest

d) Insecurity Risks

Influx of people in a project area in search of jobs is likely to come with a host of vises such as thefts, crime and general deterioration of area security. Materials prone to theft include cement, fuel and equipment. Theft of materials will lead to an increase in the project cost and project delays. Besides theft of the project materials, the community property and assets could also be stolen. The impact will be short term and may go up to district level. The impact will moderately affect the communities and the project in general. The significance of this impact is thus assessed as medium negative.

Mitigation / Enhancement Measures

- Collaborate with the local security set ups in areas of labour recruitment such that, priority is given to locals in the areas in terms of casual and non-skilled jobs;
- Those seeking jobs are to present their details accompanied with recommendations from their area LCs as well as next of kin for purposes of traceability in case of engagement in any misconduct or otherwise;
- Employ private security guards at the construction site.
- The contractor should work closely with the area police out-posts, local defence secretaries and general community policing.
- Contractor will put in place an internal control system to curb cases of theft of materials.
- Fencing off the project sites to prevent intrudes or violet people from vandalising the facilities

Impact Significance after mitigation

After application of the above mitigations, the impact significance was of a minor ranking. Therefore, no further mitigations are proposed at this stage.

e) Effects of Poor Solid Waste Management

Waste will be generated from the construction sites. The waste to stream from the construction sites will include Cement bags, timber and pipe cuttings empty water bottles, food remains from the construction workers and other forms of waste. If not well managed, the area could be prone to nuisance from foul smell, breeding of vermin and vectors, and lead to outbreak of diseases.

Impact significance: Extent of this impact will be local to areas where waste is dumped or their immediate neighborhoods. The impact ***intensity*** is assigned ***low*** due to the lack of a well streamlined waste management system in Mubende. The ***sensitivity*** of receptors is assessed as ***'low'*** given that similar activities have and are taking place in the area and that an experienced contractor will be hired. This gives rise to minor impact significance.

Proposed Mitigation Measures

- Waste collection bins will be provided at strategic positions at the construction sites for temporary waste storage.
- The waste collection bins should be provided with covers to avoid spillage by scavengers and clearly coded for sorting purposes.
- The contractor will hire a certified waste collection company to transport the waste for final disposal to designated waste dumping sites by NEMA/MDLG/Kyenda Town Council.
- Burning of waste on-site shall not be allowed.
- Encouraging the practice of reusing or recycle some of the generated solid wastes

Impact Significance after mitigation

After application of the above mitigations, the impact significance was of a minor ranking. Therefore, no further mitigations are proposed at this stage.

f) Generation of Noise

Increased noise levels will be experienced from the use of heavy construction equipment. Increased vibrations during construction by equipment movement, excavations and blasting may transform the calm and quiet conditions in the area. Noise during the project construction will mainly be caused by construction machinery, such as bulldozers, excavators, pile drivers, concrete mixer trucks, and transport vehicles among others could exert noise impact. The vibration effect during the construction period will mainly result from the operation of machinery and equipment. However, the site is set aside for the dam construction works and it was observed that the site is not inhabited, the construction process will therefore have no key receptors except for the construction workers who will have the necessary PPEs such ear plugs.
Construction traffic associated with the construction will be routed via main roads and along the ROW as far as is possible. Some minor roads will have to be used for access to the pipeline spread itself and some new access roads will be created.

The increase in traffic movements on minor roads may cause a noticeable increase in daytime noise levels through small villages; this effect will be localised and temporary, and will, for the most part, be restricted to the construction phase of the project. A number of roads will require repair prior to use for construction vehicle access. These repairs will help to reduce noise levels

generated by such access, and other vehicular movements.

Impact significance: Due to the intermittent and short-term nature of the activities, the ***intensity*** of impact is assessed as ***low*** and ***sensitivity*** of the receptors as ***medium***, given that most of the proposed routes for the water pipelines are located in relatively noisy mixed residential and commercial areas of the project area and its neighbourhood. This results into ***moderate*** impact significance.

Proposed Mitigation strategies:

- Contractor will be careful when selecting the working equipment to avoid use of old equipment or damaged equipment with high level of noise emissions that would have a negative impact in the environment.
- Contractor will ensure that equipment is properly maintained and fully functional in accordance with the manufacturer's recommendations.
- The contractor should ensure that noise levels emanating from machinery, vehicles and noisy excavation and construction activities are kept at a minimum for the safety, health and protection of people in the nearby areas.
- Regular maintenance, monitoring and, where necessary, the use of silencing equipment will be employed with the aim of reducing noise emissions.
- The selected contractor will be required to submit detailed information on the noise levels which will be generated by the specific methods and equipment proposed and to identify actions required to minimise the noise impact.
- Pumps, generators and other mobile equipment will be sited as far as practicable from housing and other noise sensitive locations, work will not be carried out Sunday during service time or hours.
- During periods of inactivity, equipment will be switched off whenever possible. A limited number of construction activities may have to continue on a 24-hour basis. These include horizontal direction drilling, pipeline cleaning and hydrostatic pressure testing which are relatively low noise activities.

Adoption of the above mitigation measures will reduce impact intensity to "very low" resulting in a residual impact of minor significance.

g) Increased incidences of diseases

The increase of people involved in the project activities is likely to increase the incidences of diseases in the area. The above situation will be aggravated by the entry of commercial sex workers into the area following the commencement of the project activities. Consequently, there will be potential risk of contracting sexually transmitted diseases (STDs) especially the Human Immuno-Deficiency Virus/Acquired Immuno-Deficiency Syndrome (HIV/AIDS) and other communicable diseases like Ebola, COVID and water born diseases among the program workers and the local communities. This will be increased due to influx of people seeking for employment.

Mitigation / Enhancement Measures

- The contractor should liaise with the District and Town council CDO to mobilise communities during the recruitment process to reduce on influx of people who are unskilled.
- The contractor should emphasise equal opportunities for both men and women.

- The Contractor should, in conjunction with local health authorities, undertake to educate and sensitise the workforce on communicable diseases such as cholera, STDs and HIV/AIDS. Condoms must be made available to the workforce.
- Provision of hand washing facilities and clean toilet facilities at the sites for purposes of hygiene promotion.
- Creation of awareness and hygiene promotion campaigns within the project area

h) Change in Land scape/visual intrusion

This will mainly arise from the erection of service reservoir tanks on the high altitude. In addition, visual intrusion will occur where project activities are likely to create disfigured landscapes in the project area especially where the construction activities will result in deposition of large spoils and digging of the trenches.

Mitigation / Enhancement Measures

- The contractor should maintain as much as possible the existing landscapes and plant trees and vegetation to enhance the visual aspect.
- Rehabilitate all areas disturbed by construction and landscape with trees, grass and shrubs

i) Increased accidents and occupational hazards

Implementation of the project will definitely increase volume of human and motor traffic in the project area. The increase in human and motor traffic will be aggravated by the transportation of construction materials, water pipes and other equipment required in the construction of the water supply facilities. This is likely to result in a higher risk of accidents and occupational hazards occurring in the area of operation. Factors that may exacerbate this situation are inadequate appropriate working gears for project workers including the helmets, overalls, boots and gloves. During the construction of the proposed project, it is expected that construction workers are likely to have accidental injuries as a result of accidental occurrences, neglect of the use of protective gears among others. Accidents may also occur to members of public, livestock and wildlife from open trenches, but they will be reduced by fencing of the construction site and restricting access to the site.

Impact significance: Accidents could cause considerable ecological damage, financial loss and harm to human life. While largely reversible, some impacts such as loss of human life are irreversible. The receptor ***sensitivity*** is considered ***high*** given that such impacts may be irreversible once they occur. The impact ***intensity*** is considered to be ***low*** since MWE/WfPRC-C will procure a qualified contractor who is aware of OHS measures. Nevertheless, this gives rise to an impact of ***moderate*** significance

Mitigation / Enhancement Measures

- The contractor should ensure that workers are provided with adequate personal protective wear to mitigate injuries such as gloves, helmets, overalls and gumboots.
- Traffic guides and signs should be utilized to avoid accidents on busy roads and junctions especially with vehicles transporting materials.
- Best transport safety practices will be adopted with the goal of preventing traffic accidents and minimizing injuries suffered by project personnel and the public by: employing safe traffic

control measures, including road signs and flagmen/traffic guides to warn of dangerous conditions and children crossings; and setting speed limits on all access roads in the project area will be 30km/h for light vehicles and 20km/h for heavy vehicles.

- Service ducts installed by the road contractor will be used where applicable to avoid cutting through roads that have just been upgraded.
- All workers, including sub-contractors and casual labor, will undergo an environmental, health and safety induction before commencing work on site. This will include a full briefing on site safety and rules.
- The affected communities will be informed of the timing and duration of the construction activities across access roads and any uncertainties or potential for change and also sensitized on the dangers of construction sites and the need to keep away.
- Restrictions on hours of driving (including night time restrictions where sensitive receptors may be affected) and timing of vehicle movements to avoid busy periods in urban areas, particularly the start and end of school and the working day
- Control over routes used by vehicles to avoid construction traffic using inappropriate roads and other road users gaining access to the pipeline spread and access roads.
- Ensuring adequate vehicle maintenance to ensure that vehicles do not produce significant emissions and that all safety features including brakes, lights etc. are in good condition.
- Adoption of the above mitigation measures will reduce impact intensity to "very low" resulting in a residual impact of minor significance.

j) Sourcing of Construction Materials

Sourcing of materials such as sand, gravel bricks/blocks and timber if not well regulated and controlled can have a significant impact in the points of sourcing.

Proposed Mitigation Measures

- The Contractor should liaise with local authorities to ensure that materials such as sand and gravel are only taken from quarries and borrow pits with the necessary environmental permits.

k) Air quality

Limited air pollution will occur mainly due to fugitive emissions and dust generation from various construction activities. Particulate matter pollution is likely to occur during the site clearance, excavation, loading and transportation construction materials. However, the site is not inhabited and will therefore have no key receptors except the construction workers who will have the necessary PPEs such as dust masks.

Proposed Mitigation measures

- The areas of such works be routinely sprinkled with water to suppress dust during works.
- Restricting excavations to those sites needed for the works.
- For the safety of the workers on such areas, the workers supplied with appropriate PPEs to protect them dust nuisance.

l) Impact on current water ecosystem services

Disturbance or loss of protected/endangered plant species or communities (terrestrial, wetland, aquatic) due to construction activities of the different project components.

Proposed Mitigation measures

- Project implementation should be planned in a way to allow users of these continued Earth Dam access. This is to be adhered to, bearing in mind that the project area is prone to water scarcity and long droughts.

m) Social Misdemeanour by Construction Workers

While most workers may originate from the local community where they have families, there might be others from distant places and working away from their families. With some disposable income to spend, this might induce illicit sexual relationships,. Irresponsible sexual relationships in project communities can break families and heighten risk of contracting HIV/AIDS. Illicit sexual relationships can be short-term but have long-term and irreversible effects. The Code of Conduct for Contractors has to be signed by contractor upon award of contract and copies displayed for workers to view. It ought to be translated into predominant local language of the workforce.

Impact significance: Duration of the impact will be short-term or long-term depending on whether HIV/AIDS is contracted and the extent of the impact will be local or national depending on origin of construction workers. The ***intensity*** of the impact is ***very low*** given the small size of the project and

other similar construction activities like for roads are already taking place in the area. ***Sensitivity*** of the receptor is rated ***high*** given that some of the outcomes have a long-term effect. Therefore, significance of the impact is ***minor***.

Proposed Mitigation measures

- As a contractual obligation, contractors shall be required to have an HIV/AIDS policy and a framework (responsible staff, action plan, etc.) to implement during project execution.
- A sensitisation programme for the would-be affected local communities will be conducted prior to commencement of and during the project implementation.
- A code of conduct (appropriate to behaviours in workplace and with respect to relations with local community) will be developed and approved by MWE/WfPRC-C which will be signed by all workers on the project.
- Local workers will preferentially be employed, paid directly through their banks and access to bars by workers from outside the project area in the local communities controlled.
- All construction workers shall be orientated and sensitized about responsible sexual behaviour in project communities.

n) Destruction of Cultural Resource/Heritage

No known archaeological or historical sites exist in the project area or around proposed project sites and no impacts on any features of importance to national heritage are expected. Any such features that may be found (e.g., during excavation works) that were not apparent on surface

investigation or that did not come to light during the ESIA study will be reported by the project and a chance finding procedure will be followed as annexed.

o) Violence Against Children (VAC) and Child labour

According to the consultations made during the stakeholder engagement, most of the community members are aware of children's rights. On the other hand, the common abuses are child labour, parental neglect, child marriage, violent discipline/harsh punishment and sexual abuse. With the implementation of the project, there must be stringent measures in place to protect children's rights against child abuses.

Impact significance: The receptor sensitivity is **medium** given the number of children and construction activities at the different sites while the intensity is **medium** given the temporary nature of the construction activities, however, some of the impacts may be irreversible. The impact significance is thus assessed to be **major**.

Proposed Mitigation measures

- The contractors should put in place child protection policy/code of conduct to ensure that no child is employed during the construction works and zero child rights abuses are recorded.
- Preparation of the Stakeholder Engagement Plan to cater for mobilization and sensitization on child rights and child protection.
- Strengthen the referral pathways for cases of child rights abuses by involving the relevant child protection actors such as LCI, Police, CDOs, Probation Officers in some of the project activities like community mobilization and sensitization, development and dissemination of the referral pathways. This would reinforce prompt response to cases of child rights abuses and derail the abusers from perpetrating the vice further.

p) Domestic, Sexual and Gender Based Violence (SGBV)

SGBV is likely to be experienced, for example, an increase in intimate partner violence (IPV) when compensation schemes that share funds equally among husband and wife at the household level do not provide adequate sensitization and safety measures to reduce potential for increased tensions due to females receiving funds. This also refers to other GBV-related risks incurred as a result of project implementation that do not adequately consult women and adolescent girls in the community about safety and security issues related to the delivery of water and sanitation services. However, the impact intensity is ranked as low because of the low number of workers who would be exposed to incomes that can encourage irresponsible behaviour. The overall significance is ranked as ***Moderate***.

Proposed Mitigation measures

- Sensitizations should include the men to champion the GBV/DV fight and should as well target awareness creation sessions for women and girls since they are the most prone.
- Promote good relationships and improved communication skills amongst couples and positive parenthood through the various stakeholder engagements.
- Emphasize GBV in codes of conduct for contractors and these should be disclosed in local language and be widely publicized to all workers and community members in the project

area.

- Accessible grievance reporting, referral pathways and support systems should be established for and popularized for workers and community members.
- Deliberate measures to ensure that the Resettlement Action Plan (RAP) takes into account gender dynamics including GBV at household and community levels especially during compensation payments.
- Social management plans should be developed to include aspects of GBV.
- All construction workers shall be orientated and sensitized about responsible sexual behaviour in project communities.
- The Contractor should have a "No sexual harassment" policy and mainstream it to ensure strict adherence to established mechanisms to avoid the emergence of these challenges.
- Contractor should restrict access to the workers' camps to only authorized persons.
- The contractor shall involve police in case of illicit behavior.
- MWE should ensure that social safeguards personnel are recruited as part of the project implementation personnel to supervise contractors and to continuously engage communities concerning SGBV.

- ***Crime, Drug Abuse and Prostitution***

The Earth dam implementation will attract a number of workers on the site who may have different behaviours and habits. These may result in the increase in the number of crimes, drug abuse and prostitution

Proposed Mitigation measures

- Contractor should involve local (LC) leaders in labour recruitment to reveal criminal record.
- The hired labour shall be made to sign the code of conducts to hold them accountable
- Contractor should work with local authorities and police to contain criminal activities.

q) Labour Exploitation

The construction works for the water project will require a number of employees for its various works though details of the specific labor needs will be clearer during works. It is estimated that, about 50 workers will be recruited in the project for its various works and these to include: Civil engineers, works supervisors, Human resource managers; Clerks of works, Laborers; Security
Other staff shall include Skilled Workers like drivers, masons, carpenters, operators, technicians, admin staff, foremen, mechanics, welders and Unskilled Workers mostly the casual Labourers, cleaners, kitchen and traffic control.

Proposed Mitigation measures

- Contractor should verify the age of every applicant before they are recruited in order to eliminate any cases of Child Labor
- Contractor should ensure that they pay hired labour on time or have a solid justification for delayed payment
- The contractor should stick to the agreed working hours
- Contractor shall discuss the work schedule with the local labour obtained from the project area so as not to clash with cultural norms

8.5 Negative Impacts during the Operation Phase

i) Downstream flow variations

Downstream flow variations may be either beneficial or harmful. Releasing of water to simulate normal flood conditions can be beneficial in that it can lead to fish migration and create enabling environment for trees to set seed and germinate. On the other hand, low flow variations can affect fish migration and their breeding patterns. Similarly, low flow variations can affect downstream community who depend on the river for their domestic and livestock water use. For the case of the Proposed Kasensero Earth Dam the downstream flow variation will be beneficial to the local community.

Proposed Mitigation measures.

- MWE should abstract the right amount of water recommended on the Abstraction permit issued by DWRM.
- Frequent monitoring of the water yields abstracted
- Get involved with Water source catchment protection and management planning that could improve land management and restore groundwater recharge.
- Encourage contour ploughing, mulching and other agricultural practices that increases soil water retention and percolation into the underlying aquifer

ii) Water quality and pollution

Kasensero and surrounding location/ do not have formal wastewater disposal system. Provision of additional water to the surrounding location is expected to spur economic growth of the area leading to additional wastewater which will unlikely be managed by use of septic tanks. This can cause pollution of surrounding rivers besides increasing cases of water related diseases which are already significantly affecting the local community. Suitable mitigation measures have been proposed.

Proposed Mitigation Measures

- The reservoir should be constructed with an embarkment to prevent water, sand and other debris cannot fall in. Transmission and distribution pipes should also be covered underground to reduce exposure.

iii) Risks of water and vector-borne diseases:

The water in the reservoir will be stagnant and will act as a breeding ground for mosquitoes and this will have consequence in terms of incidence of mosquitoes and malaria at large in the area. The water in the reservoir may also be unsafe for human consumption as such, contaminated by human activities in the vicinity of the dam, thereby leading to water borne diseases like typhoid. The impact will be medium negative and can be mitigated through:

Mitigation measures

- The project will work closely with some of the on-going water and sanitation programs in the district especially on hygiene and water to reduce mosquito breeding areas and bushes around households;
- The reservoir will be fenced off with restricted access, but in addition the communities will be sensitized to sleep under treated mosquito nets distributed under the Ministry of Health Malaria Control Program; and
- Have primary health care programs in place to create awareness on the risks of diseases from dam waters to discourage farmers from using the irrigation water for domestic purposes.

iv) Introduction of invasive species:

The invasive species may include pests and noxious weeds. Accumulation of sediments and high concentration of nutrients in the water can lead to proliferation of aquatic weeds like water hyacinth, *Pistia* and water cabbage. The impact is likely to occur in the dam reservoir and its shores. The likelihood of the impacts occurring is small negative.

Mitigation measures

a. Ensure construction equipment come on site while clean and leave site after being cleaned to avoid spread of noxious weeds or invasive plant species; and
b. Sensitize communities about the need to control the spread of water hyacinth and encourage them to physically remove and destroy water hyacinth found floating on the dam and other water courses. In addition, mechanical removal will be considered.

v) Community Health and Safety:

During the operational phase, there is likely to be risk of drowning by both children and adults in the reservoir. The children or adults may be enticed to swim in the reservoir and may end up drowning or may drown accidentally while passing by. Furthermore, domestic animals may also drown in the reservoir while trying to drink from it. The risk of drowning can be long-term and irreversible when it involves death/loss of life. Dam release operation may lead to unexpected high flows downstream and potential impacts on community safety and downstream activities.

Mitigation measures

- Fencing off and employing of security guards to man security of the dam facilities and other sensitive infrastructure
- Sensitization of the community on the risks/dangers of swimming in the reservoirs especially for the children;
- Provide watering points for livestock outside the reservoir; and
- There should be Project Management Committee which should address issues of operations of the reservoir

vi) Low hypolimnetic oxygen concentration

Proposed Kasensero Earth Dam is likely to suffer from hypolimnetic oxygen depletion during the rainy season because large amounts of fresh oxidizable matter which are likely to be washed into the reservoir and settle at the bottom. However, this will only happen during the initial

period of a few years after dam commissioning due to the expected submergence of natural vegetation. The environmental impact of this to the aquatic fauna will be minimal because the reservoir ecosystem will still be at the formative stage and very few species will have established in the area.

Mitigation measures

- Monitoring of the hypolimnetic oxygen within the earth dam/Reservoir and nearby water bodies.

vii) Long-term reservoir nutrient build-up

Improper catchment land-use in the agricultural area above the proposed Kasensero Earth Dam if unchecked could eventually lead reservoir nutrient build-up which will affect the quality of drinking water. Nitrogen is likely to be anthropogenically transferred diffusely from the farming areas and pastures especially through the movement of fertilizer residue and animal excrement. High total-P content is likely to occur in Kasensero Earth Dam especially at the onset of the long rains through soil movement into the waterbody. High leakage of fertilizer from the agricultural land to the reservoir is likely to occur due to land ploughing in the planting season due to the high rainfall erodibility and soil erosivity levels. Reservoir nutrient build-up is likely to create the problem of eutrophication hence needs mitigation.

Mitigation measures

- Advocating for proper land use practices within the Earth dam catchment area.
- Implementing the Earth dam water Source protection interventions
- Frequent Desilting of the Earth dam reservoir

viii) Potential risk of other reservoir disease vectors

Standing water bodies such as reservoirs attract people to settle nearby and provide the habitat and circumstances for water related problems. For the case of Kasensero Earth dam the commonly expected problems will be that of diseases related to mosquitoes and intestinal worms. These are considered to be major and negative impacts and appropriate mitigation measures have been considered.

Mitigation measures

- Training community in vector control strategies
- Clearing of all stagnant water ponds within the Earth dam catchment to control mosquitoes from breeding.
- Community awareness regarding the dangers of vectors within the project area

ix) Risk of dam failure

The Proposed Kasensero Earth Dam Project belongs to the Class B Category thus classified as medium risk dam. However, any impoundment of water by a dam forms a hazard so due consideration is required to the nature of the hazard, the risk of harm and/or damage, and mitigation measures that can be undertaken to minimize the risks. The typology of failure could

include hydraulic, seepage, structural or operational failure which could lead to downstream flood hazards.

Mitigation measures

- Payment for the Earth dam services is the only way to keep the service running continuously and therefore tariffs would be designed to ensure financial viability. Cost recovery would be achieved through service fee payments.
- Put in place a water user committee to oversee the operations of the Earth dam system or supervise the operations by the System Operator.
- The Government (MWE) and the Local Government should sign the Memorandum of Understanding (MoU) with clear mandate of the System Operator to implement catchment protection interventions and the installed water infrastructure (dam, livestock watering facilities, irrigation schemes,…)
- Fence off the areas of the Earth dam infrastructures to avoid vandalism

x) Potential water uses conflicts

Currently the local community taps water for domestic and livestock use from the seasonal rivers. This means that communities living downstream of the proposed dam could lose their rights of using the river, if measures are not taken during the design stage to guarantee minimum regulated flow downstream to local community since this is usually taken for granted.

Mitigation measures

- Regulate the amount of water abstracted
- Put in place a water user committee to oversee the operations of the Earth dam system to create ownership
- Community awareness and sensitization regarding the importance of the Earth dam
- Make the tariffs affordable for all those interested in benefiting from the earth dam

xi) Increased agricultural activity

The establishment of the dam will not only increase water availability within the project area but also accelerate other economic activities, there are all possibilities that the outcome of the increased economic activities within the supply area will ultimately exert pressure on the limited forested catchment areas and agricultural activities both upstream as well as downstream of the water reservoir. This may then lead to the following negative impacts:

- ✓ Increased siltation rates due to increased farming activities upstream of the reservoir with potential of shortening the working life of the reservoir
- ✓ Changes in the hydrological regime of the upper river due to changes in vegetation cover and consequently impairment of the base flows of the river with adverse effects on water supplies.

Mitigation measures

- Advocating for proper land use practices within the Earth dam catchment area.
- Implementing the Earth dam water Source protection interventions
- Frequent Desilting of the Earth dam reservoir

xii) Effect of the dam on climate change

The initial filling of a reservoir floods the existing plant material, leading to the death and decomposition of the carbon-rich plants and trees. The rotting organic matter releases carbon into the atmosphere albeit in very small quantities given the small nature of the dam. The decaying plant matter itself settles to the non- oxygenated bottom of the reservoir, and the decomposition– unmitigated by a flow pattern that would oxygenate the water –produces and eventually releases dissolved methane. All these are greenhouse gases that can contribute to global warming and climate change

xiii)Noise levels from generators

Using of generators to boost the pumping of the water at the pumping stations may lead to moderate noise levels around the project area.

Mitigation measures

- Installation of solar system instead of generator
- Service the generators regularly to minimize on the noise.
- Switch on generators only for few hours to boost on the pumping hours but always use the solar systems

8.6 Environmental Impacts of Decommissioning

After the Earth dam infrastructure has attained its lifetime, it will either be rehabilitated or decommissioned to return the affected area to a natural environment similar to that which would have existed prior to construction. However, some of the structures/facilities may still have other beneficial uses such as: run-off control, recreation, and water supply among others. Therefore, prior to destroying the structure it is crucial to know whether the structure can be reused through refurbishment of the structures and equipment.

Decommissioning of the water scheme can have negative impact on environment of the area from the release of built-up sediments into the neighbouring ecosystems. There will be changes in the quality of the different water sources (physical and chemical characteristics. These will include:

- *Changes to aquatic ecology:* The smaller animals like the macro–invertebrate's population distributions would be affected, as their digestions would become slower leading to unfavourable conditions for reproduction. When the levels of suspended solids are in excess, the non–organic sediments loading increases where the sediment particles are ingested and becomes hard to digest.
- *Pollution:* Decommissioning will lead to temporary increase in noise and vibration as well as air pollution due to emissions of dust. The removal of concrete and similar non-recyclable construction materials may cause land degradation.
- *Socio-economic impacts:* Removal of structure may impact the socio-economic conditions such as loss of employment thus reduced livelihoods damage of land use.

Mitigation / Enhancement Measures

The Earth Dam and all other infrastructure should be rehabilitated from time to time and might not necessarily have a life span and with the passage of time social and environmental scenario will change. Therefore, the decommissioning plan discussed above cannot be framed in present scenario however; the various mitigatory measures should meet the following requirement in addition to decommissioning plan to be developed before decommissioning:

- Decommissioning will be undertaken in accordance with the legislation prevailing at that time, in liaison with the relevant regulatory authorities and adhere to the health and safety guidelines to ensure that the decommissioned facilities do not deteriorate to the point where they become a hazard to the public or the environment.
- Safe disposal of waste and concrete and similar non-recyclable construction materials, restoration of all disturbed sites to pre-construction conditions through bioengineering measures.
- Those who will have received water supply would instead be connected to other existing water supply systems using the same pipeline network and taps. The same should apply for other water infrastructure such as irrigation schemes and developed livestock watering facilities.

8.7 Cumulative Impacts

Cumulative effects can be defined as "the impacts on the environment that result from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions, regardless of what agency or person undertakes such actions" (Council on Environmental Quality, US 1978).

Cumulative impacts occur when a project activity acts together with other activities from other projects to impact on the same social receptor. This social impact assessment incorporates this cumulative effect considering the past and present activities.

At this stage and from available information, no significant negative cumulative impacts have been identified. The proposed interventions planned as part of the project do not have significant irreversible impacts. Hence, the project interventions are unlikely to contribute to cumulative impacts in the project area. All negative impacts will be addressed in the site-specific Environmental, Social and Management Plans to be developed during the implementation stage of the project

Below are some of the envisaged cumulative effects:

a) Physical Impacts

Predicted physical impact is increasing recession area and water pollution. Also, activities like clearing of vegetation may increase the intensity and frequency of erosion/land degradation. This results in increased sediment concentration in receiving water bodies hence hindering other water usage purposes of affected water sources.

b) Biological Impacts

Changes in the physical and chemical characteristics of water from increased runoff inevitably affect distribution and abundance of aquatic biota. This can be attributed to increased nutrients leached from flooded soils and vegetation, enhanced productivity throughout the food chain.

c) Socio–economic Impacts

The development of proposed project over the time would generate many employment opportunities directly as well as indirectly in the form of various service providers e.g. operation and maintenance.

Tables 19, 20, 21 and 22 below presents a summary of an evaluation of the above envisaged impacts as a result of the implementation of the project

Table 21: Environmental and Social adverse/negative impacts during Construction Phase

Item	Environmental Component	Potential Environmental Impact	Potential Mitigation Measure	Impact Rating
C1.	Land acquisition for infrastructure	The land-take would be permanent where all the project components would be constructed and temporary along the pipeline network.	▪ The proposed land for the earth dam belongs to the District Local Government of Mubende as attached see **appendix IV**). No grievances were reported and are envisaged. ▪ However, the pipeline network will be restricted to the road reserves	Moderate
C2.	Loss of vegetation cover and top soil	The existing vegetation and top soil will be cleared to give way to the construction process on all sites. This is likely to cause loss of habitat and disturbance to faunal communities in the affected sites but at an insignificant level.	▪ Construction activities will be confined to the project site and after construction, there should be landscaping and re-vegetation. The premises will be planted with vegetation/grass and ornamental trees. ▪ The water source should be fenced off to reduce on going agricultural activities around the Earth dam to avoid pollution entering it especially when it rains heavily. ▪ Minimize vegetation clearance by clearly demarcating work areas. ▪ Provide environmental awareness training to all employees. ▪ Rehabilitate all disturbed areas.	Moderate
C3.	Increase susceptibility to Soil Erosion	Increased soil erosion is likely to occur in the vicinity of project sites during the construction of the Earth dam and other related construction works. The site earthworks will reduce soil stability and hence make the soils aggregated and more susceptible to erosion especially during the rainy season.	▪ The sites will be hoarded off to intercept any eroded material and any soil material will remain within the site. ▪ The project proponent will also ensure that proper landscaping and vegetation restoration is carried out to further reduce the possibility of soil erosion. ▪ Use proper techniques for trenching and shoring	Moderate
C4.	Fauna	Disturbance or loss of protected/endangered animal species/communities and their habitat	▪ Minimize vegetation clearance.	Moderate

		due to construction activities (noise, dust, fumes, pollution, vehicles).	▪ Protect water resources from pollution so that fauna that could be depending on such resources are not at risk. ▪ Protect soils from contamination. ▪ Rehabilitate all disturbed areas	
C5.	Insecurity Risks	Influx of people in a project area in search of jobs is likely to come with a host of vises such as thefts, crime and general deterioration of area security. Materials prone to theft include cement, fuel and equipment	▪ Collaborate with the local security set ups in areas of labour recruitment such that, priority is given to locals in the areas in terms of casual and non-skilled jobs; ▪ Those seeking jobs are to present their details accompanied with recommendations from their area LCs as well as next of kin for purposes of traceability in case of engagement in any misconduct or otherwise; ▪ Employ private security guards at the construction site. ▪ The contractor should work closely with the area police out-posts, local defence secretaries and general community policing	Moderate
C6.	Effects of Poor Solid Waste Management	Waste will be generated during the construction of the earth dam. The waste stream from the construction will include cement bags, timber and pipe cuttings, empty water bottles, food remains from workers onsite and other forms of waste. If not well managed, the area could be prone to nuisance from foul smell, breeding of vermin and vectors, and lead to outbreak of diseases. The contractor should provide sanitary facilities for workers and ensure that they are kept clean during construction. The system operator will make sure that constructed toilets on site are regularly cleaned and that	▪ Waste collection bins will be provided at strategic positions at the sites for temporary waste storage. ▪ The waste collection bins should be provided with covers to avoid spillage by scavengers and clearly coded for sorting purposes. ▪ The proponent will hire a certified waste collection company to transport the waste for final disposal to designated waste dumping sites by NEMA/MDLG/Kyenda Town Council. ▪ Burning of waste on-site shall not be allowed. ▪ Encourage and promote the practice of reusing some of the solid wastes like bottles and pieces of timber	Moderate

		solid, wastewaters and sewerage around the project area are adequately managed		
C7.	Noise generation	Increased noise levels will be experienced from the use of heavy construction equipment. Increased vibrations during construction by equipment movement, excavations and blasting may transform the calm and quiet conditions in the area	▪ Contractor will be careful when selecting the working equipment to avoid use of old equipment or damaged equipment with high level of noise emissions that would have a negative impact in the environment. ▪ Contractor will ensure that equipment is properly maintained and fully functional in accordance with the manufacturer's recommendations. ▪ The contractor should ensure that noise levels emanating from machinery, vehicles and noisy excavation and construction activities are kept at a minimum for the safety, health and protection of people in the nearby areas.	Moderate
C8.	Increased incidences of diseases.	The increase of people involved in the project activities is likely to increase the incidences of diseases in the area. Consequently, there will be potential risk of contracting sexually transmitted diseases (STDs) especially the Human Immuno-Deficiency Virus/Acquired Immuno-Deficiency Syndrome (HIV/AIDS) and other communicable diseases like Ebola, COVID among the program workers and the local communities. This will be increased due to influx of people seeking for employment.	▪ The contractor should liaise with the District and Sub County CDO to mobilise communities during the recruitment process to reduce on influx of people who are unskilled. ▪ The contractor should emphasise equal opportunities for both men and women. ▪ The Contractor should, in conjunction with local health authorities, undertake to educate and sensitise the workforce on communicable diseases such as cholera, STDs and HIV/AIDS. ▪ Condoms must be made available to the workforce ▪ Promotion of hygiene and sanitation including awareness campaigns to prevent the spread of communicable diseases like the water born diseases.	Moderate

C9.	Visual intrusion	This will mainly arise from the erection of service reservoir tanks on the high altitude (hills). In addition, visual intrusion will occur where project activities are likely to create disfigured landscapes in the project area especially where the construction activities will result in deposition of large spoils and digging of the trenches.	▪ The contractor should maintain as much as possible the existing landscapes and plant trees and vegetation to enhance the visual aspect. ▪ Rehabilitate all areas disturbed by construction and landscape with trees, grass and shrubs.	Moderate
C10.	Increased accidents and occupational hazards	Implementation of the project will definitely increase volume of human and motor traffic in the project area. The increase in human and motor traffic will be aggravated by the transportation of construction materials, water pipes and other equipment required in constructing the water supply facilities. This is likely to result in a higher risk of accidents and occupational hazards occurring in the area of operation.	▪ The contractor should ensure that workers are provided with adequate personal protective wear to mitigate injuries such as gloves, helmets, overalls and gumboots. ▪ Traffic guides and signs should be utilized to avoid accidents on busy roads and junctions especially with vehicles transporting materials ▪ Fence all construction sites. ▪ Place warning signs. ▪ Enforce maximum traffic speeds to 20kph	Minor
C11.	Sourcing of Construction Materials	Sourcing of materials such as sand, gravel bricks/blocks and timber if not well regulated and controlled can have a significant impact in the points of sourcing.	▪ The Contractor should liaise with local authorities to ensure that materials such as sand and gravel are only taken from quarries and borrow pits with the necessary environmental permits.	Moderate
C12.	Air Quality	Limited air pollution will occur mainly due to fugitive emissions and dust generation from various construction activities. Particulate matter pollution is likely to occur during the site clearance, excavation, loading and transportation construction materials	▪ The areas of such works be routinely sprinkled with water to suppress dust during works. ▪ Restricting excavations to those sites needed for the works. ▪ For the safety of the workers on such areas, the workers supplied with appropriate PPEs to protect them dust nuisance	Minor
C13.	Impact on current water ecosystem services	Disturbance or loss of protected/endangered plant species or communities (terrestrial, wetland, aquatic) due to construction activities of the different project components	▪ Project implementation should be planned in a way to allow users of these continued Earth Dam access. This is to be adhered to, bearing in mind that the project area is prone to water scarcity	Moderate

			and long droughts	
C14.	Risk of Accidents	During the construction of the proposed project, it is expected that construction workers are likely to have accidental injuries as a result of accidental occurrences, neglect of the use of protective gears among others. Accidents may also occur to members of public, livestock and wildlife from open trenches, but they will be reduced by fencing of the construction site and restricting access to the site	▪ Best transport safety practices will be adopted with the goal of preventing traffic accidents and minimizing injuries suffered by project personnel and the public by: employing safe traffic control measures, including road signs and flagmen/traffic guides to warn of dangerous conditions and children crossings; and setting speed limits on all access roads in the project area will be 30km/h for light vehicles and 20km/h for heavy vehicles. ▪ Service ducts installed by the road contractor will be used where applicable to avoid cutting through roads that have just been upgraded. ▪ All workers, including sub-contractors and casual labour, will undergo an environmental, health and safety induction before commencing work on site. This will include a full briefing on site safety and rules. ▪ The affected communities will be informed of the timing and duration of the construction activities across access roads and any uncertainties or potential for change and also sensitised on the dangers of construction sites and the need to keep away. ▪ Restrictions on hours of driving (including night time restrictions where sensitive receptors may be affected) and timing of vehicle movements to avoid busy periods in urban areas, particularly the start and end of school and the working day. ▪ Awareness campaigns on road safety and use especially for children within the project area.	Moderate

C15.	Occupational Health and Safety Risks for the Workforce	Construction traffic, excavation machinery, blasting of rocks and trenches may pose accident risk to workers either when equipment is operated by inexperienced workers or when in a poor mechanical condition or falls into the trenches.	▪ All construction workers will be oriented on safe work practices and guidelines and ensure that they adhere to them. ▪ Training will be conducted on how to prevent and manage incidences. This should involve proper handling of electricity, water etc. and sensitization on various modes of escape, conduct and responsibility during such incidences. All must fully be aware and mentally prepared for potential emergency. ▪ Regular drills will constantly follow on various possible incidences. This will test the response of the involved stakeholders. Such drills will keep them alert and they will become more responsive in the case of incidences. ▪ Signage will be used to warn staff and/ or visitors that are not involved in construction activities of dangerous places.	Moderate
C16.	Social Misdemeanour by Construction Workers	While most workers may originate from the local community where they have families, there might be others from distant places and working away from their families.	▪ framework (responsible staff, action plan, etc.) to implement during project execution. ▪ A sensitisation programme for the would-be affected local communities will be conducted prior to commencement of and during the project implementation. ▪ A code of conduct (appropriate to behaviours in workplace and with respect to relations with local community) will be developed and approved by MWE/WfPRC-C which will be signed by all workers on the project. ▪ Local workers will preferentially be employed, paid directly through their banks and access to bars by workers from outside the project area in the local communities controlled.	Moderate

			▪ All construction workers shall be orientated and sensitized about responsible sexual behaviour in project communities	
C17.	Archaeological / Historical Sites	Throughout the consultations with the locals and local leaders, no known archaeological or historical sites exist on the proposed project routes, and proposed construction sites. Therefore, no impacts on any features of importance to national heritage are expected.	▪ The Contractor shall ensure that key members of his staff are briefed. Any such features that may be found that were not apparent on surface investigation will be reported by the project management and appropriate procedures followed to hand them over to the authority responsible for national heritage and antiquities.	Minor
C18.	Violence Against Children (VAC) and Child labour	According to the consultations made during the stakeholder engagement, most of the community members are aware of children's rights. On the other hand, the common abuses are child labour, parental neglect, child marriage, violent discipline/harsh punishment and sexual abuse. With the implementation of the project, there must be stringent measures in place to protect children's rights against child abuses	▪ The contractors should put in place child protection policy/code of conduct to ensure that no child is employed during the construction works and zero child rights abuses are recorded. ▪ Preparation of the Stakeholder Engagement Plan to cater for mobilization and sensitization on child rights and child protection has been attached to this report as annex XI. ▪ Strengthen the referral pathways for cases of child rights abuses by involving the relevant child protection actors such as LCI, Police, CDOs, Probation Officers in some of the project activities like community mobilization and sensitization, development and dissemination of the referral pathways. This would reinforce prompt response to cases of child rights abuses and derail the abusers from perpetrating the vice further	Moderate
C19.	Domestic, Sexual and Gender Based Violence (SGBV).	SGBV is likely to be experienced, for example, an increase in intimate partner violence (IPV) when compensation schemes that share funds equally among husband and wife at the household level do not provide adequate sensitization and safety measures to reduce	▪ Sensitizations should include the men to champion the GBV/DV fight and should as well target awareness creation sessions for women and girls since they are the most prone. ▪ Promote good relationships and improved communication skills amongst couples and	Minor

		potential for increased tensions due to females receiving funds.	positive parenthood through the various stakeholder engagements. ▪ Emphasize GBV in codes of conduct for contractors and these should be disclosed in local language and be widely publicized to all workers and community members in the project area. ▪ Accessible grievance reporting, referral pathways and support systems should be established for and popularized for workers and community members. ▪ Deliberate measures to ensure that the Resettlement Action Plan (RAP) takes into account gender dynamics including GBV at household and community levels especially during compensation payments.	
C20.	Crime, Drug Abuse and Prostitution	The Earth dam implementation will attract a number of workers on the site who may have different behaviours and habits. These may result in the increase in the number of crimes, drug abuse and prostitution	▪ Contractor should involve local (LC) leaders in labour recruitment to reveal criminal record. ▪ The hired labour shall be made to sign the code of conducts to hold them accountable ▪ Contractor should work with local authorities and police to contain criminal activities	Minor
C21.	Labour Exploitation	The construction works for the Earth dam project will require a number of employees for its various works though details of the specific labor needs will be clearer during works	▪ Contractor should verify the age of every applicant before they are recruited in order to eliminate any cases of Child Labor ▪ Contractor should ensure that they pay hired labour on time or have a solid justification for delayed payment ▪ The contractor should stick to the agreed working hours ▪ Contractor shall discuss the work schedule with the local labour obtained from the project area so as not to clash with cultural norms	Moderate

C22.	Sexual Exploitation and Abuse (SEA)	This impact refers to sexual exploitation and abuse committed by Project staff against communities and represents a risk at all stages of the Project, especially when employees and community members are not clear about prohibitions against SEA in the Project	▪ Develop and implement a SEA action plan with an Accountability and Response Framework as part of the C-ESMP ▪ Preparation of SEA prevention plan	Moderate

Table 22: Operation Phase Adverse/Negative Impacts

Item	Environmental Component	Potential Environmental Impact	Potential Mitigation Measure	Impact Rating
OP1	Downstream flow variations	Downstream flow variations may be either beneficial or harmful. Releasing of water to simulate normal flood conditions can be beneficial in that it can lead to fish migration and create enabling environment for trees to set seed and germinate.	▪ MWE should abstract the right amount of water recommended on the Abstraction permit issued by DWRM ▪ Frequent monitoring of the water yields abstracted ▪ MWE and SO should get involved with Water source catchment protection and management planning that could improve land management and restore groundwater recharge ▪ Encourage contour ploughing, mulching and other agricultural practices that increases soil water retention and percolation into the underlying aquifer	Moderate
OP2	Water quality and pollution	The quality of water recommended is that which is physically, chemically and bacteriologically safe for human consumption. When not thoroughly treated, water could be a source of water related diseases which could affect the project communities, thereby causing an epidemic in the area. Transmission of water can also result into pollution and pollution entering the Earth dam	▪ The reservoir should be constructed with an embarkment to prevent water, sand and other debris cannot fall in since there will be no water treatment plant within the earth dam. Transmission and distribution pipes should also be covered underground to reduce exposure	Moderate

OP3	**Risks of water and vector-borne diseases**	The water in the reservoir though will not be stagnant may act as a breeding ground for mosquitoes and this will have consequence in terms of incidence of mosquitoes and malaria at large in the area. The water in the reservoir may also be unsafe for human consumption as such, contaminated by human activities in the vicinity of the dam, thereby leading to water borne diseases like typhoid	▪ The project will work closely with some of the on-going water and sanitation programs in the district especially on hygiene and water to reduce mosquito breeding areas and bushes around households; ▪ The reservoir will be fenced off with restricted access, but in addition the communities will be sensitized to sleep under treated mosquito nets distributed under the Ministry of Health Malaria Control Program; and ▪ Have primary health care programs in place to create awareness on the risks of diseases from dam waters to discourage farmers from using the irrigation water for domestic purposes	Minor
OP4	Introduction of invasive species:	The invasive species may include pests and noxious weeds. Accumulation of sediments and high concentration of nutrients in the water can lead to proliferation of aquatic weeds like water hyacinth, *Pistia* and water cabbage	▪ Ensure construction equipment come on site while clean and leave site after being cleaned to avoid spread of noxious weeds or invasive plant species; and ▪ Sensitize communities about the need to control the spread of water hyacinth and encourage them to physically remove and destroy water hyacinth found floating on the river and other water courses. In addition, mechanical removal will be considered	Minor
OP5	Community Health and Safety	During the operational phase, there is likely to be risk of drowning by both children and adults in the reservoir. The children or adults may be enticed to swim in the reservoir and may end up drowning or may drown accidentally while passing by	▪ Sensitization of the community on the risks/dangers of swimming in the reservoirs especially for the children; ▪ Provide watering points for livestock outside the reservoir; and ▪ There should be Project Management Committee which should address issues of operations of the reservoir ▪	Moderate

OP6	Low hypolimnetic oxygen concentration	Proposed Kasensero Earth Dam is likely to suffer from hypolimnetic oxygen depletion during the rainy season because large amounts of fresh oxidizable matter which are likely to be washed into the reservoir and settle at the bottom.	▪ Monitoring of the hypolimnetic oxygen within the Earth dam/Reservoir and the nearby water bodies	Minor
OP7	Long-term reservoir nutrient build-up	Improper catchment land-use in the agricultural area above the proposed Kasensero Earth Dam if unchecked could eventually lead reservoir nutrient build-up which will affect the quality of drinking water. Nitrogen is likely to be anthropogenically transferred diffusely from the farming areas and pastures especially through the movement of fertilizer residue and animal excrement.	▪ Advocating for proper land use practices within the Earth dam catchment area. ▪ Implementing the Earth dam water Source protection interventions ▪ Frequent Desilting of the Earth dam reservoir	Moderate
OP8	Potential risk of other reservoir disease vectors	Standing water bodies such as reservoirs attract people to settle nearby and provide the habitat and circumstances for water related problems. For the case of Kasensero Earth dam the commonly expected problems will be that of diseases related to mosquitoes and intestinal worms	▪ Training community in vector control strategies ▪ Clearing of all stagnant water ponds within the Earth dam catchment to control mosquitoes from breeding. ▪ Community awareness regarding the dangers of vectors within the project area	Minor
OP9	Risk of dam failure	The Proposed Kasensero Earth Dam Project belongs to the Class B Category thus classified as medium risk dam. However, any impoundment of water by a dam forms a hazard so due consideration is required to the nature of the hazard, the risk of harm and/or damage, and mitigation measures that can be undertaken to minimize the risks	▪ Payment and effective management for the Earth dam services is the only way to keep the service running continuously and therefore tariffs would be designed to ensure financial viability. Cost recovery would be achieved through service fee payments. The MoU between the System Operator (SO) and MWE should include the management strategies especially for Operation and maintenance (O&M). ▪ Put in place a water user committee to oversee the operations of the Earth dam system.	Moderate

			▪ Fence off the areas of the Earth dam infrastructures to avoid vandalism	
OP10	Potential water uses conflicts	Currently the local community taps water for domestic and livestock use from the seasonal rivers. This means that communities living downstream of the proposed dam could lose their rights of using the river, if measures are not taken during the design stage to guarantee minimum regulated flow downstream to local community since this is usually taken for granted	▪ Regulate the amount of water abstracted ▪ Monitor the quality of water both in the upstream and downstream of the dam ▪ Put in place a water user committee to oversee the operations of the Earth dam system to create ownership ▪ Community awareness and sensitization regarding the importance and management of the Earth dam ▪ Make the tariffs affordable for all those interested in benefiting from the earth dam.	Moderate
OP11	Increased agricultural activity	The establishment of the dam will not only increase water availability within the project area but also accelerate other economic activities, there are all possibilities that the outcome of the increased economic activities within the supply area will ultimately exert pressure on the limited forested catchment areas and agricultural activities both upstream as well as downstream of the water reservoir	▪ Advocating for proper land use practices within the Earth dam catchment area. ▪ Implementing the Earth dam water Source protection interventions ▪ Frequent Desilting of the Earth dam reservoir	Moderate

Table 23: Decommissioning Phase Adverse Impacts

Environmental Component	Potential Environmental Impact	Potential Mitigation Measure	Impact Rating before Mitigation
Surface Water Quality	Pollution of water bodies from erosion of unconsolidated materials, contaminated soil, wastes (solid and liquid), etc. as a result of demolition activities.	• Rehabilitate all areas e.g. grass/tree planting. • Take samples of the runoff water into the receiving water body nearby and ensure free pollution. • Remove all contaminated soil identified and dispose of it in an approved site.	Moderate

		• Close any waste disposal facility on site and make provision for drainage in such a way as to prevent future pollution.	
Flora	Disturbance or loss of plant species or communities (terrestrial, aquatic) due to dust fall-out onto leaves and soil, dump erosion.	• Rehabilitate or stabilize all cleared areas using indigenous vegetation until handover of the site.	Minor
Fauna	Disturbance or loss of animal species/communities and their habitat due to the lack of rehabilitation etc.	• Rehabilitate or stabilize all cleared areas using indigenous vegetation where possible.	Minor
Soils	Re-use of soils in rehabilitation and re-instatement of pre-project capability.	• Replace subsoil and overburden first and then cover with saved topsoil. Do not use heavy equipment to replace topsoil because this can cause compaction.	Minor
	Soil erosion from denuded areas and demolition activities.	• Maintain erosion protection works. • Rehabilitate or stabilize all disturbed areas.	Minor
Topography	Reinstate the topographic profile.	• Backfill, contour and landscape.	Minor
Air quality	Dust from un-rehabilitated sites and demolition activities.	• Avoid dusty activities e.g. loading and dumping on windy days & monitor dust emissions.	Minor
	Odors from waste dump.	• Avoid activities that can lead to pilling of wastes in the project area. • Dispose off all the wastes in gazetted sites	Minor
Noise and vibration	Noise generated by demolition equipment and earth moving equipment	• Prescribe noise reduction measures if appropriate e.g. restricted working and transport hours and noise buffering.	Minor
Health, safety and hygiene	Risk of accidents and ill health as a result of the project	• Fence all unsafe and dangerous areas & monitor environmental health (air quality, water quality).	Minor
Aesthetic and amenity values	Improvement of the visual impact of the site on scenic views.	• Rehabilitate with trees, grass and shrubs where possible. • Consult with the local community and tourist industry.	Minor

Note:

- Mitigation measures have been designed in order to avoid, reduce, mitigate, or compensate for adverse environmental and social impacts and inform the Environmental and Social Management Plan (ESMP).

- Closure and decommissioning of the facility were also identified as a key issue. An environmental management plan has been developed during the assessment that will prescribe procedures for closure and post-operation to ensure that the environment is restored as much as possible to its original state.

9 ENVIRONMENTAL MANAGEMENT AND MONITORING PLAN

9.1 Introduction

The objectives of the Environment and Social Management and Monitoring Plan (ESMMP) include: compliance with applicable national environmental and social safeguards; propose mitigation, enhancing, management, consultative and institutional measures required to prevent, minimize, mitigate or compensate for adverse environmental and social impacts and; address capacity building requirements. The Plan includes details such as the issue to monitor, the indicators, responsibility for collecting and checking data and reporting, costs of implementation (where applicable), responsibility for implementing the action and training or orientation of responsible person (if applicable). It should, however, be noted that the costs indicated in the ESMMP are indicative only and the responsible implementing parties such as Contractors, Supervising Consultants, and respective MWE/WfPRC-C teams and other agencies responsible for monitoring should prepare budgets to include the aspects covered in this ESMMP. The proposed project may have minimal adverse environmental effects, provided that recommendations and mitigation measures identified in this Chapter are incorporated into all project phases and are implemented by the developer and the contractors.

Table 19 presents management plan with specific mitigation measures to be implemented during Design, construction, operation and Decommissioning phases of the proposed project.

9.2 Role of the Developer

The developer will be responsible for:

- Reviewing the approved ESIA document, particularly the required mitigation measures and the Environmental and Social Management and Monitoring Plan;
- Reviewing the approval conditions provided by NEMA (approval certificate), and permits from lead agencies including DWRM (Ground Water Abstraction Permit), MoGLSD, (Workplace Inspection Certification), Ministry of Water and Environment (River bank), NEMA (Environmental Management).
- The developer should prepare Environmental, Social, Health and Safety Action Plans to comply with the above requirements.
- Costs related to complying with the Environmental Safeguards as applicable to the construction and operation of the Water Supply System will be met by the developer.
- The day-to-day responsibility for implementing the ESMMP will be of the Developer/contractor.
- Implementing and complying with the conditions of the ESMMP forms part of the conditions of appointment of all Consultants and Contractors throughout the life of the project;
- Appointing Independent environmental experts to audit the implementation of, and compliance with, the ESMMP and monitoring plan, as well as the NEMA Approval conditions on an annual basis; and the independent environmental Compliance audits, together with other relevant monitoring information made available to the public, throughout the life of the project, summarized in lay person's terms and in a culturally accessible manner.
- Training and awareness creation in environmental and social management and the mitigation of impacts are provided to MWE Project staff, to ensure they are aware of

their responsibilities and are competent to carry out their work in an environmentally and socially responsible manner

9.3 Role of Construction Supervision Consultants

The Supervision Consultants to whom work is outsourced during project implementation will be responsible for the following:

- Reviewing project design, contractor's contract, BOQs and all other project documents like the ESMP, ESIA report, NEMA project certificate conditions, RAP as to get familiar with in order to build up an additional mechanism for enforcing compliance as per those in contract.
- Ensuring that contractors familiarize themselves with the environmental and social management framework for the project sites and activities.
- Reviewing and approving Contractor's plans as required in the above documents like; EHS Plans, Waste Management Plan, Traffic Management Plan, Emergency Response Plan, Gender Management Plan, Erosion and sediment control plan, Decommissioning and Restoration Plans of the site; among others.
- Following up on Contractor's obligation in acquiring the various permits in relation to the project works which then will be verified like; permit for excavation, Permit for hoarding and scaffolding, Work registration permit.
- Monitoring the Contractor's performance in EHS aspects, particularly in regard to the above-mentioned plans; using the safeguards documents provided by MWE and NEMA, as well as permits from other Lead Agencies, using the safeguards documents provided.
- Ensuring that all the contractors and their subcontractors receive basic training or are sensitized on environmental and social matters, including acceptable conduct, storage and handling of potentially hazardous substances, waste management, and prevention of pollution of natural resources.
- Receiving daily, weekly and monthly reports from the Contractor on EHS aspects, and furnishing MWE/WfPRC-C with the information during monthly meetings or site visits. Any urgent issues will have to be reported to MWE immediately to allow appropriate timely action to be implemented.
- Preparing the environmental supervision statement and also approving of invoices or payments with consideration of ESMP performance.
- Regularly engaging with the local communities to ensure continued social acceptance in the areas where the Contractor is in operation, and also to ensure that Contractor adheres to the recommendations made in this ESMMP.
- Instructing the contractor to correct within the timeframe determined as per contract in case of any corrective actions. If there is breach of contract or strong public complaints on contractor's environmental performance, the Supervision Consultants is obligated to order the contractor to correct, change or stop the work, reporting to relevant agencies and the MWE/WfPRC-C.

9.4 Role of Government Institutions

Agencies such as NEMA, MGLSD, MDLG will be involved in the various phases through the life of the Project as proposed in the ESMMP. The responsibilities of each respective agency will be those that are within their mandate, and as such, no extra costing has been included in the ESMMP since it is expected that their annual operational budgets will be made to include the required works for this Project. For this reason, MWE should regularly update the respective lead agencies with the Project progress, and challenges and opportunities presented during the

implementation of the project. The budget estimation for ESMP management during operation phase is provided in the ESMP to serve as reference and facilitate planning by the operator.

9.5 The Role of the Contractor and/or subcontractors

During sites preparation and construction for the new Water supply system, the contractor and/or the subcontractors will be responsible for ensuring compliance with all national legislation and Policies as well as adherence to all environmental and socio-economic mitigation measures specified in the ESMP that has been developed during this ESIA study. The contractor and/or subcontractor will also be responsible for managing the potential environmental, socio-economic, safety and health impacts of all contract activities whether these will be undertaken by themselves or by their subcontractors.

9.6 The Monitoring Team

It is recommended that a core team of people preferably headed by the Mubende District Natural Resources Office, District Water Office and composed of other officials from relevant ministry and respective local environment committees will carry out monitoring activities. The monitoring team will start its work during the site preparation and construction process and continue throughout the operation phase and should ensure that the proposed mitigation measures are implemented as suggested and recommended in this ESIA study. The monitoring team will most particularly check for the following issues among others:

- Changes in the water quality and quantity.
- Compliance with the conditions set out on the water abstraction permit.
- Compliance with the conditions on the issued Certificate of Approval from NEMA.

9.7 Environmental and Social Monitoring Plan

A monitoring process will be established to check/assess the implementation progress and effectiveness of the mitigation measures suggested and the resulting effects of the proposed project on the environment. The process will begin during site preparations, construction stage and continue throughout the operation phase. It also includes regular reviews of the impacts that cannot be adequately assessed before the beginning of the project, or which arise unexpectedly. In such cases, appropriate new actions to mitigate any adverse effects will be undertaken.

The recommendations will provide a basis for tracking progress of the proposed project activities with regard to sound environmental practice and mitigation measures. This will be done with the support of supplementary documents such as specific architectural and engineering plans and designs for civil and mechanical works to be undertaken on the site.

Environmental Management and Monitoring Plan is presented below under Table 22.

Table 24: Environmental, Social Management and Monitoring Plan (ESMMP)

Ref. No	Affected Environment	Objective to Address Impact	Monitoring Activity	Project Phase	Responsibility	Frequency	Mitigation Cost (UGX)
CP1	Land acquisition	The land-take would be permanent where the earth dam facilities, office block, would be constructed and temporary along the pipeline network	Liaise with MDLG, local authorities in Kyenda Town Council together with communities for land agreement to be used for the different Earth Dam facilities and Compensate (where possible) to land owners as project affected persons	Construction	Client/MWE/ WfPRC-C	Daily	-Already secured
CP2	Loss of vegetation cover and top soil	To minimize on the loss of vegetation cover and top soils along the project sites	Landscaping and re-vegetation after construction and fencing off all the sites. Rehabilitation of the site	Construction	Contractor	Daily	15,550,000
CP3	Increase susceptibility to soil erosion	To reduce on incidences of soil erosion at project sites	Hoarding off project sites to intercept any eroded material and any soil material and proper landscaping and vegetation restoration. Use of proper techniques for trenching and shoring	Construction	Contractor	Daily	16,800,000
CP4	Loss of fauna	To minimize on the loss of fauna within the project area	▪ Minimize vegetation clearance. ▪ Protect water resources from pollution. ▪ Protect soils from contamination.	Construction	Contractor	daily	Included as part of M2.

			▪ Rehabilitate all disturbed areas				
CP5	Insecurity risks	To reduce on cases of insecurity in the project	▪ Employ private security guards at the construction site. ▪ The contractor should work closely with the area police out-posts, local defence secretaries and general community policing	Construction	Contractor	Daily	25,000,000
CP6	Solid waste and wastewater generation	To minimise on cases of poor solid waste and wastewater management	▪ Waste collection bins will be provided at strategic positions at the sites for temporary waste storage. ▪ The waste collection bins should be provided with covers to avoid spillage by scavengers and clearly coded for sorting purposes. ▪ The proponent will hire a certified waste collection company to transport the waste for final disposal to designated waste dumping sites by NEMA/MDLG/Kyenda T/C. ▪ Temporal toilets with hand washing facilities	Construction	Contractor	Daily	10,200,000 15,600,000

			will be constructed/installed on sites and always kept clean				
CP7	Noise Levels	To minimise noise disturbance to neighbours	▪ Measurements of noise levels using a noise meter.	Construction	Site Supervisor	Daily	5,790,000
CP8	Incidences of diseases	To prevent cases of potential disease risks within the project area	Liaising with the District and Sub County CDO to mobilise communities during the recruitment process to reduce on influx of people who are unskilled. Educating and sensitising the workforce on communicable diseases such as cholera, STDs and HIV/AIDS and other both communicable and non-communicable diseases and provision of Condoms to the workforce.	Construction	Contractor	Daily	12,000,000
CP9	Visual Intrusion	To reduces on the changes in landscape	Rehabilitate all areas disturbed by construction and landscape with trees, grass and shrubs	Construction	Site Supervisor	Daily	6,000,000
CP10	Construction Material Sourcing	To regulate and control the impact in the points of sourcing materials.	Liaise with local authorities to only source materials from legally registered suppliers	Construction	Site Supervisor	Daily	-
CP11	Air Quality	To minimise dust nuisance and exhaust pollution	Provision of adequate and appropriate personal	Construction	Site Supervisor	Daily	14,720,000

			protective equipment (PPE).				
CP12	Risk of accidents	To reduces on incidences of accidents	▪ Service ducts installed by the road contractor will be used where applicable to avoid cutting through roads that have just been upgraded. ▪ All workers, including sub-contractors and casual labour, will undergo an environmental, health and safety induction before commencing work on site. This will include a full briefing on site safety and rules. ▪ The affected communities will be informed of the timing and duration of the construction activities	Construction	Site Supervisor	Daily	8,600,000
CP13	Occupational Health and Safety Risks for the Workforce	To reduce on cases of OSH risks to workforce	▪ All construction workers will be oriented on safe work practices and guidelines and ensure that they adhere to them.	Construction and Operation	Site Supervisor and Operator	Daily	9,400,000

			▪ Signage will be used to warn staff and/ or visitors that are not involved in construction activities of dangerous places				
CP14	Social Misdemeanour by Construction Workers	To minimise on cases of illicit relationships	▪ A sensitisation programme for the would-be affected local communities will be conducted prior to commencement of and during the project implementation. ▪ A code of conduct (appropriate to behaviours in workplace	Construction	Site Supervisor	Daily	7,800,000
CP15	Violence Against Children (VAC) and Child labour	To reduce on cases of child labour VAC	▪ The contractors should put in place child protection policy/code of conduct to ensure that no child is employed during the construction works. ▪ Protection of child rights	Construction	Site supervisor	Daily	12,300,000
CP16	Occupation Safety, hygiene & Health	To ensure Health and Safety at the site / Premises	Inspect all equipment to ensure that they are in good working condition.		Site Supervisor	Monthly	14,500,000
		To prevent injury to workers and other personnel.	Barrier tape and warning signs will be used, install	Construction	Site Supervisor	Weekly	8,670,000

			safety signage, fence off the area.				
Total Cost for the ESMP Implementation during Construction							**182,930,000**
OP1	Public health	To prevent spread of diseases	Creation of awareness, provision of waste bins and health care.	Construction	Site Supervisor	Quarterly	16,560,000
OP2	Water quality and yield	To improve on the water quality from the Earth dam	Prepare a water source protection plan for implementation before construction starts	Operation	Operator/ WfPRC-C	Monthly	76,000,000
OP3	Occupation Safety, hygiene & Health	To ensure Health and Safety at the site / Premises	Cleaning of offices, toilets and other facilities. Maintenance and repair of the facilities. Security of the facilities through hiring guards to protect sensitive infrastructure Awareness of communities to protect the infrastructure (dam, pipes, irrigation scheme, watering livestock facilities,.)	Operation	Operator/ WfPRC-C	Monthly Monthly Monthly Monthly	10,450,000 23,500,000 30,400,000 25,800,000
OP4	Water quantity and yield	To maintain the water levels and yield during abstraction	Maintain abstraction records & check for gaps or cracks around the opening of the Earth dam Prepare Water source catchment Plan for the Earth dam before construction starts	Operation		Daily	10,400,000
OP5	Earth dam failure	To reduce on the chances of the system	Putting in place a water user committee to oversee	Operation	Client/ Operator	Daily	15,400,000

		failure during operation	the operations of the water system before construction starts. Fencing off the areas for the Earth dam facilities				
OP6	Earth dam failures	To minimise on the chances of vandalism and theft of the water facilities parts	Hiring of security guards to monitor and guard the water supply system facilities. Sensitization and awareness about the dangers of vandalizing the water supply system facilities	Operation	Client/ Operator	Daily	32,450,000
OP7	Noise generation	To minimise on cases and nuisance of noise generation	▪ Installation of solar system instead of generator ▪ Service the generators regularly to minimize on the noise. ▪ Switch on generators only for few hours to boost on the pumping hours but always use the solar systems	Operation	Operator/ WfPRC-C	Weekly	28,500,000
Total Cost for the ESMP Implementation during the Operation Phase							**268,840,000**

Note:

External Monitor can be a lead Agency and or Authorities like NEMA, DNRO/DEO/DWO or a NEMA Certified Consultant whom the developer and Contractor will contact on matters arising like noise, biodiversity, air and water quality monitoring. Lead Agencies will make their own arrangements on inspections on site to ensure compliance with set guidelines and standards.

CONCLUSION AND RECOMMENDATIONS

Kasensero Earth Dam is being proposed by the Ministry of Water and Environment/WfPRC-C for Kyenda Town Council in Mubende district. This is envisaged to bring an end to water stress and overreliance on Rain fall for crop production and a few existing surface water sources within the project area of Kyenda Town Council and neighbouring community. It is also envisaged that, the area experiences scarcity of water for production and high growing population. Further still, the project will also address the focal area of access to clean water and water for production as stipulated under the Uganda Vision 2040 and the National Development Plan III. The project also contributes towards achieving SDG *(specifically SDG 6 on clean water and sanitation)*. Several beneficial impacts envisaged will include:

- Improved quality of water supplied to communities.
- Provision of employment opportunities during construction and operation phases.
- Improved health and sanitation due to improved water quality and quantity.
- Improved local economies and induced development especially sourcing of raw materials for construction activities and tree seedling growing business boost during operation phase.
- Small to Large scale irrigation farming especially in vegetables and flowers since most household heads are involved in subsistence agriculture.
- An increase in revenue for the Town Council from water project collections.
- Initiate the move away from the status quo of rural women and children's perpetual carrying of water on their heads from unprotected and distant point water source and allow them to engage in income generating activities and to improve the image of the woman and children.
- Improved image of the Town Council and parishes in terms of providing good services to its people hence more funding from potential funders.
- Increase in land value within the project area.

However, the ESIA findings indicate that direct impacts will be fairly compassionate and limited to the project area where construction works will be undertaken. Direct negative impacts will include:

- Insecurity risks.
- Destruction of vegetation and crops during construction phase.
- Increased noise nuisance during construction phase by workers and equipment.
- Improper disposal of cut out spoil and other construction wastes.
- Other concerns include occupational safety hazards, and HIV/AIDS risk associated with construction labour.

No resettlement issues are anticipated however; a resettlement action plan (RAP) can be prepared to address all compensation issues that are anticipated and an environment and social management plan (ESMP) has been presented in this ESIA report to ensure positive impacts are enhanced while negative impacts are avoided and or mitigated.

During this ESIA study, comprehensive stakeholder consultations were conducted with relevant stakeholders and MWE/WfPRC-C will liaise with them to ensure effective implementation of the proposed mitigation measures for the anticipated negative impacts as indicated in the EMMP. MWE/WfPRC-C should work closely with the local leaders and Local Government to ensure smooth implementation of the EMMP and if impacts not contemplated during this ESIA arise, the management of WfPRC-C should immediately address them in consultation with NEMA. If any

other structures/ expansion not described in this report takes place, it will be considered separate and an ESIA Report/Project brief will be prepared by WfPRC-C or the Contractor and submitted to NEMA for approval before implementation.

The following mitigation measures should be considered as conditions of approval as they are regarded as being essential in so far as rendering potentially significant impacts acceptable. Implement the EMMP for all provided project phases with special attention being given on:

- Undertake Annual Environmental Audits and submit reports to NEMA.
- Maintaining good house-keeping through the duration of the construction phase.
- Screening unsightly aspects from public view including excavations (where practical), construction material storage areas, waste storage areas and ablutions.
- Erect fencing around construction sites to act as screens minimizing the effect of wind in generating dust emissions.
- The re-vegetation of all areas of natural vegetation with indigenous species that have been disturbed as a result of construction activities and maintain the 200m buffer zone.
- Designation of construction materials and fuel storage areas.
- Effective control of waste and containment of storm water especially during rainy season.
- Implement dust suppression measures (use of water) when appropriate.
- Train workers on issues of HIV/AIDS and child labour should not be permitted.
- Adhere to Occupational Health and Safety Act, 2006 provisions e.g. monitoring noise levels and provision of protective equipment to staff.
- At least 75 % (subject to availability) local labour from Mubende district should be used and 95% (subject to availability and skills levels) local contractors should be used.
- The Developer (WfPRC-C) monitors compliance together with stakeholder wide monitoring group comprising technical staff from local government institutions.
- Fencing is recommended in order to prevent contamination of the water source and for security of hydraulic structures and installations for the pumpstation.
- Prepare a water source protection plan for the catchment area of the water sources.

Therefore, the proposed Kasensero Earth dam is environmentally and socially feasible for implementation provided the recommended mitigation and monitoring measures are implemented, and the proposed implementation arrangements are upheld.

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ANNEXES

Annex I: Approved Terms of Reference for ESIA by NEMA

NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY (NEMA)

NEMA House
Plot 17, 19 & 21, Jinja Road.
P.O.Box 22255, Kampala, UGANDA.

Tel: 256-414-251064, 251065, 251068
342758, 342759, 342717
Fax: 256-414-257521 / 232680
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Website: www.nemaug.org

NEMA/4.5

3rd March, 2023

The Permanent Secretary,
Ministry of Water and Environment,
P.O. Box 2026,
KAMPALA.

Tel: +256 414 505 942/5
Email: mwe@mwe.go.ug /ps@mwe.go.ug

RE: REVIEW OF SCOPING REPORT AND TERMS OF REFERENCE FOR ENVIRONMENT AND SOCIAL IMPACT ASSESSMENT FOR THE PROPOSED REHABILITATION OF KASENSERO EARTH VALLEY DAM AND THE ASSOCIATED PIPED WATER SUPPLY SYSTEM IN NALYANKANJA WARD, KYENDA TOWN COUNCIL, MUBENDE DISTRICT.

Reference is made to the Scoping Report and Terms of Reference (ToR) for carrying out Environmental and Social Impact Assessment (EIATOR10089) for Kasensero Earth Valley Dam and the associated Piped Water Supply System that was submitted to this Authority, for review and approval. This Authority has finalized the review and grants formal **APPROVAL** of the said TOR.

Please note that the approval of the TOR DOES NOT GRANT permission to start implementing any of the proposed project activities. This is not a Certificate of Approval.

In addition, you are advised to incorporate the considerations below during the conduct of the environmental impact study and the preparation of the ESIA report.

(i) Provide a comprehensive description of the proposed Earth Valley Dam rehabilitation and the associated Piped Water Supply System, the specific components and associated infrastructure, and the activities that will be undertaken during both the construction and operational phases of the project and the size of the work force.

Page 1 of 3

(ii) Include in the ESIA, a hydrological investigative report in regard to the potential impacts of the project on water resources within the proposed project area, incorporate in the ESIS mitigation actions to address such impacts.

(iii) Provide a detailed description of the waste streams that will be generated from the activities of the Earth Valley Dam rehabilitation and the associated Piped Water Supply System, and the measures and equipment that will be put in place to handle such waste.

(iv) Include in the report other relevant baseline information that is project site-specific, on the soils, water, air quality and noise; as well as, clear-colored photographs depicting the current status of the project area and the neighboring environs.

(v) Provide clear, colored and well-labelled location maps/images (preferably *each covering A-3 size paper*) and accurate sets of GPS coordinates clearly indicating the site boundaries. Ensure that all GPS coordinates are provided in UTM format.

(vi) Provide a clear and legible copy of the site layout plan *(preferably on A-3 sized paper).*

(vii) Carry out comprehensive consultations with all the relevant key stakeholders including Mubende District Local Government authorities, the Directorate of Water Resources Management (DWRM) particularly in regard to the potential impacts of the proposed project on water resources in the project area. The views of the stakeholders consulted should be well documented and appended to the ESIA report.

(viii) Include in the ESIA report, comprehensive analysis of alternatives/options to the selected project location, design and technology, among other aspects.

(ix) Carry out a comprehensive evaluation of the negative environmental impacts associated with the proposed project activities and the relevant mitigation measures to minimize the identified negative impacts and environmental management/monitoring plans that relate to the identified environmental impacts of the proposed project.

(x) Make reference to all the relevant provisions of applicable policies, laws, regulations, guidelines and standards, in particular, the National Environment Act, No.5 of 2019.

(xi) Append to the ESIA report authentic copies of land ownership and acquisition documents.

(xii) Indicate the actual total project (investment) cost including costs of works, machinery/equipment and land where applicable; and these should be submitted by a Certified Valuer and Valuation Certificate attached to the ESIA.

(xiii) In line with Regulation 49 (2) of the National Environment (Environmental and Social Assessment) Regulations S.I. No. 143/2020, pay a non-refundable administration fee of thirty percent (30%) of the total fees payable on submission of the Environmental and Social Impact Statement

Note that only registered EIA Practitioners including the team leader should be contracted to carry out the ESIA for the proposed project.

This is, therefore, to recommend that you proceed with carrying out the ESIA for the Earth Valley Dam rehabilitation and the associated Piped Water Supply System. We look forward to your cooperation and receipt of comprehensive copies of the ESIA report, for our further action.

Waiswa Ayazika, Arnold
FOR: EXECUTIVE DIRECTOR

Annex II: Records of Stakeholder Consultations

STAKEHOLDER CONSULTATION AND ENGAGEMENT FORM

NAME OF THE PROJECT: CONSULTANCY SERVICES FOR ENVIRONMENT AND SOCIAL IMPACT ASSESSMENT (ESIA) FOR A VALLEYDAM IN KASENSERO, MUBENDE DISTRICT.

DATE 27th/01/2023

NO.	NAMES	DESIGNATION	CONTACT	SIGNATURE
1.	Nzomwi Michael Muhereza	Chairman LCV	0785-744668	
2.	Tumusiime Leonard.	CAO	0772452620.	
3.	Katerega Dickson	Civil Engineer	0772387014	
4.	Ndagire Maria	DCDO	0772617274	
5.	Kisgaikye Fredrick William	DPDO	0772474306	
6.	Anthony Guma	Dist. councilor Kyenda/Lc	0772959702	
7.	Katerega Ronald	Civil Engineer(MWE)	0706 245576	
8.	Nusiimenta Ann Mary	Sociologist		
9.				
10				

STAKEHOLDER CONSULTATION AND ENGAGEMENT FORM

NAME OF THE PROJECT: CONSULTANCY SERVICES FOR ENVIRONMENT AND SOCIAL IMPACT ASSESSMENT (ESIA) FOR A VALLEYDAM IN KASENSERO, MUBENDE DISTRICT.

DATE 27th/01/2023

NO.	NAMES	DESIGNATION	CONTACT	SIGNATURE
1.	Hinsiima Deogratius	C/man LCI	0700396347	[signature]
2.	NSUBUGA MOHAMMED	LCII C/MAN KYEGOBA	0756419741	[signature]
3.	SSERUGO VINCENT	V C/P LCIII Kyenda T/C	0706059292	[signature]
4.	SSEBAKIGIE JOEL ABAAH	CDO-Water MALG	0774600424	[signature]
5.	Kizza Peter	mutuze	0703514000	[signature]
6.	KATONGOLE RASOOR	C/Man Kyemu cell	0703988732	[signature]
7.	[illegible]	Mutuze	07	[signature]
8.	Kajoka D. Emmanuel	Citezen	0772906274	[signature]
9.	Ndyamuhaki Sebugwawo	C/ Kigana	0708168980	[signature]
10	Sebikima Kizito	Kijuya		

STAKEHOLDER CONSULTATION AND ENGAGEMENT FORM

NAME OF THE PROJECT: CONSULTANCY SERVICES FOR ENVIRONMENT AND SOCIAL IMPACT ASSESSMENT (ESIA) FOR A VALLEYDAM IN KASENSERO, MUBENDE DISTRICT.

DATE 27th/01/2023

NO.	NAMES	DESIGNATION	CONTACT	SIGNATURE
1.	Kabasinguzi M	Kijuya		
2.	Rugumayo Charles	Disbility C/man	0789968197.	[signature]
3.	Mbonwe Bananas	Member	0702408555	[signature]
4.	Ssenyondo Gabulyd	Member	0759973119	[signature]
5.	Muhairwe Jordan	Action for Environment	0704566812	[signature]
6.	Naselemba Joseline Mary	C/per 4 women Migunwa LC1	0708354963	[signature]
7.	Ndyanuba Korebu			[signature]
8.	Tibekinga Abias	Mayumba Kumi (Place)	0757975959	[signature]
9.	Bayinobulya Boniface	Information	0775752731	[signature]
10	Mugumya Simon			[signature]
	Tumwiere Ali J	Kijjuya	0756441610	[signature]
	Nalbakooza Alistella	Kijjuya	0752590494	Nalbakooza

STAKEHOLDER CONSULTATION AND ENGAGEMENT FORM

NAME OF THE PROJECT: CONSULTANCY SERVICES FOR ENVIRONMENT AND SOCIAL IMPACT ASSESSMENT (ESIA) FOR A VALLEYDAM IN KASENSERO, MUBENDE DISTRICT.

DATE 27th/01/2023

NO.	NAMES	DESIGNATION	CONTACT	SIGNATURE
1.	Ninsiima Deogratius	C/man LCI	0700396347	[signature]
2.	NSUBUGA MOHAMMED	LCIII C/man Kyegoba	0756419741	[signature]
3.	SSERUGO VINCENT	V C/P LCIII Kyenda T/C	0706059292	[signature]
4.	SSEBAKIJJE JOEL ARAALI	CDO-Water MALG	0774680424	[signature]
5.	Kizza Peter	mutuuze	0703514000	[signature]
6.	KATONGOLE RASOOR	C/man Kyemu cell	0703988732	[signature]
7.	[illegible]	mutuuze	07	[signature]
8.	Kajoka D. Emmanuel	citizen	0772906274	[signature]
9.	Ndyamuhaki Sedurolla	C/ Kyenda	0708168980	[signature]
10	Sebikima Kizito	Kijuya		

STAKEHOLDER CONSULTATION AND ENGAGEMENT FORM

NAME OF THE PROJECT: CONSULTANCY SERVICES FOR ENVIRONMENT AND SOCIAL IMPACT ASSESSMENT (ESIA) FOR A VALLEYDAM IN KASENSERO, MUBENDE DISTRICT.

DATE 27th/01/2023

NO.	NAMES	DESIGNATION	CONTACT	SIGNATURE
1.	ZADOKI			
2.	Abwhine paul	-	-	-
3.	Masiko Zikuria	-	-	-
4.	TAVEBWA SIMON	-	0776545870	[signature]
5.	Ndwenjiso Slyio			
6.	SAFARI PATRICK	Chairman Butereru	0702919441	[signature]
7.	Kiwanuka BRUNO	-		[signature]
8.	Ssemugo Elia			
9.	Kenyangu Godfrey		0753841202	[signature]
10	Kato John			[signature]

Annex III: MINUTES FROM STKEHOLDER CONSULTATIONS

COMMUNITY ENGAGEMENT THAT TOOK PLACE AT THE PROJECT SITE

AGENDA

1. Prayer
2. Self-introductions
3. Opening remarks from one of the area LCI Chairpersons
4. Communication from MWE
5. Community engagement with consultants
6. Dam inspection

1.Prayer; Prayer was led by Naselemba Joseline Mary

2. Self – Introduction;

Introductions were done by Names, designation and Places of residence. This list of attendance will be attached last.

1.	LC I	• Welcomed every one for coming especially Visitors from MWE and Consultants • Thanked the local leadership starting from Mayor, District Councilor for Kyenda and the community at large for having spared some time to come and listen to the visitors
5.	MWE Representative	• The engineer informed the community that the dam was to be rehabilitated by the ministry of water and environment but in concurrence with the district and after it will to support many activities of the community especially farmer related.
5	Consultant engagement with the Community members	• The dam was constructed in 1952 • In 1999 the Mityana-Mubende-Fortpal road was being Upgraded to bitumen standard and the then RDC Zerida Rwabusagara gave out the dam water to be used for construction and it dried up • Other factors such as clearing forests on hills from both cells i.e., Buterevu, Kijuya led to the silting of the valley dam • Originally the valley dam drilled to serve several purposes which included; Watering of animals, Fishing, Irrigation and Study Purposes • Currently its being used as a source of water for drinking, watering animals and source of papyrus Expectations from the community • Expect to get water for domestic use supplied to the immediate neighbours • Once the dam is rehabilitated to its original state, it will stop encroachers from dam land • Expect to get water for irrigation • It can help the District/Sub County increase crop production since cultivation will be all year around • It will provide sufficient water for animals • It will be used for study and tourist attraction

		• The dam is rich, it has fish, it can be used for fish farming • It will attract industries • The process should be hurried before the dam completely dries up
		QN. MWE rehabilitating the dam and then carry out fish farming and then selling the fish to us ANS. The aim of the government of Uganda through Ministry of water and Environment is to rehabilitate the Valley dam to its original state and then handed over to its rightful owners. It aimed at improving the livelihoods of the community. **QN. The community expressed fear of being charged for water.** ANS. The engineer clarified by informing the community that after dam rehabilitation, water was to be charged for in order to raise some resource for dam maintenance. **QN. There is need for fencing around the site, because they it can be dangerous to the community and animals** ANS. There will be a wire mesh surrounding the dam the dam and only authorized people will access it. Watering points for animals will be constructed in easily accessible places outside the dam. **QN. The neighbouring community also expressed fear for losing their land to the dam that they had settled on for a long time.** ANS. The engineer explained that the land matters were to be handled by the district land board and the sub county subsequently. **QN. Possibility for Insecurity in the area was another concern but the area** ANS. District councilor, Kyenda Town Council clarified that the district worked in conjunction with the ministry and security for the dam was to be prioritized. This security would also benefit the community so insecurity is likely to be minimal.

District Leadership

Kiyanja Ahmed- Community development officer in charge of Water for Production

- The dam was constructed oin 1950s by the Buganda Kingdom after the Kabaka then Sir Edward Muteesa visited the area realising the need/ water scarcity in Buwekula south during his hunting expedition. He ordered for the construction of the dam which was completed in 1958
- Dam is depleted, was previously constructed serve water for livestock and domestic use, currently its has provided water for numerous needs mainly water for livestock, domestic and construction. For example during the construction of Mubende- Fort Potal Road, Energko drew water from the dam and Excel is currently drawing water for construction of resettlement houses for Project Affected person for East African Crude Oil Pipeline.
- The area that hosts the dam is water stressed, communities lack sufficient sources of water. Most of sunk boreholes run dry during the dry season. The dam area has been encroached on with cultivation happening within the reservoir area.

- The community in the past has been engaged in battles to recover and restore land that initially belonged to the dam. The dam had 200Acres however during the endevours to recover the enchroached on land, only 100 acres was recover, pliers/ demarcating markers installed though most have been destoryed by the same encroachers.
- The dam would be a reliable source of water for the Villages in Kitenga S/C and villages within 3 to 5km radius. NWSC is already operating in Kyenda Township however there is unreliable supply especially in the dry season.
- The respondents of villages around the dam are mainly doing subsistence agriculture involved in mixed farming. Most of households have livestock on average 5 to 10 with over 100 goats for those with land holdings above 10 acres. The average land holding is between 1 to 10 acres. The CDO revealed that in the villages of Mijunwa and Buterevu, there are commerical farms mainly in livestock bull fattening and dairy.
- The main crop enterpises include: Maize, Coffee and Banana

Critical issues raised to focus on during Kasenero Dam rehabilitation include:

- Human activities in catchment areas especially poor farming practices are affecting the quantity and quality of water into the dam. There is serious encroachment on valleys, most have been fenced off and numerous ponds/valleys have been excavated in water ways that lead into dam reservoir.
- The operation and maintenance are likely to arise unless a water user is constituted and empowered to operate. CDO recommended that members on water user committee should come from all the surrounding villages, trained. The maintenance costs for dam would be quite low once a committee is constituted.
- People have a poor attitude towards payment for water, there is a persecution that water is for free.
- Some community members think the dam technology is outdated and obsolete. Piped water systems would be most viable option to deliver water to community or household level, however for case of greater kitenga and Kyenda township in particular, there is no sustainable water source for the dam would one of the best options to be developed.
- The land for dam was encroached on, Mubende LG together with area MP demarcated the land, carried out community engagements, awareness and sensitization however Mubende LG lacks the technical capacity and resources to rehabilitate the dam thus forward the matter to central government through Ministry of Water and Environment.
- NGOs & CBOs operating in area included: C-Care in Kitenga mainly involved in smart agriculture activities. Solaka mainly in Lusalira community sensitization-education, environmental mgt & garbage collection. Mogacha- Agriculture.
- The land tenure system in Kitenga is mainly public land with no predetermined land use plan, each individual develops his or her land as they wish.

LC V Chairman (Hon Muhereza Ntambi)

- Chairman revealed to the team that there are other options/ dams available for rehabilitation with much greater capacity than Kasenero dam. He wondered the criteria used to select it for immediate intervention. Other dams available for intervention include

Butayujja Dam among others which he stated that its so huge with bigger potential to serve bigger community yet mubende district lacks the resources to fix it.

- Chairman brought to our attention the land issues and controversey around Kasenero dam.

DNRO- Alex Tumwesigye

- The was established in 1950s as buganda kingdom intervention to curb the water scarity in Buwekula south.
- There is serious degradation of catchment areas, deforestation is rampant and is driven mainly by mushrooming plywood chinese factories in Mubende district.
- Dam Land was over **200 Acres, but now 50 to 100 acres** is available due to encroachment. District installed land demarcating pliers. There is no buffer zone maintained, cultivation is upto highwaterline and livestock is watered directly into the reservoir. The indigenous tree species around dam have been cut down and replaced with exotic species like Eucalptus and pine. The dam reservoir dead storage is used up due to excessive siltation as result of poor farming practices upstream.
- There are no sensitive flora and fauna diversity at or surrounding the dam site, environment around the dam is already disturbed with indigenous tress species cut and replaced by exotic species like eucaptypus
- The current functionality of the dam stands at about 10 to 20% with most, the reservoir has been infested by papyrus and reservoir fringes severally encroached on. Demarction of boundaries was done by Mubende district Local government. There is poltical will to restore the dam since area it serves it water stressed however the district lack the technical manpower and financial resource to handle the rehabilitation on its own.
- DNRO stressed the need for engagement of people owning land around the dam to engaged in alternative livelihood rather than cultivation especially in the land that would be conserved as bufferzone for the dam. The proposed alternative sources of livelihood included Apiculture, Piggery, poultry, agroforestry and strip grass planting to help trap sediments into the dam. DNRO advised that for trees to be preserved, there is need to introduce the component of carbon credits with soft loans introduced for those with woodlots and preserving trees for 10 to 15 years and above.
- The NGOs & CBOs that have previously supported farmers include C-Care, FAO and JICA.

LC- Village consultations

Kijuuya Cell

- Mr Vicent Sekeyo highlighted the number of villages that are dependent on the dam and these included: - Kisoju, Buyonzi, Nsenge, Kyenda.
- The water from the dam is used for need of activities e.g road construction by Energko during construction of Mubende- Kampala Road, EACOP resettlement construction project by Excel Construction Ltd.
- Water user committee was in place with 8 members however of late only 3 members are remaining. There were efforts to clean up the dam in 1992 after its dried up by Action Aid. Silt was dredged and pits excvated with spoils piled on either side of the reservoir. Over the years the dam has again lost its storage.

- Spillway was blocked and destoryed by the trucks fetching water for road communities, this lead to malfunction of the dam during flood events which lead to overflow over the embankment crest. During field visit, there was evidence of piping underneath the embankment which started as small seeps on lower side of embankment.
- The community in Kijuuya lacks reliable source of water for domestic and production. The boreholes in area have low yield and dry out during long dry spells. Kijuuya has atleast **1200 to 1500 people**. The village is also characterised of migrant workers. Each household in Kijuuya has on average 5 to 10 people. There is a primary school in Kijuuya called St Johns (Day & Boarding school)~approximately 300 students. The Village also has a technical insitute for vocational studies with approximately~**70 to 100 students**.
- There is no secondary school in Kijuuya only in Kitenga/ Kyenda TC. There is no hosiptal in village only private clincs, **2 hotel/lodges, 3 resturants, 15 bars and 10 shops.**
- The community members highlighted the need for piped water system to deliver the water to each household for those who can afford or install public stand pipes at designated locations. The community members lamented the pain of taking water at same watering points with animals and other risks associated with collecting water directly from the dam. The community members revealed the risks of drowning, rape and defilement of women & children respectively, injury from wild animal etc.

Positive & Negative benefits

- With the rehabilitation of the dam, there will be more water for production epecially irrigation and this will enable cultivation throughout the year.
- The presence of dam can enhance fisheries, aquiculture and livestock rearing within the area. The dam was major water source for whole of Buwekula south, cattle could come as far as **Gomba, Kyakwanzi** to water from Kasenero dam during dry spells. Previously the dam had alot of fish which was supressed by the presence of papyrus and other water weeds on the dam.
- Dam can used for recreation and eduction field studies and research. The older community member revealed how the fisheries officers used **60s, 70s, 80s and early 90s** used to come from Entebbe to conduct numerous studies on fish in Kasenero dam.
- The villages members stressed the urgency to rehabilitate the dam, the dam is under a serious threat of failure by piping and breach at anytime from now. Incase of failure there could damage to crops, property and dam downstream of embankment.
- The inundation of extra land can flood gardens and property upstream
- Accidents like drowning can happen

Key highlights why the dam got depleted

- Unsustainable abstraction of water from dam during construction of Mubende- Fortal Road, it left the dam withno water which gave opportunity to water weeds and other incusive species to invade the reservoir. This was culminated by the excessive encroachment activities with the reservoir buffer zone which lead to excessive siltation.
- Previously when Kyenda township lacked a gazetted solid waste dumping site, private garbage collector used to dump the waste into reservoir area.

- The community members also think that a failed deredging project by Action Aid might have just made the situation more worse.

What needs to be done

- ✓ Establishment/ constitute a water user and management committee. The communities' members from be from all the surrounding villages, trained, roles and responsibilities well stated. The committee should be to some extent empower to collect water user fees for proper operation and maintenance of the dam. The water user committee should be gender sensitive
- ✓ By Laws and Ordinance to be passed to curb further encroachment on the dam land. In future activities/ huge water drawing like construction should be regulated and in some cases a fee charged.
- ✓ There is need to engage and sensitize the upstream communities in Dam catchment area about sustainable soil and water conservation practices to help reduce sediment yield and siltation into dead. The community members advocate for water source protection plan that brings onboard all the identified key stakeholder, mapping of hotspots in catchment and possible interventions to ensure good quantity and quality of water into dam.
- ✓ Water user fees proposed by community is 50~100 per jerrycan. Members proposed that it can be made mandatory for each family to contribute 2000 per year to help fund conservation activities e,g tree planting in catchment area.
- ✓ There is need to instal a piped water system to deliver water to community or individual households for those who can afford
- ✓ There is need to demarcate and fence off the dam and system installed on downstream side of dam to distribute water to watering points for livestock and taps for communities nearby.
- ✓ Need to control seepage underneath the dam and open up the blocked spillway to avoid overflow on top of embankment.
- ✓ There is need to increase the capacity of dam to meet the growing water demand in Kyenda and greater kitenga especially from domestic as result of rapid growing population, livestock and irrigation to mitigate the effects of climate change.

Sn	Easting	Northing	Elevation	Remark
1	0336280	0054510	1277	Possible land uptake/ Inundation as result of embankment raising
2	0336304	0054505	1279	Need to shift the road
3	0336323	0054489	1223	Blocked spillway, vegetated and Non functional at moment
4	0336349	0054509	1225	Embankment crest level
5	0336369	0054509	1223	Valley bottom
6	0336389	0054496	1224	Valley bottom
7	0336402	0054486	1225	Valley bottom
8	0336421	0054479	1227	Valley bottom
9	0336487	0054467	1231	Demarcated Dam Land Voundary

Kyenda TC

- The township has about **31 villages/cells and 4 parishes** with a population of about **10,000 to 15,000 persons.** There are over 1000 households and over 300 households and population of **2500~3000 person** in Kasana cell only.Most of township residents are mixed farmers and traders(Shops for general merchandise, Livestock & crop produce sellers). In 2014 the estimated population for Kyenda Township was approximately 11,400 persons. The average household size is 6~10 persons.
- There is piped water system in the township however supply is not reliable especially in the dry season. Most times it takes 2 to 3 weeks without water since supply is from mubende which is more than 20km away. The jerry of water from current installed system costs between 200~300 shillings. Community members stated they would be comfortable purchasing a jeerycan of water between 50~100 shs. Other alternative sources of water include ponds and kasenero dam which is also at moment is noongar fully functional. Water is collected from ponds 2 plus miles away especially in Kayizi.
- The cost of jerrycan is over 1000, its always turbid and used by both livestock and people. Dry severe droughts all the ponds dry out in just 2 to 3 weeks which leaves the all of greater kitenga in water crisis.
- Most common water borne diseases include typhoid, Malaria and skin diseases.
- There is no proper solid waste management systems in the township, TC collects garabge from homesteads and dumps it designated disposal site of 2 acres. The dumping site is not engineered as landfill with no organised format/ formula for waste disposal at the facility.
- Township has no designated water borne toilets, most of toilets are not up to standard, there is need to better toilet facilities for township. Open defection is not common and sanitation coverage is over the recommended average.
- Kyenda TC has a physical development plan, however it is hard to enforce it since most of older buildings were randomly constructed and its hard to enforce the zoning, however for new buildings sprouting the physical planner first approves the plans. The Zones stipulated in the master plan include industrial park. Currently 3 chinese plywood factories with over 300~500 workers have already been opened up.

Schools	Details/ Particulars
Primary school	**~20 schools** @ primary school approximately **300~500 pupils**
Secondary schools	~2 schools @ Each secondary school**~ 600** students
Health Centre III	5 beds(Maternity Ward)
Police	**1**
Church	**35**
Mosque	**8**
Markets	1 Weekly market on Wednesday and 2 Permanent Food markets

Kyenda TC Coordinates **(36N 0334080, 0055025, 1293m)**

Positives

- ✓ Rehabiltation of dam will reduce water shoratge in greater kitenga and whole of buwekula south.

- ✓ Water borne diseases will reduce
- ✓ Rehabilitation of dam will provide water for irrigation, livestock and domestic use
- ✓ Kasensero dam can be used as tourism and recreational/ Education facility
- ✓ Aquiculture and fisheries can promote,
- ✓ Development of Town council and improvement sanitation at household and community level
- ✓ With better water source alternatives, more factories can be attracted to area which in end will employ many unemployed youths in the township and pay taxes.

Negatives

- ✓ The dam is so close to main roads, in case of criminality it can be dumped site for dead bodies
- ✓ Accidents such as drowning
- ✓ Government can take over the management of dam, sells water to community at fee higher with one operator entirely in charge of operating the dam. The community can lose ownership over the dam.
- ✓ In case of dam embankment raising, there might be more land flooded in upstream areas beyond the original land of dam. A number of people might be affected and they might be a need to compensate and even resettle some.
- ✓ In case of failure, the property and mubende fort portal road might be damaged.

Recommendations

i. Contractor should do good work to ensure that dam can serve atleast for the next 50yrs
ii. There should be water utilization plan for communities near by and others far away. Piped water system is proposed to distribute water up to household level. Water for livestock should be also thought of how it will reach the individual farms.
iii. Other water uses especially those drawing water for construction projects like Excel abstracting water for construction of resettlement house for PAP of EACOP project should do it in sustainable manner after clearance from the ministry of water and environment. There activities around the dam should be regulated and permits issued if need be.
iv. There is need to constitute a water user committee, the committee should include members from all the surrounding villages and should be gender sensitive with sufficient women and youth representation. The committee should be empowered and entrusted with the responsibilities of operation and maintenance, revenue mobilization for water source protection activities in catchment area and also with powers to enforce ordinances enacted especially against encroachers and degraders.
v. Warning signage should be installed around the dam and some sections fenced off to ensure the safety of community members.
vi. Demarcation of the reservoir/dam buffer zones to help deter encroachers.
vii. Land for expansion of dam can be got, however compensation element may come up if the neighbouring land owner have to give up their land in case it's inundated.
viii. Strip grass should be planted all along the dam in buffer zone to ensure that all sediment is trap to avoid rapid lose of storage before the dam's useful life time.

Buterevu LC/ Mijunwa Village

- Buterevu LC was curved out of Mijunwa Village. Butervu village is part of Kyenda TC. Former LC1 chariman stated that dam was very useful to herders who used to camp around dam in dry spell. The herders used to come as far as Kyankwanzi, Gomba to water livestock at Kasenero dam.
- Former chairman stated that dam is bad state, its seeping water underneath after a hole/Pipe developed. He emphaised the need to rehabilitate the dam as quickly as possible so that there is no further breach and ehnace its storage functionality to help provide water for deomestic, livestock and possibly irrigation.
- There is need for water source protection plan, utilization and distribution plan for resource to be developed otherwise the earlier challenges that lead to depletion of dam will be faced again.
- The Dam was constructed as an intiative by the Buganda government to avert water scracity challenges in 1950s. The community members wondered if there is any offical communication from Buganda government before any rehabilitation of dam can commence. It was brought to our attention that Buganda govt in collobration with central govt has planned an intervention to revive the dam. The plan was to excvate and pile up soils on lower side of existing embankment then after break up the old embankment progressively as the reservoir fills up.
- If the dam is rehabilitated, tank can be installed at Nsisi hill and can gravitate/ distribute water to most of villages in Kyenda Township at fee of not more than 100shs for both domestic and livestock. At the dam a designated place can be installed downstream for watering of animals.

Situational analysis

- ✓ Livestock numbers **>= 50,000~100,000 cattle**
- ✓ About 10~20 farms and about **16~20 kraals with over 400 cattle per farm**
- ✓ Individual farms have isolated water ponds which dry out during the dry season.
- ✓ 4~5 trucks of 2000ltrs capacity draw water for EACOP resettlement project from dam on daily basis.
- ✓ Jerry can of water can cost **1000~1200 shs plus 2000shs transport for Boda-boda**.
- ✓ Dam had a lot of land however encroachers grabbed it, the cultivate along the reservoir banks silting and depleting it instead. There is need for an ordinance to curb encroachment on valleys and reservoir buffer zone. They recommended planting of trees and grass in buffer zone to reduce siltation into dam. Cultivators near the dam can use the land for other alternative sources of livelihood such as apiculture, fisheries etc.
- ✓ Major crop enterprises include: -**Coffee & Banana, Maize& Beans, Vegetables (Tomatoes, Onions, Cabbages etc).** Subsistence farming is mainly practiced with land holdings of between **2~10 Acres**. Over time the soils have lost fertility due to season after season cultivation.
- ✓ The longer dry spells and erratic rains as effects of climate change call for installation of irrigation systems to support farmers and ensure all year-round production.
- ✓ About 13 groups and PDM is already on board to help farmers.

- ✓ There is ready market for produce though the prices over fluctuate. The biggest markets are in Mityana and Mubende about **80 and 20km away** respectively.
- ✓ Gender Based and Domestic violence based on water shortages e.g. improper house hygiene and general cleanness. Child are exposed to risks of defilement and rape especially if the collect water alone from ponds and dam.
- ✓ Issues of animal watering directly into water sources as community members.

Kyemu cell

Kabogoza Bob

- Thanked the kabaka then Sir Edward Muteesa II for being visionary and instructed the construction of Kasenero Dam in 1980s. He recommended that design team consults with the Buganda kingdom since its also a major stakeholder in the region and its the kingdom that had earlier donated 200acres of land onto which the dam was installed. Mr Kabogoza further highlighted the water scraity as one of Buwekula South's biggest challenge. The piped water supply system from Mubende is very unreliable especially in the dry season. Kyemu cell can go without water for weeks to months and distribution is not upto household level, only public stand pipes installed at isolated spots within the community.
- Mr Kabogoza advocated for moblization of community members to raise money voluntarily to help in restoration and rehabilitation of the dam e.g., each family can be allocated certain amount to help in extension of water up to household level and conservation of dam. He gave an example of how the electricity distribution project is handled.

Mugwana Nasani

- Distance of Kyemu cell to dam is over 2miles, though the source is to be developed it will be still hard for children, women and elderly to collect water from the dam. There is need to comprehensive plan to ensure water is distributed at least up to household level.
- Dam land was encroached on, reservoir silted and dam reservoir infested by a papyrus and other water weeds. Mubende district intervened to demarcate the dam land boundaries however in some areas the pliers were removed, buried and in others animals continue to drink directly from the dam. He is happy with the proposed intervention and hopes it will help the communities around since the around is already water stressed.

Bwerere Jane

- Tap water is unreliable and only flows in wet season thus a need to clean up the Kasenero dam to be alternative source of water for community. The cell can spend over a month with no piped water supply. The source for piped water scheme in as far as Mubende in Katebe which probably dries up in dry season or just insufficient to meet the increasing demand.
- Jerrycan of water is sold at 100shs however supply is unreliable in dry season yet its when operators of community public taps should be getting money since most of available water ponds dry up. She narrated how at one time there was no supply for close to 5months, at time of this consultation it had spent 1month without flowing through the pipes.

- She advised that if people can't individually get the water to their household, they can form groups which would ask for public stand tap and they all collectively pay for extension of distribution lines as its case for electricity distribution within the community.

Kyomuhangi Latifa

- Parents send children to go collect water from the Dam, however there is always fear that they can drown in dam. There is need to install taps downstream of dam from which children and other community members can collect water from instead of directly from dam.
- Need for piped water systems up to community or household level.

Kimala Vangelista

- Animals used to drink directly from dam, they scare kids collecting water which might end up running into dam thus drowning. A piped water system can be installed, water charged at small fee of like 200 shillings to deter direct drawing of water from the dam.

Kiggundu Joseph

- Dam was clear with plenty of water, it was spoiled by excessive abstraction by Energko during the construction of Mubende- Fort Portal Road.
- Originally dam land was over 200acres, over half of it was encroached on.
- If the dam's capacity is to be increased to store more water, more land will be inundated/flooded thus project implementing team might need to think about compensation and resettlement of project affected persons.
- Is there by any chance for the rehabilitation contractor to employ some of unemployed youth in community. Kyemu cell should be prioritized for **unskilled, semi-skilled** and casual jobs once construction starts.

Bugonzi village

- Community members wondered whether only the dam is to be rehabilitated or even opening up the boundaries of dam is to be done to ensure that all original 200acres of dam is secured. Can the dam be fitted on **200acres**
- More than 5000 cattle from whole of greater kitenga used to water from Kasenero dam.
- Encroachers destroyed the dam, most of land titles acquired on dam land were cancelled in Mijunwa but those in kijuuya were not. Previous district leadership leased land.
- Community members wondered hown the socio-economic survey is related to rehabilitation of dam: Response: - For planning and estimation of water demand in surrounding viilages.
- There is water scarcity in Bugonzi and even if Kasenero Dam is rehabilitated its still far. Chairman requested for short term intervention like drilling of boreholes to help reduce the water shortage.
- **Tugume Godfrey:** There is a fear within community members that government may have identified an investor to rehabilitate and develop Kasenero dam after which water will be

sold out to community members at fee which might not be sustainable to community in long run.

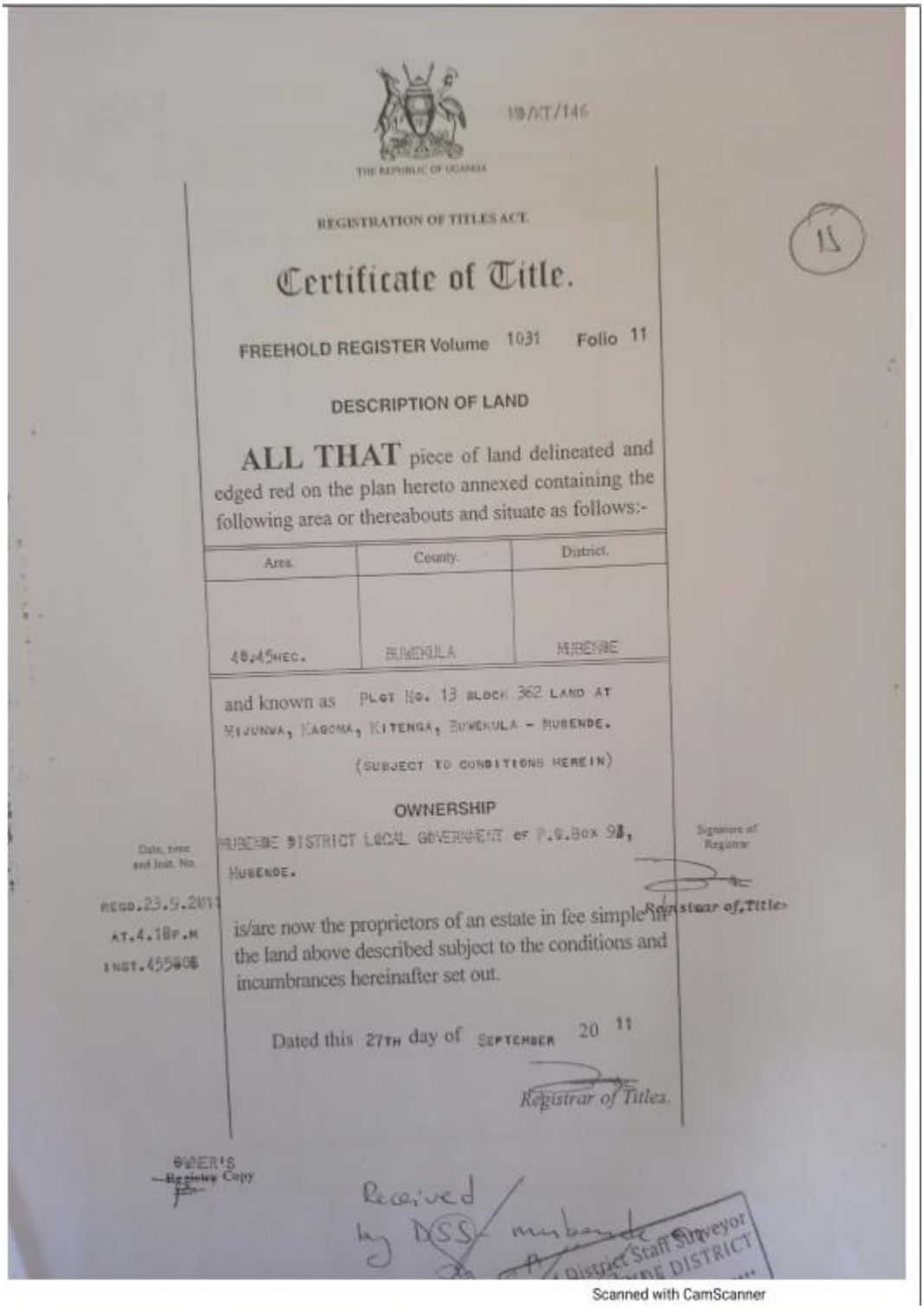
- **Mugula Mike:** Affected persons will need to assisted and possibly compensated if their property is destroyed and land inundated.
- LCs around dam should be approached first to engaged all those/ community members around the facility about the willingness to give up land for the dam during its expansion.
- Bugonzi has about **549 persons and 175 Households**, however it has people who own property in village but dont stay there. Most of residents are engaged in subsistence mixed farming (rearing cattle and cultivation). The average land holding is **2-5 Acres** and the predominant enterprises include Maize& Beans, Coffee & bananas. Market is readily available for farm produce. Traders purchase and deliver to stores in kyenda. The biggest challenge is low farm gate prices which flutctate seasonally especially intimes of plenty harvest. Farmer groups are available to only provide soft loans for purchase of inputs; however, farmers cultivate, produce and market thier produce individually. There is lack of organisation in these famer groups. On average households with cattle have **5~7 cattle and 5 goats**. Big commercial farms have 4~5 acres and raise upto 10 heads of cattle. Average Household size is 5.
- Bugonzi village lacks primary and secondary school and the nearest nursey& primary school is morethan 1mile away. There is health centre II mainly handling out patients.
- Shortest distance to most prominent water source is 3miles away (Water Pond excavated by Action Aid). There is no borehole, the installed piped water taps have no running water. Jerrycan of water costs between **1000 to 1500shillings**. With proposed system, members recommend atleast a jerrycan to cost **100 to 200 shillings.**

Challenges

- ✓ Encroachers
- ✓ Distance to dam, need for reliable piped water system to distribute water to Bugonzi village
- ✓ No access to dam for those who would wish to take animals to water from near the dam, valleys that used to be assess points have been fenced off.
- ✓ Existing Farmer groups are not organised
- ✓ Previously dam was met for livestock and a few surrounding communities, at moment there is increase in population in all nearby villages and kyenda TC. There are also other upcoming water needs like water for irrigation, piped water scheme, water for construction which need to be catered for in the new design.
- ✓ Excessive deforestation in catchment area. There are not incentives like carbon credits and alternative livelihood sources for those with individual plantation forests to preserve them. The growing plywood industry by Chinese firms and factories in district is fuel alot of deforestation. No ordinances to protect forests especially from unsustainable cutting for sell to Chinese factories.
- ✓ Laxity in voluntarily community service (Bulungi Bwansi).
- ✓ Improper waste disposal especially single use Alcohol plastic bottles are becoming a nuisance to community. Bottles are polluting soils, contaminating water courses and aesthics of the entire village.

- ✓ Community doesn't get feedback about the proposed interventions after a series of engagements.
- ✓ Demarcations were made, pliers installed however some nearby community members refused to vacate dam land. The corruption and compromise leaders fail the efforts of community members to evict the encroachers.
- ✓ Bugonzi village lacks educational facilities.
- ✓ Unemployment amongst the youth- Most of them are into temporary seasonal jobs, brick laying while others are growing horticultural crops likes tomatoes, onions with no supporting infrastructure. Most of the groups support maize farmers yet youths have no capital and inputs as well. There is need to skilling programs.

Annex IV: Land Ownership Documents for the Infrastructure



MB/KT/146

THE REPUBLIC OF UGANDA

REGISTRATION OF TITLES ACT.

11

Certificate of Title.

FREEHOLD REGISTER Volume 1031 Folio 11

DESCRIPTION OF LAND

ALL THAT piece of land delineated and edged red on the plan hereto annexed containing the following area or thereabouts and situate as follows:-

Area	County	District
48.45HEC.	BUWEKULA	MUBENDE

and known as PLOT No. 13 BLOCK 362 LAND AT MIJUNWA, KAGOMA, KITENGA, BUWEKULA - MUBENDE.

(SUBJECT TO CONDITIONS HEREIN)

OWNERSHIP

MUBENDE DISTRICT LOCAL GOVERNMENT of P.O.Box 98, MUBENDE.

Date, time and Inst. No.

REGD.23.9.2011
AT.4.18P.M
INST.455408

Signature of Registrar

Registrar of Titles

is/are now the proprietors of an estate in fee simple in the land above described subject to the conditions and incumbrances hereinafter set out.

Dated this 27TH day of SEPTEMBER 20 11

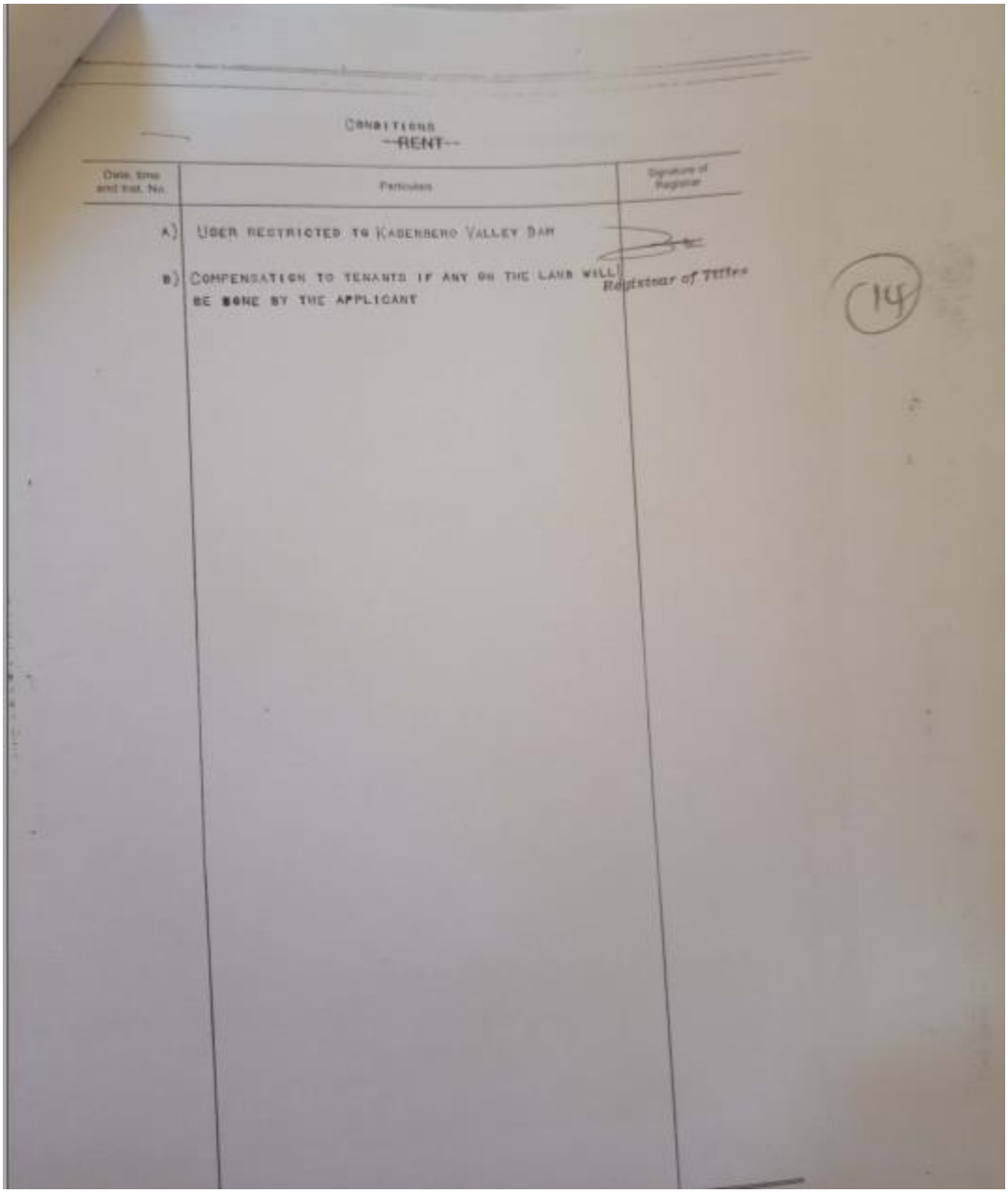
Registrar of Titles.

OWNER'S Register Copy

Received by DSS mubende

District Staff Surveyor MUBENDE DISTRICT

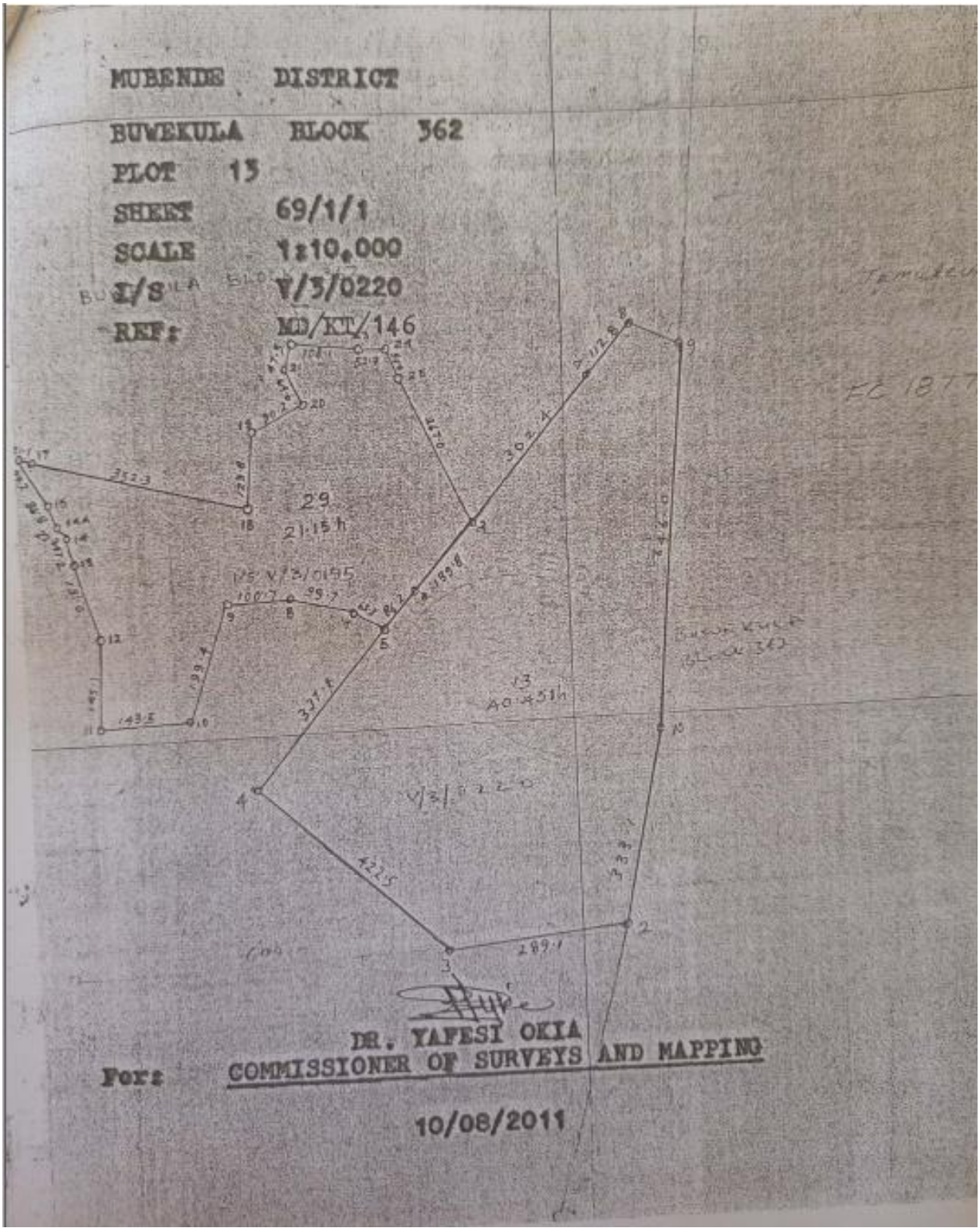
Scanned with CamScanner



CONDITIONS
--RENT--

Date, time and Inst. No.	Particulars	Signature of Registrar
	A) USER RESTRICTED TO KABENBERG VALLEY DAM	
	B) COMPENSATION TO TENANTS IF ANY ON THE LAND WILL BE DONE BY THE APPLICANT	Registrar of Titles

(14)


MUBENDE DISTRICT
BUWEKULA BLOCK 362
PLOT 13
SHEET 69/1/1
SCALE 1:10,000
F/S V/3/0220
REF: MD/KT/146
29
21.15h
13
40.451h
V/3/0195
V/3/0220
DR. YAFESI OKIA
For: COMMISSIONER OF SURVEYS AND MAPPING
10/08/2011

Annex V: Chance Finds Procedure on Physical Cultural Resources Management

The Physical Cultural Resources Policy (PCRs) i.e. OP 4.11 should be triggered because of the excavation works that may encounter PCRs. To meet the requirements of this policy, a Chance Finds Procedure has been developed to indicate a real risk of causing undesirable adverse environmental and social effects on the physical and intangible cultural resources, and that more substantial planning may be required to adequately avoid, mitigate or manage potential effects. Chance find procedures will be used as follows:

i. Stop the construction activities in the area of the chance find;
ii. Delineate the discovered site or area;
iii. Secure the site to prevent any damage or loss of removable objects. In cases of removable antiquities or sensitive remains, a night guard shall be present until the responsible local authorities and the Directorate of Museums and Monuments (DMM) take over;
iv. Notify the site / supervisory Engineer who in turn will notify the responsible local authorities and the Directorate of Museums and Monuments under the Ministry of Tourism, Wildlife and Antiquities (within 24 hours or less);
v. The Directorate of Museums and Monuments would be in charge of protecting and preserving the site before deciding on subsequent appropriate procedures. This would require a preliminary evaluation of the findings to be performed by the archaeologists of the Directorate of Museums and Monuments (within 24 hours). The significance and importance of the findings should be assessed according to the various criteria relevant to cultural heritage; those include the aesthetic, historic, scientific or research, social and economic values;
vi. Decisions on how to handle the finding shall be taken by the Directorate of Museums and Monuments. This could include changes in the layout (such as when finding an irremovable remain of cultural or archaeological importance) conservation, preservation, restoration and salvage;
vii. Implementation for the authority decision concerning the management of the finding shall be communicated in writing by the DMM;
viii. Construction work could resume only after permission is given from the responsible local authorities and the Directorate of Museums and Monuments concerning safeguard of the heritage;
ix. These procedures must be referred to as standard provisions in construction contracts, when applicable. During project supervision, the Site Engineer shall monitor the above regulations relating to the treatment of any chance find encountered are observed;
x. Construction work will resume only after authorization is given by the responsible local authorities and the National Museum concerning the safeguard of the heritage.
xi. Relevant findings will be recorded in World Bank Implementation Supervision Reports (ISRs), and Implementation Completion Reports (ICRs) will assess the overall effectiveness of the project's cultural property mitigation, management, and activities, as appropriate.

Annex VI: Grievance Redress Mechanism

There will be a necessity to resolve conflicts swiftly in order to expedite the project's planning and construction phase and for the smooth eventual operational activities. Therefore, a grievance redressing mechanism is essential for Recycling Facility. This procedure will address this need in detail. The objectives of the grievance process as explained in the subsequent chapter of these guidelines will be as follows:

- Provide affected people with avenues for making a complaint or resolving any dispute that may arise;
- Ensure that appropriate and mutually acceptable corrective actions are identified and implemented to address complaints;
- Verify that complaints are satisfied with outcomes of corrective actions;
- Avoid the need to resort to judicial proceedings.

Grievance management is an important step in community engagement. There had been and will be community grievances throughout the project's various development stages. It is expected that all such grievances be amicably resolved if the developer is to abide by the global and country specific Social Safeguard guidelines. In practice, in similar compensation and resettlement activities, many grievances arise from misunderstandings of the Project policy, or result from conflicts between neighbors, which can usually be solved through adequate mediation using customary rules or local administration at the lowest level. Most grievances can be settled with additional explanation efforts and some mediation using customary dispute settlement mechanisms.

The purpose of Grievance management shall be to provide opportunity for the aggrieved parties to resolve issues through arbitration and negotiation based on transparent and fair hearing. It will allow the parties in the dispute to arrive at a win -win solution. Final outcome thus be that the extra judicial systems will work smoothly and that number of disputes seeking interventions at the country judiciary will be made minimal. The functioning a proper grievance management mechanism is a requirement in view of the above. The overall management of grievances is the responsibility of the developer or/and the contractor. The Project, thus, will put in place an amicable, extra-judicial mechanism for managing grievances and disputes based on explanation and mediation by third parties. Procedures relevant to this amicable mechanism are detailed below. It will include three different levels:

- Registration by project of the complaint, grievance or dispute;
- Processing by project of the grievance or dispute until closure is established based on evidence that acceptable action was taken; and
- In the event where the complainant is not satisfied with action taken by project as a result of the complaint, an amicable mediation can be triggered involving a mediation committee independent from the Project.

Managing grievances needs a clear and transparent procedure well instituted within the management structure of the project. At minimum, such a procedure should consist of the following steps:

a) to receive the grievances,
b) to acknowledgement the receipt,
c) investigation and resolution,
d) Closeout and follow-up.

i. The need for maintain a Grievance Register

There should be Grievance Register which would record all the grievances, complaints and issues the stakeholders would wish to bring to the attention of the Developer or the Contractor. It should be kept at a place where all will have easy access; preferably this should be placed at the office (allocated for the Grievance Committee (GC)). It should contain the date of the entry, name and contact details of the complainant; nature of grievance, Signature (on one side of the Register) and actions taken to address or reasons the grievance was not acted on, the signature of the GC and Complainant as to how the grievance was closed and date (on the other side of the Register.

ii. Recording of the complaints into the Grievance Register

The following steps are to be followed when the complaints will be received: Receipt of complaint (a verbal or in written) will be received by the Community Liaison Officer or any other officer (a member of the Grievance committee).

- The complainant can obtain the assistance from a member of the grievance committee or the Site welfare officer to lodge such an entry in to the Grievance Register.
- The Officer Responsible or the GC member, who is at present, will communicate with the complaint in a language acceptable to the complainant.
- Since the site working is carried out in English Language, the Site welfare officer or the member of the Grievance committee may lodge the entry in English language
- After lodging the complaint in the register, the officer recorded such complain shall read to the complaint what is recorded and sign the entry made into the Grievance Register

iii. Formation of a Grievance Committee

In Uganda at the local level, the village leaders and the LC (1) play a key role in managing disputes. The Parish level committees formed for the management of disputes is the lowest level of accepted forms of reconciliation board at which the complainants can have access to for justice if issues will not be resolved at the village level. However, in order to strengthen the village level reconciliation of disputes specially over the issues arising from the project related matters, appointing of a Grievance Committee has been considered a viable option according to the accepted practices. It is expected that grievances depending on the complexity and nature can be resolved either at the site level, at the grievance committee level or at the project developer's top management level or at the judiciary level. It means that if a complainant is not satisfied with the site level solution offered by the site manager or the project's administration manager, the matter can be taken up by the Grievance Committee (GC).

The constituency of the grievance committee and its role is explained in the following section. This GC is to be considered the vital body which prevents any grievances to be heard at higher levels. In parallel and where necessary, the GC holds meetings or other appropriate communication with the complainant, with the aim of reducing any tensions and preventing them from escalating. During closeout, the GC seeks to confirm that its actions have satisfied the complainant. During follow-up, the GC, with the assistance of the Site Construction Manager investigates the causes of grievances, where necessary, to ensure that the grievance does not recur.

The composition of Grievance Committee is depicted below:

a) Representative from area – 01 Members (preferably from Sub County/)
b) Representative of Women – 01 Members
c) Representative of the Local Government – 02 Community Development Officers
d) Representative from the developer – 01 Member
e) Representative from the contractor – 01 Member

Members of the Grievance will be provided training on conflict resolution and given more exposure on procedures of managing grievances.

iv. Performance Indicators in respect of the functioning of the Grievance Committee

Key interventions include:

- Setting up of a Functional Grievance Committee;
- Addressing employee's grievances in all project phases.

Annex VII: Hydrological Investigations Study Report.

The main objectives of the hydrological study are to:

- Assess water resources available to satisfy the estimated potential future water uses and demands in the sub-project areas together with their seasonality, level of service, priority of use and cumulative effects.
- Perform hydrological analysis to determine dependability of available water resources;
- Assess and quantify any upstream and downstream water uses (abstractions/diversions) and their impacts on the proposed project;
- Match the water availability for each time segment with the livestock, irrigation needs and other demands at different levels of probability;
- Undertake rainfall-runoff modelling to estimate reservoir yield, inflow design flood, reservoir routing to facilitate the sizing of spillway, reservoir, dam and outlet works;
- Determine the flow duration curves to facilitate the design of hydraulic structures;
- Carry out flood routing through the downstream channel and floodplain to enable evaluation of effects in the event of excessive spills or dam break (hydrological dam safety considerations);
- Determine the sediment yield of the river system, forecast the reservoir dead storage volume, future rate of reduction of live storage, and reservoir trap efficiency.

Description and quality of data used for analysis

The set of meteorological station with daily rainfall data used in this study is comprised was download from World bank Data portal period 1980 to 2021. From the plotted daily rainfall time series, it can be observed that the highest recorded rainfall

The annual rainfall data is analyzed and the variation in distribution over the area is studied with then statistical parameters. The best fit distribution method is found using various plotting position and probabilistic methods.

Climatic conditions

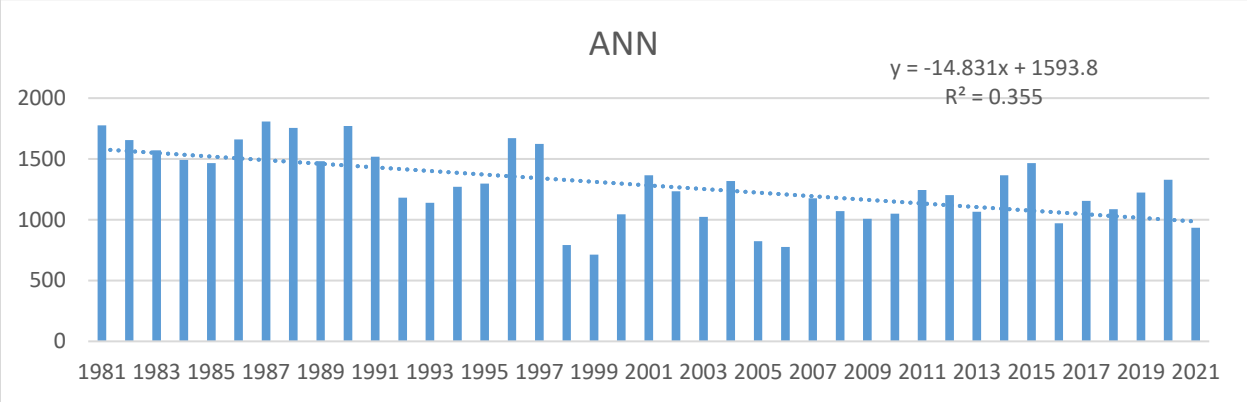
Uganda is characterized by an equatorial climate and is relatively humid. The topography, prevailing winds, lakes and rivers cause local variations in annual precipitation and temperatures are responsible for the large differences and pattern of annual rainfall. Most of the country (especially the southern region) experiences two rainy seasons, which occur in early April and October. Little rainfalls in June and December. The mean annual, 20%, 50% and 80% probabilities of Exceedance were determined by subjecting the annual monthly rainfall totals to a frequency analysis.

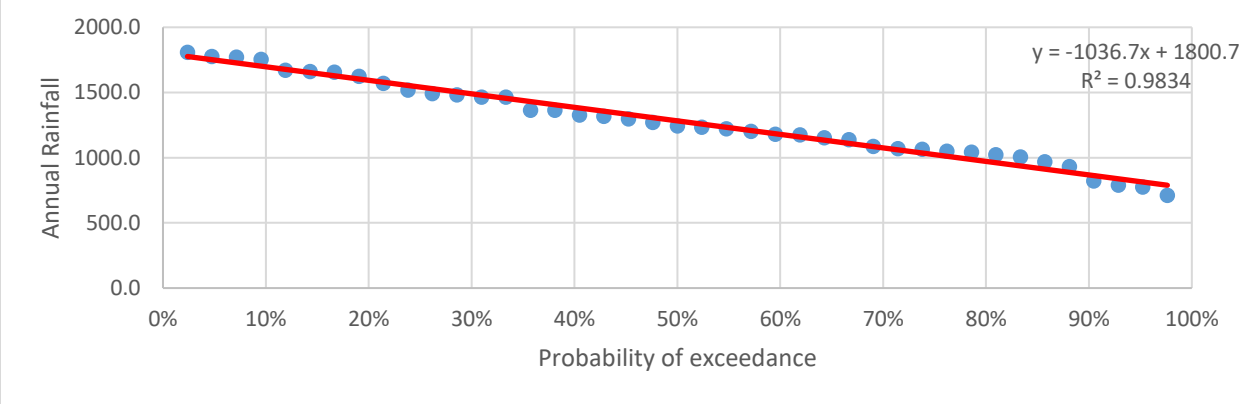
Mean and Monthly annual rainfall

Month	Nasa-Average	World Bank Data Portal Average	80% Probability of exceedance	20% Probability of Exceedance
Jan	41.4	43.7	5.3	84.4
Feb	49.8	59.3	15.8	79.1
Mar	110.7	122.0	58.0	137.1
Apr	136.9	148.8	105.5	205.7
May	128.7	121.2	94.9	189.8
Jun	47.5	52.4	26.4	84.4
Jul	48.8	52.0	26.4	89.7
Aug	84.4	92.5	52.7	137.1

Month	Nasa-Average	World Bank Data Portal Average	80% Probability of exceedance	20% Probability of Exceedance
Sep	121.3	123.1	73.8	184.6
Oct	152.9	144.8	94.9	226.8
Nov	139.8	146.2	105.5	194.4
Dec	85.4	73.5	47.5	126.6
Ann	1147.5	1179.4	706.6	1571.5

Rainfall normally ranges from 711.9mm to 1808.8mm coming in two seasons: March–July and September – November. There is normally a short dry spell between the two rain seasons during mid-June – mid July. The long dry season sets in during late November through to early March. Areas bordering Northeast experience earlier dry seasons. This is also a common occurrence at the lakeshore areas, which sometimes experience very sharp spells of drought. Annual rainfall trends revealed that there was a lot of negative departure from the Long-term Mean of rainfall amounts in the climatic zone from 2002-2005.





Mean and Monthly annual evaporation

ETo is defined as “the rate of evapo-transpiration from a hypothetical reference crop with an assumed crop height of 0.12 m, a fixed surface resistance of 70 sec m-1 and an albedo of 0.23”. This closely resembles the evapo-transpiration from an extensive surface of green grass of uniform height, actively growing, well-watered, and completely shading the ground". In the definition of ETo, the grass is specifically defined as the reference crop and this crop is assumed to be

free of water stress and diseases. The FAO-56 version of Penman-Monteith equation has been adopted for use in the determination of the reference evapotranspiration. Time series was used to obtain the trends for annual minimum, maximum and mean temperatures,

Peak Rainfall Frequency analysis (Probable Maximum Precipitation (PMP)

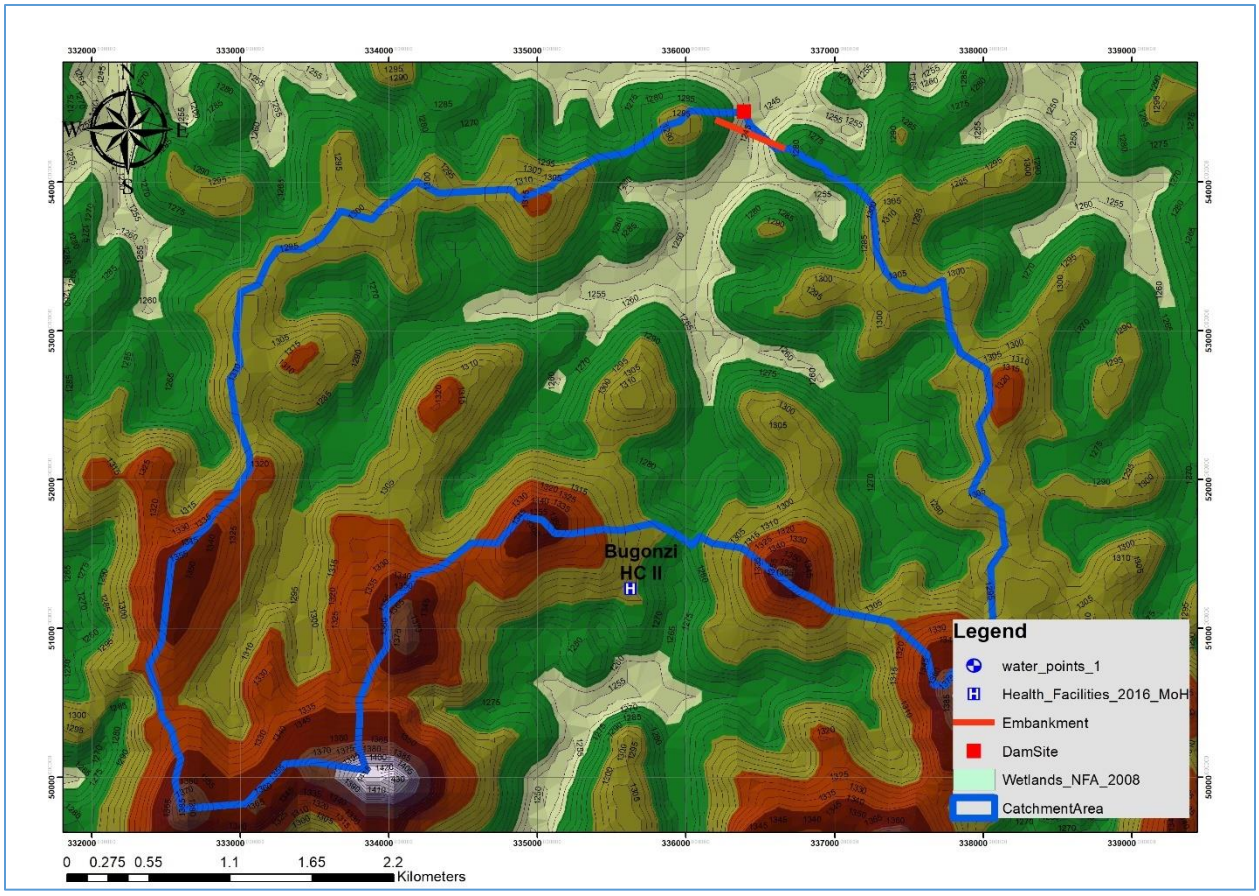
For the catchment of a dam, hydrologists utilize a PMP magnitude together with its geographical and temporal distributions to determine the likely maximum flood (PMF). In the construction of hydrological structures, a variety of conceptual flood events are utilized, including the PMF. It is mostly used to design spillways that decrease the probability of a dam overtop

Annual maximum series was generated by selecting the maximum rainfall for each year from daily rainfall times of 1990 to 2016. The maximum rainfall values for each year were arranged into series then into HEC_SSP and Excel to perform the peak rainfall frequency analysis. Frequency analysis was achieved by fitting the AMS on probability distributions (Normal, Gumbel, Lognormal or Log Pearson Type III distribution onto the datasets). The best fitting distribution was chosen after testing the Goodness of fit. For goodness of fit tests, the Anderson-Darling (AD), the Kolmogorov-Smirnov (KS), and the Chi-Squared tests were used in this report.

Catchment features

Catchment area (km2)

A catchment delineation was done to the position of the proposed dam to define boundaries of the study area and/or to divide the study area into sub-areas as illustrated in the figures below. For this study, the Digital Elevation Model (DEM) based automatic catchment delineation was undertaken in ArcGIS software, using the Arc HYHDRO Extension. The catchment area occupies 15.01.$km^{2.}$ The catchment is big enough to replenish the reservoir even in moderate dry months and yet not too big to enable a reasonable size of spillway and freeboard. As a first indication towards the minimum size of the catchment area. the storage required should be equal to 5% of the mean annual rainfall on the catchment area.



Subbasin	Area	Slope %	Lat	Long	Elev	Elev Min	Elev Max	Dam site Altitude	Longest Flow Path (m)
1	1506.38	8.92	0.47	31.52	1292.98	1245	1421		6889.29742

Catchment parameters (Longest path, maximum altitude

The overall catchment area of Kasenero dam is 15km^2, which is then divided into smaller sub catchments namely S1 -S7 characterized by different soil type and land use pattern delineated using GIS features in ArcGIS providing Digital Elevation Model (DEM) of STRM with resolution of 30 m in a coordinate system of Universal Transverse Mercator (UTM). The delineated six sub catchments are depicted in

Table 0-1: sub catchment parameters

Subbasin	Area (sqkm)	Micro Catchment Slope%	Lat	Long_	Elev	ElevMin	ElevMax	Longest Flow Path(m)
1	1.79	8.79	0.49	31.53	1271.94	1245.00	1313.00	1857
2	0.46	8.65	0.48	31.52	1272.44	1250.00	1315.00	1303.26
3	0.20	8.03	0.48	31.53	1264.94	1250.00	1298.00	342.13
4	1.55	9.01	0.47	31.53	1287.69	1255.00	1361.00	2071.33
5	1.80	10.24	0.47	31.52	1296.60	1255.00	1360.00	2623.48
6	3.40	8.40	0.47	31.54	1290.42	1255.00	1380.00	3566.85
7	5.87	8.89	0.47	31.51	1303.74	1255.00	1421.00	5246.63

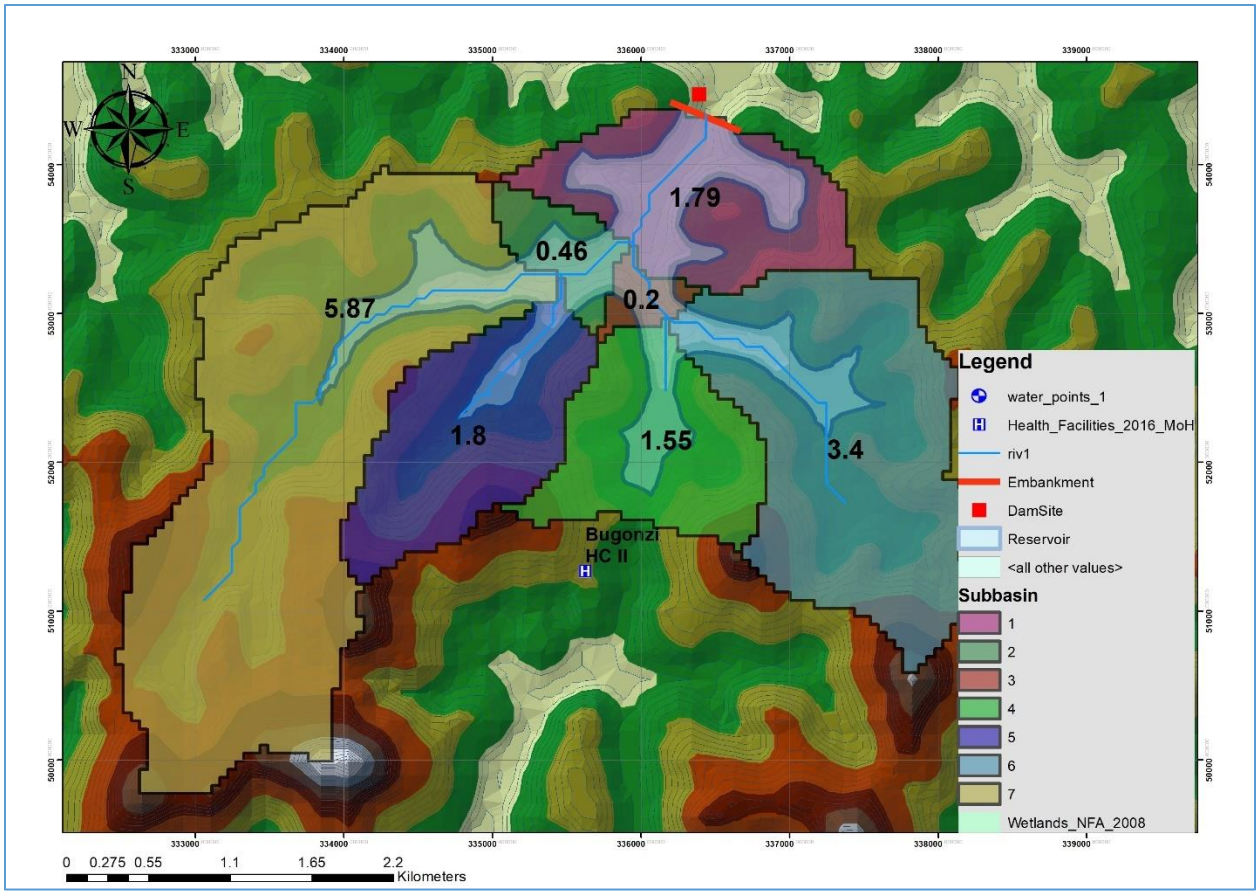
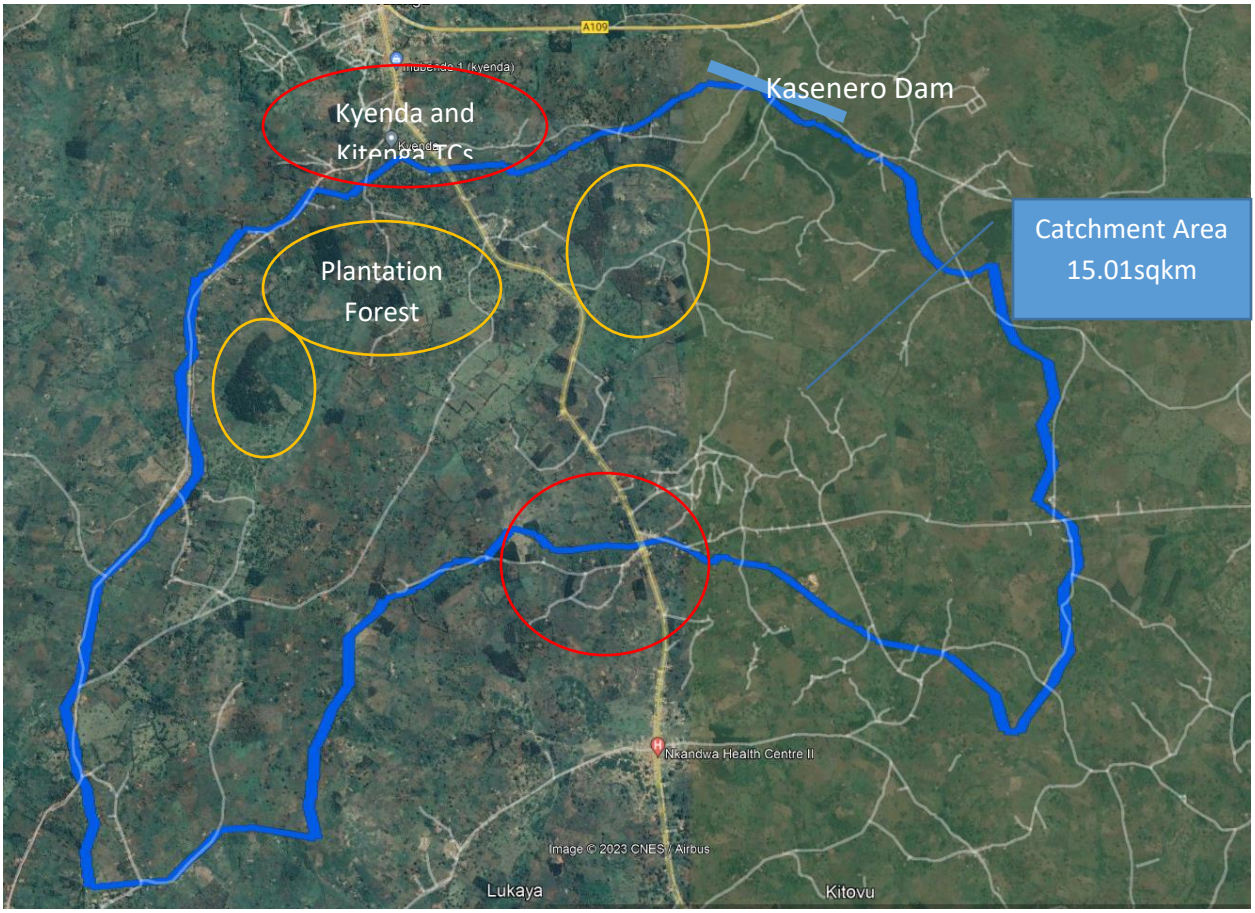


Figure 6: Delineated sub catchments for Kasenero dam

Catchment conditions (land use, vegetation cover, slopes, soils)

The land cover/use with the Kasenero dam catchment is mainly subsistence farmlands and plantations of exotic tree species like pine and Eucalyptus. There is extensive encroachment of valleys and buffer zone of the reservoir. Based on Google Earth, it can be observed that the location of this dam site is located in a valley with tree plantations mainly exotic on the fringes of the reservoir. It can also be observed that Townships like Kyenda and other rural growth centres are coming into the catchment. The soils in the catchment are predominantly yellowish sands with quartz gravel. The yellow circles highlight the plantation forests while the red circles highlight the growth centers and townships.



Hydrological analysis

Catchment Yield

Approach

The SCS CN method estimated precipitation excess as a function of cumulative precipitation, soil group and land use. The SCS curve number approach uses the following equation:

$$Q = \frac{(P - 0.2S)^2}{P + 0.8S}$$

The parameter S is related to SCS curve number, CN, by:

$$S = \frac{25400}{CN} - 254$$

The curve number, CN, is a dimensionless parameter indicating the runoff response characteristic of a drainage basin. CN is a function of hydrological soil group, land use, land treatment and hydrological condition. It has values ranging from 0 to 100. The SCS curve number is a function of the soil's permeability, land use and antecedent soil water conditions.

The soil moisture condition in the drainage basin before runoff occurs is another important factor influencing the final CN values. SCS defines three antecedent moisture conditions: 1-dry (wilting point), 2-average moisture, and 3 wet field capacity. The moisture condition 1 curve number is the lowest value that the daily curve number can assume in dry conditions. The curve numbers for antecedent moisture conditions AMC-I & AMC-III is determined by the 5-day antecedent rainfall whereby for east Africa is the Value is less than 23mm condition I is assumed and when the value is more than 40mm, moisture condition III is assumed. Calculation of CNI and CN III can be calculated respectively using equation below (Boonstra, 1994).

$$CNI = \frac{4.2CN_{II}}{10 - 0.058CN_{II}} < 23mm5dayantecedent$$

$$CNIII = \frac{23CNII}{10 + 0.13CNII} > 40mm5dayantecedent$$

Alternatively, the curve numbers for moisture conditions 1 and 3 may be calculated from equations:

$$CN_1 = CN_2 - \frac{20 * (100 - CN_2)}{(100 - CN_2 + \exp[2.533 - 0.0636 * (100 - CN_2)])}$$

$$CN_3 = CN_2 * \exp[0.00673 \times (100 - CN_2)]$$

Typical curve number values for moisture condition II are listed in various tables which are appropriate for slopes less than 5%. The Equation developed by Huang et al was used to adjust CN values obtained from the SCS-CN standard tables for slope where it was deemed necessary. This method assumes that CN obtained from SCS standard tables corresponds to a slope of 5%.

$$CN_{2\alpha} = CN_2 \times \frac{322.79 + 15.63(\alpha)}{\alpha + 323.52}$$

Where $CN_{2\alpha}$ the value of CN2 for a given slope, CN2 is the SCS-CN for soil moisture condition II (average), K is a CN constant, and α (mm^{-1}) is soil slope.

Catchment yields

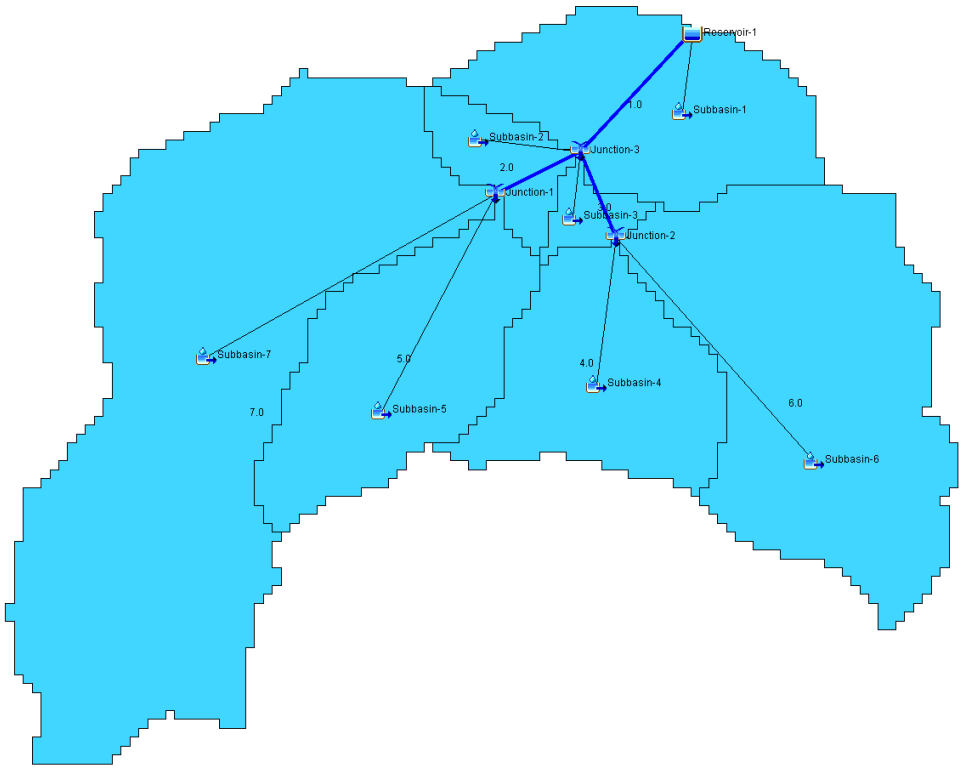
The Annual runoff yield of the Dam site location catchments at 20% Exceedance, 50% Exceedance and 80% exceedance are 9**,870,171.3 m³, 6,410,723.7 m³ and 2,804,314.6 m³** respectively. The catchment has runoffs during the dry spell scenarios of 80% probability of exceedance except in months of January and February, considering the Wet and normal rainfall exceedance scenarios, the catchment has runoffs in whole twelve months. The high runoffs in the catchment can be attributed to the high catchment curve numbers in the catchment with giving the composite catchment curve number is 75. the catchment experiences its peak runoffs for dry year scenario (80% probability of exceedance) in April and November **(589,108.9 m³**). Table 5 4 shows monthly runoff yields for Kasenero Dam catchment.

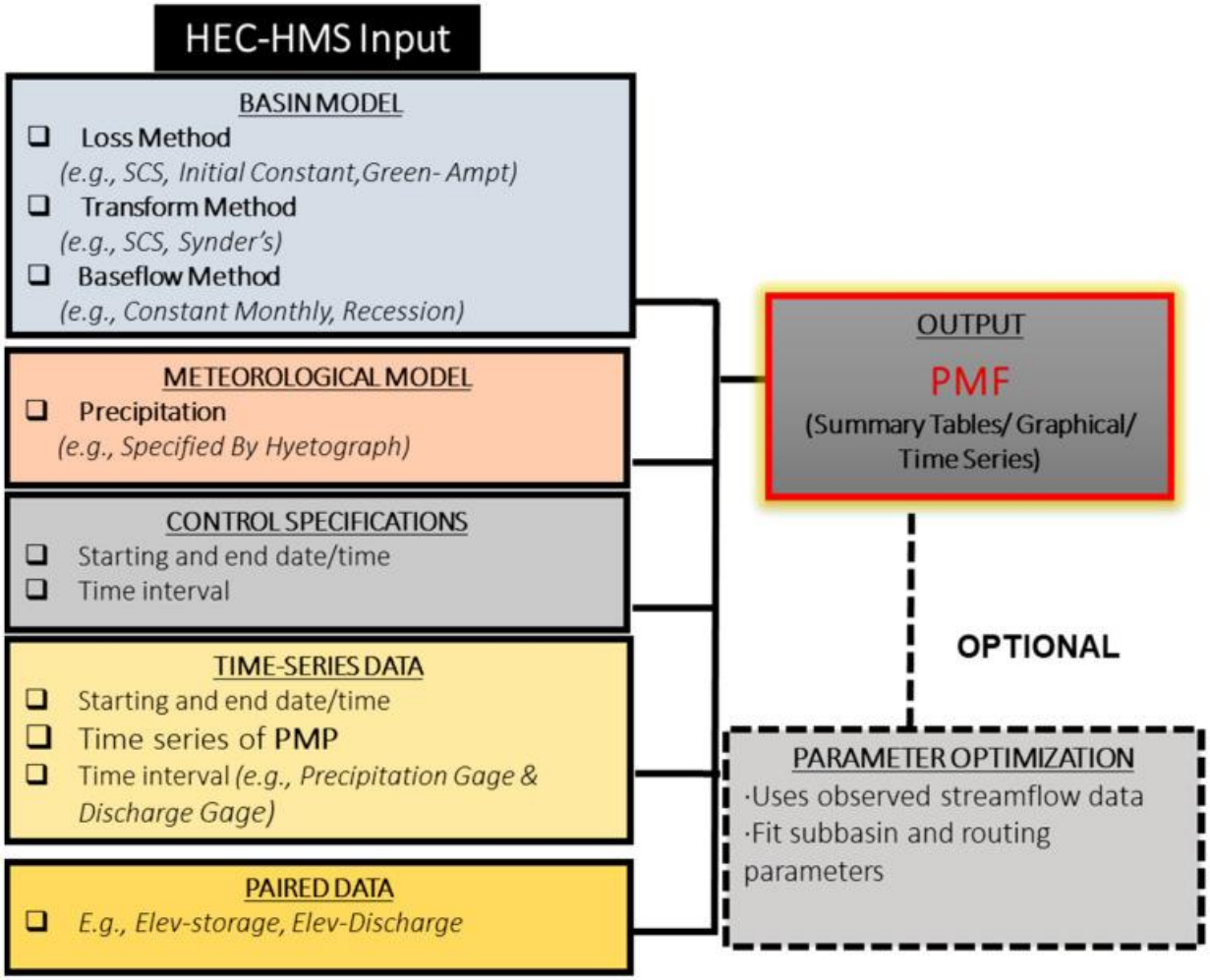
Months	**Runoff Volume m³**

	20% Run-off, Catchment Yield Q (m^3)	50% Run-off, Catchment Yield Q (m^3)	80% Run-off, Catchment Yield Q (m^3)
Jan	164,350.7	57,550.9	-
Feb	17,578.7	103,841.0	-
Mar	615,952.4	645,342.3	157,981.7
Apr	**2,347,207.3**	**939,596.6**	**589,108.9**
May	950,720.7	844,921.5	480,491.3
Jun	293,129.5	89,770.8	6,141.1
Jul	557,973.4	97,511.3	6,141.1
Aug	890,153.1	378,095.3	122,085.1
Sep	1,026,311.6	761,351.1	282,994.5
Oct	1,236,956.9	1,131,120.5	480,491.3
Nov	**1,424,915.3**	**973,634.0**	**589,108.9**
Dec	344,921.9	387,988.4	89,770.8
Total	**9,870,171.3**	**6,410,723.7**	**2,804,314.6**

Hydrological Modelling (Probable Maximum Flood (PMF)

The flood that could be predicted from the most acute combination of adverse meteorological and hydrologic circumstances is known as the PMF. For this study he PMF is produced using the probable maximum precipitation (PMP) input data.





Estimations of the peak flood are required for spillway design, the dimensions and physical characteristics of which are extremely important. Hydrologic routing employs the continuity equation and an analytical or an empirical relationship between storage within a routing reach and discharges at the end (USACE, 1994). On larger catchments (i.e., greater than 5 - 8 km^2) and rivers of a flashy nature, rock spillways are virtually essential. The Hydrologic Engineering Centre – Hydrologic Modelling Systems (HEC-HMS) model was set up to develop a series of design flood hydrographs at each facility.

For the HEC-HMS simulation, the required data are hydrological data, rainfall data, details of the dam, elevation-storage curve, and elevation-discharge curve. This model consists of several inputs such as basin model, meteorological model, control specification, time series data, and paired data as shown. The time of concentration for different sub-basins and whole watershed was estimated as a function of the length of the longest rainfall path, curve number, watershed or sub-basin slope.

Subbasin	Area	Micro Catchment Slope%	Longest flow path(m)	CN	S	Lhrs	L(min)	Tc (hrs)
1	1.79	8.79	1,857	76	3.158	0.78	46.82	1.30
2	0.46	8.65	1,303	76	3.158	0.59	35.55	0.99

Subbasin	Area	Micro Catchment Slope%	Longest flow path(m)	CN	S	Lhrs	L(min)	Tc (hrs)
3	0.20	8.03	342	76	3.158	0.21	12.66	0.35
4	1.55	9.01	2,071	76	3.158	0.84	50.48	1.40
5	1.80	10.24	2,623	76	3.158	0.95	57.19	1.59
6	3.40	8.40	3,567	76	3.158	1.35	80.77	2.24
7	5.87	8.89	5,247	76	3.158	1.78	106.86	2.97

Sediment

The average mean sediment yield of the Kasenero Dam catchment is 221,082m^3/year and the total sediment delivered at the catchment dam reservoir is 50.32m^3/year. the catchment has an average sediment delivery ratio of 0.023% This implies that out of the total soils eroded within the sub-catchment, only 0.023%. of it is delivered or stored at the dam reservoir. The higher the sediment delivery ratio in the catchment, the higher the soil loss within the catchment.

ANNEX VIII: Project Design Layout

Annex IX: COST VALUATION OF THE PROJECT.

Annex X: 30% PAYMENT PROOF FOR THE REVIEW FEES

Annex XI: STAKEHOLDER ENGAGEMENT PLAN

MINISTRY OF WATER AND ENVIRONMENT

URBAN WATER SUPPLY AND SEWERAGE SERVICES DEPARTMENT

WATER SUPPLY AND SANITATION PROGRAM-PHASE III (WSSPIII)

SOCIAL/COMMUNITY ENGAGEMENT PLAN FOR KASENSERO EARTH DAM IN MUBENDE DISTRICT

SN	MAJOR ACTIVITY	SUB ACTIVITY	PURPOSE OF ACTIVITY
PRE -CONSTRUCTION PHASE			
1	Securing commitment:	Signing of Memoranda of Understanding (MOU)between MWE and Local Government	To establish a general framework for cooperation and participation.
2	Project advocacy meeting	The advocacy is done at the district, town council and sub-county levels	To disseminate planned project to local leaders and to secure support for the project.
3	Stakeholder sensitisation meeting and design presentation	This is the meeting that targets a cross section of town residents and local leaders. This includes Institutions, councillors, hotel owners, opinion leaders (Everyone in the project beneficially community in general is invited using a sample of different categories of the community)	-To create awareness about the water supply and sanitation project and to highlight the obligations of the community to a wider audience. -To form a gender sensitive Water and Sanitation Committee (WSC).

SN	MAJOR ACTIVITY	SUB ACTIVITY	PURPOSE OF ACTIVITY
4	Conduct socio-economic baseline survey	The social-economic baseline survey is conducted to generate data on community, its livelihood, The tools are developed and examined reports are Compiled and Disseminated to the community	- It helps to create the foundation upon which to gauge progress and to evaluate the impact at the end of the project.
5	Land acquisition	-done together with the local governments and is aimed at identifying land owners. -Sign consent forms with land owners -engagement of a registered surveyor -Invite the Chief government values to value the land and other livelihood (present is the land owner and MWE, LG staff Local council one presentative) -Get the details of land owners (National identity card and bank account). -compile and submitted to MWE for payment -for Government land inform the local government to Cause the meeting to get a council resolution that gives the land for the project use.	To secure land for all infrastructural developments of the water supply and sanitation system including land for the water source, tank/reservoirs, office, and sanitation facilities.
6	Acquiring all wayleaves	-Sensitize the community and land owners along these lines to allow trenching on their property. - identify the affected property/crop owners and verify all destroyed crops/properties/ structures in a transparent manner to avoid wrangles. Engage the District production officer and apply the district compensation rates. Most of the transmission and distribution lines will utilise the road reserves, however, there are cases where the lines will be laid on private property.	To implement a conflict sensitive project and to ensure every smooth implementation of the project

SN	MAJOR ACTIVITY	SUB ACTIVITY	PURPOSE OF ACTIVITY
CONSTRUCTION PHASE			
	Site Handover	Invite the district leadership both technical and political. Visit the sites where major components will be installed Sign site handover certificate	• Officially introduce the contractor, consultant and contract management team to the leadership and some community members. • Confirm availability and access of all sites before commencement notice. • Provide information on project components. • Explain the communication channels during implementation.
7	Ground breaking ceremony	-Invite and mobilize the political leadership of the Ministry of Water and Environment, Area members of parliament, and district leadership -There is need to secure necessary event items such as, chairs, public address system, band -School children are also part of the day's event.). -There is also need for meals and refreshments to keep the community energised since the function lasts more than five hours. -It should take place in a field/large compound such as playground or a commonly used ground for similar events	-Great opportunity to share how the project will positively impact on the community -To Flag off the consultant and the contractor -Mobilize and organize to launch the commencement of the construction activities

SN	MAJOR ACTIVITY	SUB ACTIVITY	PURPOSE OF ACTIVITY
8	Conducting trainings	Training of a gender sensitive Water and Sanitation Committee on their roles and responsibilities.	To ensure that the committees are well versed with their roles and responsibility to effectively and efficiently execute their tasks.
		Training of the grievance redress mechanism committee	To ensure that all grievances are handled and responded to in time
		HIV/AIDS This is done for both the contractor's staff and the entire community	To create awareness about the killer disease to avoid transmission in the communities.
		Gender Mainstreaming	To ensure that both men and women, boys and girls, the disabled are involved in the project activities
		Sanitation and Hygiene	To educate the community on the approaches to avoid water related disease by observing TOTAL sanitation.
		COVID 19/ Epidemic awareness raising and other pandemic that might arise in the region such as Ebola,…	To educate the community about the SOPand the dangers associated with pandemic disease
		Nutrition mainstreaming	-To highlight the challenges of malnutrition in Uganda -To sensitize the communities about the MWE contribution to nutrition.

SN	MAJOR ACTIVITY	SUB ACTIVITY	PURPOSE OF ACTIVITY
		Skills development for women and youth	To Empower the community to do income generating activities.
		Climate change/disaster management	To educate the community about the challenges and the mitigation measures of climate change in Uganda.
		Training on environment and social safeguards	To Equip the local leaders, WUS and community on benefit of observing the environment and social safeguard.
		Water integrity	To foster fairness, honesty and mutual trust between project owners, contractor and community.
	Monthly site meetings	Courtesy call to District, Sub County/Town Leadership Site inspection Review of previous meeting minutes Site Meeting	• Carry out joint monitoring of progress of works. • Keep track of progress to enable communication and preparation of subsequent activities like mobilization for connections, handover, O&M meetings • Handle any issues that may crop up regarding implementation • To respond to the various queries raised by the stakeholders in the respective project towns.
9	Mobilize for new connections	-Sensitise the community on conditions and procedures for connection -Ensure forms are distributed free of charge,	To sensitize the community on connection procedure and ensure the good number of

SN	MAJOR ACTIVITY	SUB ACTIVITY	PURPOSE OF ACTIVITY
		-This activity involves working with the construction team to visit each applicant to evaluate technical viability. -The list of verified applicants should be widely publicized. The successful applicants shall be given ample time within which to pay the connection fees.	communities connect to the water supply system
10	Tariff setting	-Training on business plan -Training on water supply management	To educate the community the reason why they should pay for water.
11	Pro-poor mapping	- Meeting with community members to map out the poor community who are concentrated in trading centres -verification of the areas identified	To ensure that all communities especially the poor also benefit from the water supply system.
12	Project hand over	-Mobilise and organise the community for project handover. (Technical and political commissioning)	The sole purpose is to give accountability to stakeholders and to get their views on any issues that may require attention during the defect's liability period.
POST CONSTRUCTION PHASE			
13	Gazetting of the water supply area	Conducting Pre-gazetting meeting (sensitising about the principles of the water Act)	To prepare and educate the community on the management MWE structure
14	Operation and Maintenance (O&M) training	-Training the community on operation and maintenance of the supply system. -economic management of water supply system Training of institutions (schools) on O&M for sanitation facilities.	-To educate the community on the economic way of using water -To educate the community on the efficient and effective ways of using water e.g.

SN	MAJOR ACTIVITY	SUB ACTIVITY	PURPOSE OF ACTIVITY
			(leakages before and after the meter)
15	End of Implementation survey	This survey shall take place two months after construction completion when consumers are using the water	-To measure the degree and quality of change during the project implementation. -To document the reasons learnt and best practices
	Training on E&S monitoring and reporting	Training of staff of the System Operator, District officials and some Ministry of Water and environment on issues of Environment and Social Monitoring and reporting	To document the requirements of the E&S monitoring and Reporting