



**REPUBLIC OF UGANDA  
MINISTRY OF WATER AND ENVIRONMENT**

**INTEGRATED WATER MANAGEMENT AND DEVELOPMENT  
PROJECT (IWMDP)**



**ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT FOR  
THE PROPOSED CONSTRUCTION OF BITSYA WATER  
SUPPLY AND SANITATION SYSTEM IN BUHWEJU DISTRICT,  
UGANDA**

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# ABBREVIATIONS

AIDS	Acquired Immune Deficiency Syndrome
BDLG	Buhweju District Local Government
BOD	Biochemical Oxygen Demand
BoQs	Bill of Quantities
BTS	Bright Technical Services
BWSSS	Bitsya Water Supply and Sanitation System
CAO	Chief Administrative Officer
CBOs	Community Based Organizations
CDO	Community Development Officer
CFP	Chance Find Procedure
CGV	Chief Government Valuer
CMP	Construction Management Plan
CO	Carbon Monoxide
COD	Chemical Oxygen Demand
dBA	Decibels
DCDO	District Community Development Officer
DEO	District Environment Office
DMM	Directorate of Museums and Monuments
DNRO	District Natural Resources Office
DO	Dissolved Oxygen
DWD	Directorate of Water Development
DWRM	Directorate of Water Resources Management
EAC	East African Community
EHS	Environment, Health and Safety
EHSGs	Environment, Health and Safety Guidelines
EIA	Environment Impact Assessment
EMMP	Environmental Management and Monitoring Plan
EPB	Environment Project Brief
ESIA	Environmental and Social Impact Assessment
ESIS	Environmental and Social Impact Statement
ESMMP	Environmental and Social Management and Monitoring Plan
ESMP	Environmental and Social Management Plan
ESSs	Environment and Social Standards
FGDs	Focus Group Discussions
FIs	Financial Intermediaries
GBV	Gender Based Violence
GC	Grievance Committee
GFS	Gravity Flow Scheme
GIIP	Good International Industry Practice
GIS	Geographical Information System
GoU	Government of Uganda
GRC	Grievance Redress Committee
GRM	Grievance Redress Mechanism
HIV	Human Immuno deficiency Virus
HWFs	Hand Washing Facilities
ICRs	Implementation Completion Reports




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IEC	Information Education and Communication
IFC	International Finance Corporation
ILO	International Labour Organization
IPF	Investment Project Financing
ISRs	Implementation Supervision Reports
IUCN	International Union for Conservation of Nature
IWMDP	Integrated Water Management and Development Project
KII	Key Informant Interview
Km	Kilometre
LA <sub>eq</sub>	Average Noise Level
LA <sub>MIN</sub>	Lowest Noise Level
LA <sub>MAX</sub>	Highest Noise Level
LC	Local Council
MoGLSD	Ministry of Gender, Labour and Social Development
MoLHUD	Ministry of Lands, Housing and Urban Development
MWE	Ministry of Water and Environment
NDP III	Third National Development Plan
NEA	National Environment Act
NEMA	National Environment Management Authority
NES	National Environment Statute
NGOs	Non-Government Organizations
NO <sub>2</sub>	Nitrogen Dioxide
NO <sub>x</sub>	Nitrogen Oxides
NSSF	National Social Security Fund
NWIS	National Wetland Information System
MWE	National Water and Sewerage Corporation
OPs	Operational Procedures
OSH	Occupational Safety and Health
O&M	Operation and Maintenance
PAPs	Project Affected Persons
PAYE	Pay As You Earn
PCDP	Public Consultation and Disclosure Plan
PCRs	Physical Cultural Resources
PMT	Project Management Team
PPE	Personal Protective Equipment
PWDs	Person With Disabilities
RAP	Resettlement Action Plan
RGC	Rural Growth Centre
RWSRCs	Rural Water and Sanitation Regional Centres
SDGs	Sustainable Development Goals
SEHS	Social Economic and Health Survey
STDs	Sexually Transmitted Diseases
STIs	Sexually Transmitted Infections
S/C	Sub-County
SO <sub>x</sub>	Sulfur Oxides
TN	Total Nitrogen
TOC	Total Organic Carbon
ToR	Terms of Reference
TP	Total Phosphates
TSS	Total Suspended Solids
UAs	Umbrella Authorities
UBOS	Uganda Bureau of Statistics
UGX	Uganda Shillings

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UN	United Nation
UNBS	Uganda National Bureau of Standards
URA	Uganda Revenue Authority
UWSD	Urban Water and Sewerage Department
VAT	Value Added Tax
VES	Visual Encounter Survey
VIP	Ventilated Improved Pit latrines
VOCs	Volatile Organic Compounds
WB	World Bank
WHO	World Health Organization
WHT	Withholding Tax
WMD	Wetland Management Department
WMZ	Water Management Zone
WSS	Water Supply System
WTP	Water Treatment Plant



# ESIA TEAM COMPOSITION

Table 1 presents the composition of the Environmental and Social Impact Assessment (ESIA) team that will undertake the ESIA for the proposed Bitsya Water Supply and Sanitation System (BWSSS) 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. Pius Kahangirwe, MSc. <i>NEMA Certified Environmental Impact Assessor (CC/EIA/159/22) – Team Leader</i>	Team Leader / Environmental and Natural Resources Management Specialist	
Dr. Denis Byamukama, PhD. <i>NEMA Certified Environmental Impact Assessor (CC/EIA/073/22) – Team Leader</i>	Water Quality and Waste Management Specialist	
Mr. Andrew Nkambo, BSc. <i>NEMA Certified Environmental Practitioner (CC/EIA/273/22) – Team Member</i>	Plant Ecologist	
<b>Contributing Specialists</b>		
Dr. Eng. Alex Katukiza	Overall Team Leader for Project Coordination	
Eng. Kenneth Musabe	Water and Wastewater Expert	
Ms. Esther Nassonko Kavuma	Sociologist	
Dr. Philip Nyenje	Hydrologist	
Mr. Samuel Kasozi	Hydro geologist	
Ms. Sheila Akatukunda	Faunal Studies	
Ms. Hamidah Namatovu	Occupational Health and Safety	
Mr. Kibirango Moses	GIS Expert	
Ms. Natasha Atukunda	Environmentalist	

# EXECUTIVE SUMMARY

The Government of Uganda through the Ministry of Water and Environment (MWE) secured financing from the International Development Association (The World Bank) to implement the Integrated Water Management and Development Project (IWMDP). The IWMDP is being executed by the Ministry of Water and Environment and National Water and Sewerage Corporation (MWE). Under the project, MWE has allocated funds for implementation of Bitsya Water Supply and Sanitation System (BWSSS) in Buhweju district. The investment cost for the Water Supply and Sanitation System is approximated at **UGX 21,000,000,000 (Twenty-one Billion Shillings Only)**. Bitsya WSS is located in Bitsya and Karungu Sub Counties in Buhweju district. Buhweju town is approximately 49 km from Kabwohe Town Council located along the Mbarara - Buhweju road.

Adequate safe water is a pre-requisite for a healthy society, which in turn, among other factors, makes it feasible for the majority of the population to engage in meaningful socio-economic activities that would increase household income and thereby reduce poverty. In Uganda, most of the rural areas and upcoming small towns access water from point water sources like boreholes, protected springs and shallow wells. These point water sources are in many cases characterized by low level of service, poor functionality and poor water quality in addition to diminishing water resources. The project targets to serve 6 parishes and a total of 51 villages with a current population of 23,963 and a design population of 50,003 (Detailed Engineering Design Report, 2022). BWSSS is envisaged to bring an end to water stress and overreliance on a few low yielding boreholes within Bitsya and Karungu Sub-Counties and neighbouring community.

The main infrastructure for the proposed project is summarised below:

#	Particulars	Latitude	Longitude
1	Intake	-0.360269°	30.484149°
2	Water Treatment Plant	-0.360694°	30.484415°
3	Rugarama Main Reservoir	-0.373936°	30.504568°
4	Karungu Booster	-0.343845°	30.477376°
5	Kasharara Hill Reservoir	-0.342449°	30.455011°
6	Kabingo Hill Reservoir	-0.341474°	30.504772°
7	Bitsya Hill Reservoir	-0.306855°	30.458006°

The proposed project infrastructure and facilities include the following components:

- Intake weir across the river
  - Raw water collection channel
  - Intake sump
  - Raw water pumps, and
  - Raw water abstraction main (from River Nyarwambu)
  - High rise main
  - The full conventional water treatment plant will all unit operations with a capacity of 2,200 m<sup>3</sup>/day sized for 20 h operation per day
  - 15,998 m of transmission gravity mains and 3,600m of booster pumping main
-



- A main reservoir of 400 m<sup>3</sup> ground pressed section steel panel tank supported on reinforced concrete dwarf walls at Kamukachi Hill as a balancing tank and the following three satellite tanks:
  - 1 No. 200 m<sup>3</sup> at Kibingo Karungu Sub County to serve Katara Parish
  - 1 No. 180m<sup>3</sup> at Bitsya
  - 1 No. 150m<sup>3</sup> at Hambuga in Kasharara parish
- 44,104 m of distribution pipe line of different sizes and pressure rating
- 8No. public/institutional sanitation facilities.

In compliance with the National Environment Act 2019 and the National Environment (Environmental and Social Assessment) Regulations 2020, MWE undertook an Environmental and Social Impact Assessment (ESIA) and this report presents the findings of an ESIA that has been undertaken at the proposed project sites. The ESIA study has been conducted in consideration of the policies, legal and institutional frameworks relevant to this 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. World Bank Safeguard Policies have also been reviewed during this detailed ESIA study to ensure that the proposed development meets these requirements and some of the clauses that are likely to be triggered have been identified and the corresponding mitigation and enhancement measures proposed in this ESIA report.

Buhweju district has a land area of 700.6 square kilometres and population of 126,200 with 62,400 females and 60,200 Males with the average house hold size of 5.4, with a total of 15,353 households. The literacy levels are at 64.1% females and 78% male according to a projection by UBOS statistics. The district is found in a hilly environment with farming as the main activity undertaken by the residents and comprises of 8 sub counties and one town council. Bitsya Water Supply and Sanitation Project will require a permanent land take of 4.9234 acres and an Easement corridor of 31.5823 acres. A total number of 994 PAPs will be affected by the proposed Bitsya Water Supply and Sanitation Project.

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A comprehensive stakeholder engagement was carried out during ESIA specifically with Buhweju District Local Government Officials, Sub-County Officials, Local Community Representatives and Community members among others. 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. It is anticipated that the establishment of the water scheme is expected to have the following benefits:

- Improved access to clean and safe water
- Improved health conditions due to access to safe clean water
- Employment during construction and operation of the water scheme
- Eradication of poverty and improved livelihoods of the local people through employment
- Reduced expenditure on water and medical bills due to diseases
- Reduced time spent walking long distances to wells and springs especially women
- Reduction of child mortality
- Improved local economies and induced development especially sourcing of raw materials for construction activities
- Ensure environmental sustainability

Further still, the project will also address the focal area of access to clean water as stipulated under the Uganda Vision 2040 and the National Development Plan III (NDP III). The project will also contribute towards achieving Sustainable Development Goals (SDG) (*specifically SDG 6 on clean water and sanitation*).

However, some concerns were raised by various stakeholders as regards to the project and these

include:

- Poor waste management practices at construction sites
- Destruction of existing vegetation especially when establishing the intake and trenching
- Soil erosion due to loss of vegetation especially at the water abstraction point
- Land degradation
- Dust and vehicle emissions
- Increase in noise and injuries on duty
- Increased spread of communicable disease associated with construction labour
- Destruction of crops during the trenching activities along distribution lines.

Anticipated and or identified negative impacts throughout the project phases are summarised below and discussed in detail under Section 8.3 of this ESIA report and these include:

- Air pollution from dust generated by trucks, construction activities and exhaust emissions from vehicles,
- Contamination of water resources,
- Generation of noise by construction workers and vehicles,
- Impact of climate change on project construction and operation,
- Impact on ecological environment,
- Impacts of project construction and operation on climate change,
- Improper management of construction waste,
- Land loss and damage to property
- Land pollution, waste and drainage problems,
- Landscape and land use impacts
- Loss of vegetation and soil degradation especially at the intake point and trenching activities for the pipelines,
- Stress of water resources due to water withdraw against the recommended water abstraction levels,
- Negative impacts on water vendors,
- Occupational health and safety risks for the workforce,
- Risk of accidents
- Slope failure due to earthworks especially at intake point for the water works,
- Social misdemeanor by construction workers (e.g. conflicts due to influx of labour, child abuse and early age pregnancies, child labour and increase in HIV/AIDS and STDs).

The ESIA findings indicate that majority of the predicted adverse impacts are local in nature as they are limited to the project sites where construction works will be undertaken. The mitigation hierarchy has been used to ensure that Environmental and Social risks and impacts are eliminated and/or minimised. Various enhancement and mitigation measures have been proposed and the developer should ensure that these are implemented such as:

- Maintaining good house-keeping
  - Screening unaesthetic 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 in accordance with the National Environment (Waste Management) Regulations, 2020 such as continuous monitoring and evaluation of the waste streams from source through to recovery, recycling and disposal
  - Containment of storm water especially during rainy season
  - Timely compensation of the Project Affected Persons (PAPs)
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- 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
- Local workers will preferentially be employed and paid directly through their banks
- All construction workers shall be orientated and sensitized about responsible sexual behaviour in project communities, benefits of wearing PPE to reduce accidents and incidents
- Training of community members especially the elderly, child headed households, pregnant women, and people living with HIV/AIDS in good sanitation and hygiene practices shall be conducted within the project area.
- Project workers will be documented, issued work contracts and sign codes of conduct

Based on the above anticipated benefits and adverse impacts, an Environmental and Social Management Plan (ESMP) has been developed to ensure that environmental and social impacts, risks and liabilities identified are effectively managed during the construction, operation and closure of the proposed project. The ESMP specifies the avoidance, mitigation, adaptation, prevention and management measures to which the developer is committed and shows how the Project will mobilize organizational capacity and resources to account for the factors evaluated in order to implement the proposed measures.

A total of 994PAPs have been established with 12,653 crops and trees to be impacted on by the project. Details of the compensation arrangements have been proposed in the RAP report.

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.

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# 1 INTRODUCTION

## 1.1 PROJECT BACKGROUND

The Water and Environment sector consists of two sub-sectors: (i) the Water Supply and Sanitation (WSS) sub-sector; and (ii) the Environment and Natural Resources (ENR) sub-sector. The WSS sub-sector comprises water resources management, rural water supply and sanitation, urban water supply and sanitation, and water for production. The ENR sub-sector comprises environmental management; management of forests and trees; management of wetlands and aquatic resources; and weather and climate. The Rural Water Supply and Sanitation sub-sector is defined to include all those areas under the jurisdiction of District Local Councils and Rural Growth Centres, but excluding those urban areas governed by Town Boards, Town Councils, Municipalities and Kampala Capital City. In practice this means that rural water supply covers those communities and villages with populations up to 1,500 and Rural Growth Centres (RGCs) with populations between 1,500 and 5,000.

The Project Development Objectives are to improve water supply and sanitation services and strengthen water resources management in project targeted areas. The Project will achieve this PDO through three strategic areas: (i) delivering the necessary water and sanitation infrastructure in targeted areas; (ii) supporting water related institutions (MWE, local government, and service providers) develop and strengthen measures to establish and consolidate operational efficiency and service quality in small towns and rural areas; and (iii) strengthening national and regional capacity to improve IWRM. The Project's implementation approach will consider spatial differences between rural, small towns and urban large towns. It will also ensure that citizen engagement strategy, gender approaches, and sanitation and hygiene campaigns are included to foster behaviour change and ownership within the population. Combined with infrastructure investments to support WSS services, the Project will integrate water source and catchment protection measures, comprehensive sanitation planning and service delivery support to ensure sustainability and increase resilience to climate variability. Sixteen small towns, two rural gravity flow schemes, two large towns, and four refugee hosting districts have been selected to participate in the Projects given their location and opportunity to spatially balance development, unmet water and sanitation demands, contribution to Uganda's economic growth.

In June 2015, the Ministry of Water and Environment (MWE) completed the feasibility Study and detailed design for Bitsya Piped Water Supply System (WSS) in Buhweju District. The water supply area of the proposed Bitsya GFS is located in Bitsya and Kurungu Sub Counties in Buhweju district. Buhweju town is about 49 km from Kabwohe located along the Mbarara - Buhweju road. The project targets to serve 6 parishes and a total of 51 villages with a current population of 23,963 and a design population of 50,003. The geographical coordinates of the points that define the location of the project area are 00 20.5'S, 300 28.7'E at Bitsya Subcounty, 00 18.8'S, 300 28.6'E at Karungu Health Centre IV and 00 24'S, 300 29.6'E at Tumu Hospital. The proposed water source is River Nyarwambu (GPS coordinates at the bridge: 219695 m E, 995825 m N). The total land area of Bitsya WSS as defined by the RAP report is 36.5057 acres.

During the initial design of Bitsya water supply system, a draft ESIA was prepared based on the combined discharge from 3 springs Rwakina, Rujuga and Kagyera that were found to be insufficient to meet the design discharge for the 20yr horizon (Detailed Design Report, 2015). However, the engineering designs are now being updated to capture and integrate the new changes in conditions and technical scope of the proposed sites and these therefore required the updating the ESIA and RAP for Bitsya water supply system.

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The aim of the project is to improve water and sanitation services in the sub counties of Bitsya, and Karungu in Buhweju District with minimal impact on the social aspects of the beneficiary population and the environment. The focus of the proposed project is the construction of the functional water and sanitation supply system and the proposed activity will be focused on the Bitsya water supply and sanitation system.

## 1.2 JUSTIFICATION OF THE PROJECT

The people in Buhweju Rural Growth Centres and the surrounding areas depend on wells, boreholes, open rivers/ streams and shallow wells as sources of water. This water is unreliable and not safe for drinking. The social Economic and health Survey established that protected springs are the only main water source for 66%, followed by the ponds/dams (26%), river (5%) and tap stands (2%). This shows that residents are prone to getting water-borne diseases because of unsafe water sources like ponds. Only 69.5% reported treating drinking water compared to 30.5% who reported drinking untreated water. To corroborate the high figure reporting they did not treat drinking water, out of the 69.5% who reported treating their drinking water, a majority report treating their water by boiling. While 10.2% reported to filter their water and 28.7% of the respondent indicated a combination of boiling and filtering. Furthermore, the current water sources are not safe and the quality of the water is poor for drinking and therefore implementation of the project will relieve women from wasting time at water sources, school going children will be able to go to school and the quality of water will be improved hence improving the quality of life among the population.

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From a total of 255 households that were surveyed through sampling, it was reported that water being used by households throughout the year was an average of 1 to 5 Jerrycans (each of 20 litres) per day by 92% of the households. About 27% of the households in the project area walk for about 2km to access water. This is worse than the acceptable recommended 200m (30 minutes) walking distance to access water within the rural areas (MWE-SPR, 2019) and the 0km has per SDG 6.1 (water supply at the premises/household)

Worth of noting is that 44.8% are spending more than one hour collecting water. This reduces on the productivity as much time is spent in fetching water. Survey findings indicate that a large number of households (50%) are paying between UGX 51-1000 per jerry can which is quite high. This not only demonstrates the water scarcity in the area where people are paying for water from even unimproved water sources but also the ability to pay/contribute user fees when the scheme is implemented.

## 1.3 ESIA REQUIREMENTS

The proposed development falls under Schedule 5 of the National Environment Act No.5 of 2019 (i.e. Utilization of water resources and water supply). It is in the category of projects requiring mandatory Environmental and Social Impact Assessment (ESIA) before implementation. An Environmental and Social Impact Study is thus required to be submitted to the Authority (NEMA) for review and clearance before construction of the BWSSS.

In accordance with the *National Environmental Act No. 5 of 2019* of the Laws of Uganda and the *Environmental and Social Impact Assessment Regulations (2020)*, the Environmental and Social Impact Study process starts with the scoping exercise that identifies areas and issues that should be included and addressed in the ESIA study process. The issues identified through the scoping process were developed into the Terms of Reference (ToR) that were submitted to NEMA for review so that any other areas and issues deserving attention are identified and included before the ESIA commences. Thus, this ESIA was guided by the scoping process which was approved by NEMA. A copy of the approval letter from NEMA has been attached in Annex 1.

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In pursuance of the World-Bank Operational Safeguards policies an Environmental and Social Management Framework (ESMF) and Resettlement Policy Framework Documents were developed to guide safeguards implementation. Overall, the project is likely to trigger five (5) World Bank Operational Policies which included Environmental Assessment (OP/BP/GP 4.01), Natural Habitat (OP 4.04), Physical Cultural Resources (OP 4.11), Involuntary Resettlement (OP/BP 4.12), and Forests (OP 4.36). However, Safety of Dam (OP4.37) and International Water Ways (OP 7.50) will not be triggered. 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.

This ESIA report has been prepared following Uganda's and the World Bank's Environmental and Social requirements, sets out to identify potential environmental and social impacts of the proposed Bitsya Water Supply and Sanitation Project, with a view of informing the final engineering design and recommending mitigation measures to be implemented during construction and operational phases of the project.

## 1.4 OBJECTIVES AND SCOPE OF THE STUDY

The main objective is to carry out an ESIA for the proposed construction of BWSSS. Specific objectives include the following:

- To study the baseline environmental conditions of the project areas and their surrounding and to assess how these conditions will be affected by the proposed development.
  - To identify and assess the likely impacts (positive and negative) of the proposed project and to recommend feasible measures to avoid, minimize or mitigate the negative impacts.
  - To develop an environmental and Social Management Plan/Mitigation plan for the identified negative impacts and an environmental monitoring plan for project implementation.
- To compile an Environmental and Social Impact Statement for submission to NEMA for consideration and approval.

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This ESIA focused on the following scope and or areas/sites for the proposed project components:

- Water abstraction and intake works
- Water treatment works
- Pumping stations (i.e. Raw and treated water pumps at the water treatment works, the Kasharara booster pumps at Hambuga and Karungu Booster)
- Transmission Pipelines (i.e. Rugarama to Karungu, Karungu to Bitsya, Branch main off Transmission Line 1 to Kabingo and, Booster pumping main to Kasharara Tank)
- Water tanks (i.e. Rugarama Main Reservoir, Kasharara Hill Reservoir, Kabingo Hill Reservoir, Bitsya Hill Reservoir)
- Distribution pipelines (i.e. Bitsya Tank supply area network, Kabingo Tank supply area, Kasharara Tank supply area, Rugongo supply area)

Section 3.2 on project description and design elaborates the details of each of the above mentioned project components assessed under the scope of this ESIA.

The proposed public sanitation facilities at health centres and primary schools do not require an elaboration of the ESIA in reference to the thresholds provided under Schedule 5 of the National Environment Act No.5 of 2019 for sanitation facilities.

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## 1.5 DETAILS OF DEVELOPER AND INVESTMENT COST

The project is to be implemented by the Ministry of Water and Environment. The investment cost of the project is approximately Uganda Shillings Twenty- One Billion , only including all taxes **(UGX 21,000,000,000)**.

The address/contact person of the Developer is presented below:

**Ms. Cate Namyalo**

Directorate of Water Development,  
Rural Water Supply and Sanitation Department,  
Headquarters, Plot 3-7, Kabalega Crescent, Luzira,  
P. O. BOX 20026, Kampala, Uganda  
E-mail: [cnamyalo@ymail.com](mailto:cnamyalo@ymail.com)

## 1.6 ADDRESSING NEMA RESPONSES TO TERMS OF REFERENCE

*Table 2: Addressing NEMA Response to the ToR approval*

S/N	NEMA Comments	Response to comments
1.	A separate environmental assessment shall be undertaken for the proposed Faecal Sludge Treatment Plant and sanitation component of the project. and the report submitted to this Authority for consideration. Note however, the cumulative impacts of both projects should be evaluated and mitigation measures provided in the respective reports.	The proposed conventional raw water treatment process results in the generation of sludge thus sludge drying beds are being proposed before disposal of this water sludge/ semi-solid slurry. The sludge treatment plant is not a stand-alone project as it's a component of the entire system and will not include any sewage (or wastewater from sanitation facilities). The mentioned sludge drying beds does not fall under Schedule 4 or 5 of the National Environment Act (2019) that require an elaboration of the Project Brief and ESIA respectively. Anticipated impacts together with proposed mitigation measures for the sludge drying beds as part of the water treatment process are presented under Chapter 8.
2.	Provide a clear description of the water supply scheme, including the designs, treatment processes and a detailed lay-out plan for the project and the water treatment plant, location of the different infrastructure and geographic coordinates for the different infrastructure.	Presented under Chapter 3 and Annex 8.
3.	Undertake a comprehensive assessment of the potential impacts of the project its associated components, particularly the options for water abstraction on the hydrology and ecosystem of the water source	Presented under Chapter 8. A separate Water Source Protection has also been prepared and a budget allocated in the ESMP for implementation.
4.	Evaluate the risks associated with the project and emergency preparedness options in case of breakdown of the system and discuss these options in the ESIS	Presented under Chapter 8.

5.	Undertake comprehensive consultations with the key stakeholders and develop a clear stakeholder engagement plan for the entire project cycle to regularly respond to stakeholder concerns in a timely manner. Ensure that the views/concerns of the stakeholders consulted are well documented and addressed in the report and lists of persons consulted appended to the ESIA report	Presented under Chapter 3 and Annex 7. An Executive Summary of the RAP has also been presented under Annex 10. Section 9.3 provides a grievance redress system for communities and workers that will be followed by the developer and contractor(s).
6.	Provide detailed description of site specific baseline information of the project sites for the different project components	Presented under Chapter 5.
7.	Assess the different types of waste streams likely to arise from the project activities and propose measures for managing such waste	Presented under Chapter 8.
8.	Ensure that detailed soil and water analyses are carried out for the project site, and the results provided in ESIA report	Presented under Chapter 5.
9.	Include in the ESIA report comprehensive mitigation and environmental management and monitoring plans, respectively (preferably in table matrix format), that related to the identified potential environmental impacts and risks	Presented under Chapter 8 and Chapter 9 presents an ESMP.
10.	Assess any other critical environmental aspects/ concerns which may have not been initially foreseen during the preparation of the scoping report and ToR are addressed, and include an evaluation of such concerns in the ESIA report	None identified during the ESIA stage.
11.	Provide the actual project {investment} cost, evidenced by a certificate of valuation of the project, issued by a qualified and registered valuer.	Refer to Section 1.6 of this ESIA report.
12.	Note that you are required to pay a non-refundable administration fee of 30% of the total fees payable upon submission of the ESIA report.	Refer to attached payment slip.

## 1.7 STRUCTURE OF THE ESIA REPORT

This Environmental and Social Impact Assessment report is concise and limited to the significant environmental and social 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

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- 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 that will be proposed in the ESIA, including capacity building requirements; and
- 17) 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) Institutional mandates.
- 19) List of References.
- 20) Appendices:
- Approved Scoping Report/Terms of Reference
  - Land title/agreements
  - Records of Stakeholder meetings
  - Map, drawing and pictorial complement, especially to convey information on the project affected area and proposed project activities
  - Chance Finds Procedure
  - Grievance Redress Mechanism
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## 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 and Social Assessment Regulations, S.I. No. 143 of 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 AND PLANS RELEVANT TO THE PROPOSED PROJECT

Table 3 below presents the policies and plans related to the project.

*Table 3: Policies and plans related to the Project*

<b>Policy</b>	<b>Goal and objectives</b>	<b>Relevancy of the Policy to the proposed project</b>
National Environment Management Policy, 2014	The overall policy goal is sustainable development which maintains and promotes environmental quality and resource productivity for socio-economic transformation. The Policy provides a system of Environmental Impact Assessment (EIA) and environmental monitoring so that adverse environmental impacts can be foreseen, eliminated or mitigated.	Environment and development are interrelated, and this policy requires that environmental aspects are considered in all development projects. Therefore, this ESIA study has been conducted to take into consideration any adverse social and environmental impacts of the construction activities.
The National Water	The goal of this policy is to provide guidance on	Construction and operation activities have an impact on

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Policy	Goal and objectives	Relevancy of the Policy to the proposed project
Policy, 1999	development and management of the water resources of Uganda in an integrated and sustainable manner, so as to secure and provide water of adequate quantity and quality for all social and economic needs, with full participation of all stakeholders and mindful of the needs of future generations. The policy aims to: Promote rational use of water; Control pollution and promote safe storage, treatment and disposal of waste, which could pollute water and impact public health; and Promotion of awareness of water management and development issues and capacity building.	downstream water quality and quantity due to construction activities and if the discharged raw water and sludge from the water works is not treated and, this policy is relevant to the proposed project. The design included environmental flows and a sludge treatment has been proposed to mitigate over abstraction of water and maintenance of the existing water quality downstream.
The National Land Policy, 2013	The goal of this Policy is: "to ensure an efficient, equitable and optimal utilization and management of Uganda's land resources for poverty reduction, wealth creation and overall socio-economic development". One of its objectives is to ensure sustainable utilization, protection and management of environmental, natural and cultural resources on land for national socio-economic development.	By undertaking an ESIA for the proposed project, the developer is ensuring planned and environmentally friendly infrastructure development. Enhancement and mitigation measures should be implemented by the developer and the contractor(s) to ensure that all land use practices conform to land use plans and the principles of sound environmental management such as biodiversity preservation, soil and water protection, conservation and sustainable land management.
Uganda National Climate Change Policy, 2015	The overarching objective of the policy is to ensure that all stakeholders address climate change impacts and their causes through appropriate measures, while promoting sustainable development and a green economy including integration of climate change issues into planning, decision making and investments in all sectors.	ESIA promotes the wise use of water resources to minimize harmful effects to the environment and water resource monitoring. It promotes and strengthen the conservation and protection against degradation of watersheds, water catchment areas, river banks and water sources in order to increase their resilience to climate change impacts.
The National Health Policy, 2010	The overall objective of this policy is to reduce mortality, morbidity and fertility, and the disparities therein.	The project will contribute to the reduction of water borne diseases thus improving on the health of beneficiaries.
The National Gender Policy, 2007	The goal of this policy is to mainstream gender issues in the national development process in order to improve the social, legal/civic, political, economic and cultural conditions of the people of Uganda, particularly women. The policy recognizes women and children as the main	This policy would especially apply in the recruitment process of labour, both during construction and operation phase. Men and women should have equal opportunities for available jobs. This policy also requires provision of a work environment that is safe and conducive to women, as

Policy	Goal and objectives	Relevancy of the Policy to the proposed project
	carriers and users of water and related sanitation facilities. It anchors the importance of gender responsiveness in terms of planning, implementation and management of water and sanitation initiatives.	it is for men, considering gender-disaggregated differences and vulnerabilities. For example, women should have separate facilities from men at workers' camps and sites.
The Occupational Health and Safety (OHS) Policy, 2006	This policy seeks to: Provide and maintain a healthy working environment; Institutionalize OHS in the power-sector policies, programs and plans; and Contribute towards safeguarding the physical environment. The OHS Policy also takes into consideration the Health Sector Strategic Plan, all of which aim to improve the quality of life for all Ugandans in their living and working environment.	This policy will be especially relevant for OHS of construction crews and subsequently, operation and maintenance personnel. The policy will also have relevance in mitigation measures that protect the public from health and safety impacts as a result of project construction and subsequent operation and maintenance activities.
The Environmental Health Policy 2005	The policy provides a framework for the development of services and programs at National and Local Government levels that establish the environmental Health priorities.	Analysis of water quality was done during this ESIA where water quality sampling and analysis was done at design stage and during ESIA stage at different times.
The National Policy for the Conservation and Management of Wetland Resources, 1995.	The goal of this Policy is to curtail the rampant loss of wetland resources and ensure that benefits from wetlands are sustainable and equitably distributed. Wetlands acting as sources of water supply wastewater treatment should be fully protected. This policy outlines guidelines for wetland resource developers.	A water source protection has been elaborated for the proposed project and is aimed at conservation and management of wetland resources within the catchment area. The designs will adhere to the principles of sustainability such that areas within wetlands are left intact, as much as possible
The National Land Use Policy, 2007	The overall goal for the national land use policy is "To achieve sustainable and equitable socioeconomic development through optimal land management and utilization in Uganda." Specific goals of this policy include among others: To adopt improved agriculture and other land use systems that will provide lasting benefits for Uganda; To reverse and alleviate adverse environmental effects at local, national, regional and global levels.	By undertaking an ESIA for the proposed project, the developer is to ensure planned and environmentally friendly infrastructure development. Enhancement and mitigation measures should be implemented by the developer and the contractor(s) that ensure all land use practices conform to land use plans and the principles of sound environmental management such as biodiversity preservation, conservation and sustainable land management.
The National HIV/AIDS Policy, 2004	HIV/AIDS is recognized by Ministry of Health as a considerable risk in construction of infrastructure projects and it (together with the Ministry of Gender, Labour and Social Development) encourages employers to develop in-	It is anticipated that during the construction phase, there may be an influx of people into the project area possibly resulting into sexual fraternisation and a risk of HIV/AIDS spread. The construction contractors or their subcontractors,

Policy	Goal and objectives	Relevancy of the Policy to the proposed project
	house HIV/AIDS policies, provide awareness and prevention measures to workers and avoid discriminating against workers living with or affected by HIV/AIDS. The policy encourages employee awareness and education on HIV/AIDS. The policy also guides about HIV/AIDS management including awareness and provision of condoms in workplaces.	will provide in-house HIV Policy, worker sensitisation and provision of free condoms. This policy is relevant to the project if implementation of proposed construction activities leads to in-migration into the project area by people seeking construction jobs and indulging in prostitution or irresponsible sexual fraternisation associated with HIV/AIDS risk.
The National Child Labour Policy, 2006	The policy provides an enabling environment for the prevention, protection and elimination of child labour. It is intended to establish guiding principles in Uganda's effort to eliminate child labour and priorities for government and stakeholder action. This policy is based on recognition that all human beings, adults and children, have rights. Children by virtue of their age and needs are entitled to specific rights, including education, health, survival development, protection and participation.	The project management should ensure that all employees are above 18years and not school going.
The National Orphans and other vulnerable children's Policy, 2004	The goal of the Policy is full development and realization of rights of orphans and other vulnerable children. The policy provides support to vulnerable children and families such that their capacity to sustain themselves is strengthened; and provides residential care for orphans and other vulnerable children as a last resort	The project Developer (MWE/DWD) and the contractor(s) including their sub-contractor(s) will ensure that the project activities do not compromise or in any way affect the lives and livelihood of all the vulnerable groups like the orphans and children in general during the project implementation
The National Equal Opportunities Policy, 2006	The National Equal Opportunities Policy provides a framework for re-dressing imbalances, which exist against marginalized groups while promoting equality and fairness for all. With a goal of: providing avenues where individuals and groups' potentials are put to maximum use by availing equal opportunities and affirmative action.	The Water supply projects come along with a lot of opportunities including service delivery, trainings and employment. The project will avail equal opportunities and affirmative action.
The National Sanitation Policy for Uganda, 1997	The Goal of this policy is to promote and preserve the health of the community through improved sanitation. Attaining and maintaining a good standard of sanitation and greatly contribute to reducing mortality and morbidity from	The proposed project will promote proper management of solid and liquid wastes and promote IEC for behaviour change concerning sanitation.

Policy	Goal and objectives	Relevancy of the Policy to the proposed project
	sanitation related diseases as well as improving the socio-economic status of the community.	
Uganda Vision 2040	In 'Vision 2040', Uganda sets goals to achieve by the year 2040 ranging from political, economic, social, energy, water, and environment. It acknowledges that the slow accumulation of infrastructure i.e. water among others retards the economic development.	The proposed project will improve on the access to clean and safe water and sanitation. It will further reduce the disease burden from water related diseases among others.
National Development Plan III (NDP III)	The plan focuses on increasing and matching the capacity of the local authorities with the high urbanization rate of Uganda where most of the urban areas in Uganda have expanded beyond their original spatial plans with many of them surrounded by vast sprawling unplanned settlements and have increasingly encroached into the wetlands and drainage corridors contributing to the frequent flooding especially when it rains.	The proposed project will improve on the access to clean and safe water and sanitation. It will further reduce the disease burden from water related diseases among others.

## 2.3 LAWS AND REGULATIONS RELEVANT TO THE PROPOSED PROJECT

Table 4 below presents the Legal framework related to the project.

*Table 4: Legal framework related to the project*

Legal Framework	Provision and Requirement	Relevancy to the proposed project
The Constitution of the Republic of Uganda; 1995; amended as at 15 <sup>th</sup> 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 Constitution is the cardinal law in Uganda upon which all environmental laws and regulations are founded.	All environmental impact actions of the project are therefore meant to conform to the broader objectives of the Constitution which requires a healthy environment for all citizenry. ESIA report has been prepared for NEMA's consideration before implementation of the project. Therefore, this Project will be implemented in a manner that will incorporate the appropriate safeguards for

		environmental and social issues, especially land take. Any land required for the implementation of the construction activities will be obtained within the confines of the law, after a Resettlement Action Plan (RAP) has been conducted where possible.
The National Environment Act No. 5 of 2019	This act provides for various strategies and tools for environment management, which also includes the ESIA for projects likely to have significant environmental impacts. The Third Schedule of the National Environment Act, No. 5 of 2019 lists projects to be considered for environmental impact assessment. Under that categorization, most water resources related projects fall under two ground and surface water resources.	The Act governs and guides environmental management in Uganda. This ESIA is prepared to conform to the Act's requirement that projects likely to have significant environmental impact undertake an ESIA before they are implemented. ESIA report has been prepared for NEMA's consideration before implementation of the project.
The Water Act, Cap 152 and The Water Resources Regulations, 1998	Management of water resources Regulation and issuing of water use, abstraction and wastewater discharge permits; Prevention of water pollution. Managing and monitoring and regulation of water resources	Water abstraction permits should be obtained from DWRM before operation phase. Water analysis was done under ESIA and results (see Section 5.1.6) compared to those obtained at design stage and national standards for portable water. The quality of treated water will be regularly monitored to ensure it meets portable water standards.
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.	These tenure systems will be important during resettlement planning. The extent of works designed to ensure the construction of the BWSS will necessitate land take of 36.5057 acres in the Project Area. Any land required for the implementation of this Project will be acquired in accordance with the provisions of this Act.
The Occupational Safety and Health Act, 2006	Provision of Occupation Health and Safety of workers and Inspection of places of works. This Act requires that employers provide and maintain safe working conditions and take measures to protect workers and the public from risks and dangers of their works, at his or her own cost (Section 13). Employers with more than 20 workers should prepare and often revise a written policy with respect to safety and health of workers (Section 14). The contractor therefore is obliged to provide employers with washing facilities,	An ESMP has been prepared and the Contractor will ensure the workplace is registered under the Ministry of Gender, Labour and Social Development (MoGLSD) under the Department of OHS. The construction activities will require workers during the construction, and operation and maintenance phases. Therefore, the Act requires that MWE and all contractors must ensure that workers have a safe

	First Aid, facilities for meals and safe access to workplaces	working environment at all times and that their health is not at risk as whilst at work.
The Land Acquisition Act (1965)	This law elaborates on land acquisition procedures for early entry into the delineated land as compensation matters are finalized with the objective of timely Project delivery. Reference to this Act has been made while proposing strategies for addressing unreasonable speculative persons who may jeopardize Project delivery by demanding exorbitant compensation.	MWE will issue Notices of Entry at the start of RAP disclosures.
The 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.	This Project will require workers during construction, operation and maintenance phases. Any injury or illness resulting from Project related activities will be subject to conditions of the Workers' Compensation Act. Buhweju District Labour officers will also be involved in ensuring compliance of the Contractor's with labour laws. 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 Public Health Act, Cap 281	The Public Health Act aims at avoiding pollution of environmental resources that support health and livelihoods of communities. It gives local authorities powers (Section 103) to prevent pollution of watercourses.	The disposal of waste from the proposed project will have to be appropriately managed so as to prevent risk to public health, in line with the provisions of this Act.
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 Natural Resources Officer (DNRO) and Sub-County Community Development Officer in carrying out monitoring activities to ensure no damage onto the environment and social amenities.
The Investment Code Act, Cap 92	Section 18(2) (d) of the Act requires an investor to take necessary steps to ensure that development and operation of an investment project do not cause adverse ecological and socio-economic impacts.	MWE is the implementing agency for the project that received funding from the World Bank. This ESIA is in partial fulfilment of the requirements of this Act, since adverse ecological and socio-economic impacts as a result of the project

		implementation have been identified and mitigation measures developed.
The Employment Act, 2006	This Act is the principal legislation that seeks to harmonize relationships between employees and employers, protect worker's interests and welfare and safeguard their occupational health and safety through: i) Prohibiting forced labour, discrimination and sexual harassment at workplaces (Part II; Part IV). ii) Providing for labour inspection by the relevant ministry (Part III). iii) Stipulating rights and duties in employment (weekly rest, working hours, annual leave, maternity and paternity leaves, sick pay, etc. (Part VI). iv) Continuity of employment (continuous service, seasonal employment, etc. (Part VIII). This Act is relevant to both construction & operation phases.	The Act will govern labour arrangements and conditions under which persons hired by the project work. It prohibits Child labour (a condition the contractor must comply with) as well as providing guidance on work rights during the post-construction phase.
The Mining Act, Cap. 148	Stone quarry sites and gravel borrow pits will be necessary for materials needed to construct the concrete works of the project components. Therefore, applicable licenses shall be obtained from the Commissioner of the Geological Survey and Mines. The Mining Act of 2003 regulates mining developments including set up of new quarries and/or sandpits. Relevant environmental studies required for this license application are described in Part XI.	This Act will apply to the project's contractor(s) who will be required to obtain license for extraction of stone/ aggregate and murram materials required for construction. The extraction of stone/aggregate and murram materials will be undertaken in line with the provisions of this Act. Issues of restoration of the sites after extraction of murram will be of key importance after construction of the proposed project.
The Children's Act, Cap 59	This is an Act to reform and consolidate the law relating to children; to provide for the care, protection and maintenance of children; to make provision for children charged with offences and for other connected purposes. Part II of the second schedule of this Act defines a child as a person below the age of eighteen (18) years. In the same schedule under Section 8 of this Act provides that no child shall be employed or engaged in any activity that may be harmful to his or her health, education or mental, physical or moral development.	This Project will require workers during construction, operation and maintenance phases. No child should be employed under project work force requirement however, any employment or engagement of children will be done in line with the restrictions of this Act and the Employment Act to ensure that risks to children are either eliminated, or reduced to as low as reasonably practicable. In addition, the contractor will confirm age of potential labourers prior to hiring through National Identity card, birth certificate or confirming with LC and community elders. Buhweju District Probation Officers will

		provide guidance to Contractors and their employees' areas of compliance.
The Historical Monuments Act, 1967	Sub-section 12(1) requires that any portable object discovered in the course of an excavation shall be surrendered to the Minister who shall deposit it in the Museum. The Act adds that, notwithstanding provisions of the subsection, where any object is discovered in a protected site, place, or monument, the owner of the protected site, place, or monument shall be entitled to reasonable compensation.	This Act requires that any chance finds encountered during project construction shall be preserved by the Department of Monuments and Museum in the Ministry of Tourism, Wildlife and Heritage. Any chance find objects, material or infrastructure that may be identified as falling under the category of 'archaeological pale-ontological ethnographical and traditional interests' during the Project implementation will therefore, be reported to the Department of Museums and Monuments for advice and where necessary undergo a forensic assessment
The National Environment (Environmental and Social Assessment) Regulations, 2020	According to sections 15 of the Regulations, the developer of any project that has or is likely to have a significant impact on the environment is required to undertake an ESIA process after approval of the ToRs.	ESIA report has been prepared for NEMA's consideration after the approval of the Terms of References before implementation of the proposed project.
The National Environment (Wetlands, River Banks and Lake Shores Management) Regulations, 2000	In Regulation 17 (1), every landowner, occupier or user who is adjacent or contiguous with a wetland shall have a duty to prevent the degradation or destruction of the wetland and shall maintain the ecological and other functions of the wetland. The tool used under these Regulations to ensure compliance is the permit.	Prior to any works at the discharge of water sludge back into the environment or any wetland, MWE will seek permission from NEMA, as provided for in these Regulations. A water source protection plan (WSPP) has been prepared to protect any wetland resources within the catchment area from being polluted.
The National Environment (Waste Management) Regulations, 2020	Regulation 5 (1) stipulates that 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 in a manner that does not cause harm to human health or the environment among other provisions.	These regulations apply to both construction and operation-phase waste which should be managed in a way such as to avoid environmental and public health impact. Therefore, all the generated various types and volume of waste should be managed and conform to these regulations.
The National Environment (Noise Standards and	Part III Section 8 (1) requires facility operators, to use the best practicable means to ensure that the emission of noise does not exceed the permissible noise levels. The regulations require that	All construction activities should be carried out between 7am – 6pm by the Contractor as working hours. No construction activities to be carried out at

Control) Regulations, 2000.	persons to be exposed to occupational noise exceeding 85 dBA for eight hours in a day should be provided with requisite hearing protection.	Night. Noise levels should also be monitored and not to exceed 85dB as per Regulation.																											
The Water Resources Regulations, 1998	With regard to water abstraction, Part II: Section 3 Sub-section (1) of these regulations requires application for Water Permits by anyone who: (a) Occupies or intends to occupy any land; (b) Wishes to construct, own, occupy or control any works on or adjacent to the land referred to in regulation 10; may apply to the Director for a water permit.	Water abstraction permits will be obtained by the developer from the Directorate of Water Resources Management (DWRM) before operation phase.																											
The National Environment (Standards for Discharge of Effluent into Water or on Land) Regulations, 2020	Section 5 details that a person shall not discharge effluent into water or land except in accordance with the Act, the Water Act, the National Environment (Waste Management) Regulations, 2020, the Petroleum (Waste Management) Regulations, 2019, the Water (Waste Discharge) Regulations, these Regulations and environmental standards. For this project, this standard is applicable to liquid waste/ sewage treatment plant and public toilets.	Effluent/liquid waste (such as human waste, food scraps, oils, soaps and chemicals) should not be discharged into any wetland or in the River water resources and should be managed in a manner that does not cause harm to human health or the environment.																											
Draft National Air Quality Standards, 2006	<p>The draft national air quality standards provide Uganda's regulatory air quality standards.</p> <table border="1" data-bbox="485 834 1276 1109"> <thead> <tr> <th>Pollutant</th> <th>Averaging time for ambient air</th> <th>Standard for ambient air</th> </tr> </thead> <tbody> <tr> <td>Carbon dioxide (CO<sub>2</sub>)</td> <td>8 hour</td> <td>9.0 ppm</td> </tr> <tr> <td>Carbon monoxide (CO)</td> <td>8 hour</td> <td>9.0 ppm</td> </tr> <tr> <td>Hydrocarbons</td> <td>24 hour</td> <td>5 mg m<sup>-3</sup></td> </tr> <tr> <td>Nitrogen oxides (NO<sub>x</sub>)</td> <td>24 hour 1 year arithmetic mean</td> <td>0.10 ppm</td> </tr> <tr> <td>Smoke</td> <td>Not to exceed 5 minutes in any one hour</td> <td>Ringlemann scale No.2 or 40% observed at 6m or more</td> </tr> <tr> <td>Soot</td> <td>24 hour</td> <td>500 µg Nm<sup>-3</sup></td> </tr> <tr> <td>Sulphur dioxide (SO<sub>2</sub>)</td> <td>24 hour</td> <td>0.15 ppm</td> </tr> <tr> <td>Sulphur trioxide (SO<sub>3</sub>)</td> <td>24 hour</td> <td>200 µg Nm<sup>-3</sup></td> </tr> </tbody> </table> <p><small>Note: ppm = parts per million; "N" in µg/m<sup>3</sup> denotes normal atmospheric conditions of pressure and temperature (25oC and 1 atmosphere).</small></p>	Pollutant	Averaging time for ambient air	Standard for ambient air	Carbon dioxide (CO <sub>2</sub> )	8 hour	9.0 ppm	Carbon monoxide (CO)	8 hour	9.0 ppm	Hydrocarbons	24 hour	5 mg m <sup>-3</sup>	Nitrogen oxides (NO <sub>x</sub> )	24 hour 1 year arithmetic mean	0.10 ppm	Smoke	Not to exceed 5 minutes in any one hour	Ringlemann scale No.2 or 40% observed at 6m or more	Soot	24 hour	500 µg Nm <sup>-3</sup>	Sulphur dioxide (SO <sub>2</sub> )	24 hour	0.15 ppm	Sulphur trioxide (SO <sub>3</sub> )	24 hour	200 µg Nm <sup>-3</sup>	These standards will apply particularly during construction of the water treatment plant and reservoirs.
Pollutant	Averaging time for ambient air	Standard for ambient air																											
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The National Environment (Audit) Regulations, 2020	Part III on Environmental Compliance Audit, Section 12, Sub-section (1) requires the developer of a project or activity listed in Schedule 3 to these Regulations to carry out an environmental compliance audit.	The project will involve construction and operation of water supply and sanitation facilities that have a potential to impact negatively of the environment. Therefore, MWE should conduct Environmental Audits to assess if there are impacts, to what extent and mitigate them.																											

## 2.4 PERMITS AND LICENSES

A list of some of the permits and licenses necessary for execution of the project are indicated in the Table below.

Table 5: Permits and licenses required by the proposed development

No.	Permit or License Name <sup>1</sup>	Issuing Authority	Responsible for acquiring the permit
1.	Certificate for Approval for ESIA for the project	National Environment Management Authority (NEMA)	Rural Water Supply and Sanitation Department (RWSSD) under the Directorate of Water Development (DWD)
2.	Surface Water Abstraction Permit	The Directorate of Water Resources Management (DWRM) under the Ministry of Water and Environment (MWE)	Operator
3.	Permit to carry out an activity in a wetland/river bank	NEMA	RWSSD
4.	Construction Permit	Buhweju District Planning Office	Contractor
5.	Workplace Registration Certificate	Department of Occupational Safety and Health under the Ministry of Gender, Labour and Social Development (MGLSD)	Contractor
6.	Equipment Inspection Certifications	Department of Occupational Safety and Health/Ministry of Gender, Labour and Social Development (MGLSD)	Contractor
7.	Solid Waste Management License ( <i>to collect, transport, store, treat or dispose of waste</i> ) <sup>2</sup>	NEMA	Both the Contractor and Operator
8.	Effluent Discharge Permit	DWRM under MWE	Operator

<sup>1</sup> And any other permits or licenses prescribed by NEMA in the Certificate of Approval for the ESIA Report.

<sup>2</sup> A NEMA gazetted waste handler can be contracted by the Contractor or Operator.

## 2.5 WORLD BANK SAFEGUARD POLICIES AND REQUIREMENTS

The IWMDP is assigned an EA Category B given that significant adverse environmental and social impacts are not expected due to the nature of the proposed activities. Following the environmental and social screening of the proposed project activities, the anticipated negative impacts will be localized, site-specific and small to moderate in scale. The project is not anticipated to generate any potential large scale, significant and/or irreversible impacts. None of the project activities will be located in environmentally sensitive areas, and all the associated impacts can be mitigated with relatively standard mitigation measures.

**Overall by their nature, location, scale & scope, including the environmental and social context where the Bitsya WSS project will be situated, will have minimal adverse environmental and social impacts. Therefore, negative impacts are expected to be mitigated with known technology, good practices and management solutions, resulting in residual impact of minor significance. This therefore qualifies the project to be EA Category B.**

The applicable World Bank environmental and social safeguard policies that will require the project to meet the requirements are summarized as in Table 6.

Table 6: Summary on Bank Policies and how they relate to Bitsya WSS Project

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Yes ✓ or No X	If applicable, how might it apply?
✓	<p>Environmental Assessment (OP/BP/GP 4.01)</p> <p>The Environmental Assessment (EA) Safeguard is to ensure that projects are environmentally and socially sustainable, and provide a basis for improved decision making. OP 4.01 evaluates a project's potential environmental risks and impacts in its area of influence; examines project alternatives; identifies ways of improving project selection, siting, planning, design, and implementation by preventing, minimizing, mitigating, or compensating for adverse environmental impacts and enhancing positive impacts; and includes the process of mitigating and managing adverse environmental impacts throughout project implementation.</p> <p>The proposed project will largely generate positive impacts contributing to public health, economic growth, and environmental sustainability. OP 4.01 is triggered as the project may have potential negative environmental and social impacts through the construction and operational phases. Possible impacts during construction include; impacts on water bodies associated due to earthworks and wastewater generated from construction activities; emissions of particulate matter by earthworks and removal of vegetation cover; Occupational, Health, and Safety (OHS) risks; and social misdemeanour by workers. The impacts during construction phase will be temporary while works are carried out. During the operation phase, the potential risks include unpleasant odours and noise from the operation of sanitation facilities; inadequate sludge management and wastewater effluent discharges; possible impacts on surface and/or ground water due to leakages from and intrusion of storm water to the facilities (sewers, manholes, ponds, septic tanks); and</p>

	<p>impacts of water intake on environmental flows and aquatic ecosystems, including migratory fish species.</p> <p>The anticipated negative impacts will be localized, site-specific and small to moderate in scale. All project adverse impacts are expected to be mitigated with known technology, good practices and management solutions, resulting in residual impact of minor significance. For instance, the treated effluents from wastewater facilities (ponds and faecal sludge treatment facilities) will not generate significant impacts, if the facilities are operated and maintained according to design standards. With respect to AC, the environmental management plan will include management measures for the removal, packaging, transportation and disposal of existing asbestos waste. Works and equipment will be designed based on technical studies to ensure safe yield from groundwater and surface water resources. The water and sanitation facilities are relatively small.</p> <p>The Project is classified as Category B because it will not generate any potential large scale, significant and/or irreversible impacts, it is not located in environmentally sensitive areas, and impacts can be mitigated with relatively standard mitigation measures. Safeguards instruments: Compliance will be ensured through diligent application of Environmental and Social Management Framework (ESMF) and site specific Environmental and Social Impact Assessments (ESIAs)/Environmental and Social Management Plans (ESMPs) during implementation. The Project will follow the WB- EHS Guidelines for Water and Sanitation.</p>
√	<p>Natural Habitats (OP/BP 4.04)</p> <p>While no significant negative impacts on natural habitats are anticipated by project works, the policy is triggered because most of the sanitation facility at the water treatment plant may discharge their effluent into wetlands if constructed close to the river and not well lined. In addition, the project will also involve catchment management and some of the investments may involve afforestation, reforestation and improvement of watersheds. Depending on the subprojects and potential negative impacts to the natural habitats (forests, wetlands, lakeshores, and riverbanks), these subprojects will include/encompass natural habitats assessment and mitigation under the given sub-project ESIA/ESMP to protect or preserve any flora &amp; fauna species identified at risk of being affected. If a subproject can cause irreversible damages, it will be excluded.</p>
√	<p>Forests (OP/BP 4.36)</p> <p>OP 4.36 is triggered due to potential project impacts on health and quality of forests, especially in the catchment areas where the project will support afforestation, reforestation and improvement of watersheds. Compliance will be ensured through the site specific ESIAs/ESMPs that shall ensure inclusion of forests assessment and mitigation.</p>
X	<p>Pest Management (OP 4.09)</p> <p>The project will not involve or support the purchase, manufacture or use of pesticides. The Project will not lead to increased/changed use of pesticides.</p>
√	<p>Physical Cultural Resources (OP 4.11)</p> <p>The policy is triggered due to the possibility of chance finding of physical cultural resources during construction. Any potential physical cultural resources will be addressed by incorporating reporting and handling procedures as part of site specific ESIA and dealt with</p>

	in the context of the ESMF. The ESMF has provided a generic Chance Finds Procedure that will guide handling accidental encounter of archaeological resources.
√	<p>Involuntary Resettlement (OP/BP 4.12)</p> <p>The purpose of this policy is to avoid or minimize involuntary resettlement and, where this is not feasible, assist displaced persons in improving or at least restoring their livelihoods and standards of living in real terms relative to pre-displacement levels or to levels prevailing prior to the beginning of project implementation, whichever is higher. The key objectives of this operational policy are to: a. Avoid or minimize involuntary resettlement scenarios, where possible and examine all viable alternative project designs; b. Support affected persons in restoring/improving their former living standards, income generation and production capacities, or at least in restoring them; c. Encourage community involvement in planning and implementing resettlement actions, and provide assistance to affected people regardless of the legality of land tenure. The policy does not only cover physical displacement, but also any loss of land or other assets associated to the proposed actions resulting in: a. relocation or loss of shelter; b. loss of assets or access to assets; and loss of income sources or means of livelihood, whether or not the affected person is to reallocate to a new area.</p> <p>The policy is therefore triggered because of the potential negative social impacts that might result from the need for land acquisition and/or the loss of access to economic assets and livelihoods due to integrated WRM and WSS activities. Bitsya Water Supply and Sanitation Project will require a permanent land take of 4.9234 acres and an Easement corridor of 31.5823 acres. A total number of 994 PAPs will be affected by the proposed Bitsya Water Supply and Sanitation Project.. Both instruments will be disclosed in country and on the World Bank website by project's appraisal. For sub-projects covered under the RPF, these shall be subjected to social screening and where necessary their RAP shall be prepared and implemented before commencement of implementation of any such activities.</p>
X	<p>Indigenous Peoples (OP 4.10)</p> <p>There are no areas occupied by indigenous people in the project area</p>
X	<p>Safety of Dams (OP/BP 4.37)</p> <p>OP 4.37 is not triggered as the project will finance rehabilitation and construction of small dams (i.e. dams smaller than 15m, as per OP 4.37) identified through the catchment planning process under component 3, including small dams to prevent soil erosion and for flood protection. The Project does not support the construction or rehabilitation of large dams and subprojects do not include structures that will rely on the performance of an existing dam or dam under construction (DUC).</p>
X	<p>Projects in Disputed Areas (OP/BP/GP 7.60)</p> <p>OP 7.60 is not triggered as there are no known disputed areas in the project districts. If any, the project will not support any activities in disputed areas.</p>
X	<p>Projects on International Waterways (OP/BP/GP 7.50)</p> <p>This policy is not triggered since the water source is not an International Waterway.</p>

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## 2.5.1 World Bank Policy on Disclosure of Information

The World Bank, through its Disclosure Policy BP 17.50, requires that all safeguard documents be disclosed in the respective countries as well as at the Bank's Info shop or Website prior to appraisal or for Fast Tracking Initiative prior to Signing of the Grant Agreement. The Bank recognizes the right to information, and has information disclosure policies which generally contain the following elements: principles of disclosure; exceptions to disclosure; routine disclosure; and request driven disclosure. Disclosure of documents (including a summary of the project, and a summary of Environmental Assessment) should be in the local language, at a public place accessible to project-affected groups, local non-governmental organizations and other interested persons. In-country disclosure of information is the responsibility of the borrower, in this case of the project proponent through the steering committee or the individual institutions that will be implementing a project, in this case the MWE and MWE. Disclosure at InfoShop is the responsibility of the World Bank. Documents that need to be disclosed include:

- Integrated Safeguards Data Sheet;
- ESMF and RPF;
- All Safeguard mitigation plans: (i). Environmental and Social Impact Assessments, and/or Environmental and Social Management Plans; and (ii). Resettlement Action Plan.

All documents should be made available to stakeholders well in advance of consultations and all public consultations should be completed and draft or final documents should be disclosed prior to the project appraisal. In addition, all final documents, including the results of the consultations should be disclosed for the record. For the present ESMF document, information disclosure was initiated with the stakeholder consultations and public meetings held in selected project sites and Ministries or Agencies. The meetings provided an opportunity for stakeholders to provide comments and useful inputs to be taken into consideration when planning and implementing the proposed project.

As the EMSF has now been drafted, it is proposed that the disclosure process be through continued interaction with stakeholders using contacts gathered during public meetings. A public advert shall be sent to most widely distribute and read newspapers in the country, to inform stakeholders of the availability of the ESMF document for review and comments. The MOWE shall ensure the availability of the full ESMF in their Public Library and Website, including websites and offices of MWE, and participating Districts, where the public can have access and provide any comments.

## 2.6 ENVIRONMENTAL HEALTH AND SAFETY GUIDELINES SPECIFIC TO WATER SUPPLY AND SANITATION PROJECTS

The World Bank Group (WBG) Environmental Health and Safety (EHS) General Guidelines are recommended to be used by the project. This section provides an overview on how the general approach to be taken with regards to the management of EHS issues at the sub-project or project level. The WBG EHS Guidelines are technical reference documents with general and industry-specific examples of Good International Industry Practice (GIIP). They shall be referred to and used to guide EHS issues in specific industry sectors, and they should be used together with the safeguard policies. These shall govern both workers' (occupational) safety and public safety. However, the application of the EHS Guidelines to

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existing facilities that will be rehabilitated/expanded may involve the establishment of site-specific targets, with an appropriate timetable for achieving them. The applicability of the EHS Guidelines shall be tailored to the hazards and risks established for each project on the basis of the results of an environmental assessment in which site-specific factors are taken into account. Effective management of environmental, health, and safety (EHS) issues entails the inclusion of EHS considerations into corporate- and facility-level business processes through the following steps:

- Identifying project hazards and associated risks as early as possible;
- Involving EHS professionals, who have the experience, competence, and training necessary to assess and manage EHS impacts and risks, and carry out specialized environmental management functions;
- Understand the likelihood and magnitude of the risks;
- Prioritizing risk management strategies with the objective of achieving an overall reduction of risk to human health and the environment;
- Favouring strategies that eliminate the cause of the hazard at its source;
- Incorporating engineering and management controls to reduce or minimize the possibility and magnitude of undesired consequences;
- Preparing workers and nearby communities to respond to accidents;
- Improving EHS performance through a combination of ongoing monitoring of facility performance and effective accountability.

The following were considered when assessing the potential risks related to health, safety and security: Infrastructure and Equipment Safety; Hazardous Materials Safety; Environmental and Natural Resource Issues (such as floods/ landslides etc.); Community safety and exposure to project related risks; Emergency Preparedness and Response. The General EHS Guidelines contain information on cross-cutting environmental, health, and safety issues potentially applicable to all industry sectors. This document should be used together with the relevant Industry Sector Guideline(s). The General EHS Guidelines (2007) relevant to this Project are summarized in Table 7:

Table 7: World Bank General EHS Guidelines relevant to this Project

Aspect	Relevancy to the proposed project
<b>Environmental</b>	
<p><i>Air Emissions and Ambient Air Quality</i> This guideline applies to facilities or projects that generate emissions to air at any stage of the project life-cycle. This guideline provides an approach to the management of significant sources of emissions, including specific guidance for assessment and monitoring of impacts.</p>	<p>This guideline is relevant because fugitive emissions are expected during the construction phase of this Project. These guidelines will be referenced for acceptable air quality levels during Project implementation, particularly for fugitive sources.</p>
<p><i>Wastewater and Ambient Water Quality</i> This guideline applies to projects that have either direct or indirect discharge of process wastewater, wastewater from utility operations or storm water to the environment. These guidelines are also applicable to industrial discharges to sanitary sewers that discharge to the environment without any treatment. Projects with the potential to generate</p>	<p>This Project is primarily about water abstraction, treatment, supply and management. As the guidelines state, any wastewater discharge, even of uncontaminated will be managed properly before discharge. These guidelines will be referenced for principles of HSE regarding wastewater management, to improve efficiency and sustainability of the</p>

Aspect	Relevancy to the proposed project
<p>process wastewater, sanitary (domestic) sewage, or storm water should incorporate the necessary precautions to avoid, minimize, and control adverse impacts to human health, safety, or the environment.</p>	<p>Project.</p>
<p><i>Waste Management</i>            These guidelines apply to projects that generate, store, or handle any quantity of waste across a range of industry sectors.            Solid (non-hazardous) wastes generally include any garbage, refuse. Examples of such waste include domestic trash and garbage; inert construction / demolition materials; refuse, such as metal scrap and empty containers (except those previously used to contain hazardous materials which should, in principle, be managed as a hazardous waste); and residual waste from industrial operations, such as boiler slag, clinker, and fly ash.            Hazardous waste shares the properties of a hazardous material (e.g. ignitability, corrosivity, reactivity, or toxicity), or other physical, chemical, or biological characteristics that may pose a potential risk to human health or the environment if improperly managed.</p>	<p>This Project will produce waste during the construction period. The operation and maintenance phase also have an insignificant element of waste management since the operation will only involve the water abstraction, treatment and supply.            These guidelines will be referenced for principles of HSE regarding waste management during the life of this Project.</p>
<p><i>Noise</i>            This guideline addresses impacts of noise beyond the property boundary of the facilities. Noise prevention and mitigation measures should be applied where predicted or measured noise impacts from a project facility or operations exceed the applicable noise level guideline at the most sensitive point of reception</p>	<p>The pump station is far away from residential areas and houses and it is not close to schools and health care institutions which are considered to be very sensitive receptors.            Noise emissions shall be monitored against the WB's guidelines during construction, operation and maintenance:</p>
<p><i>Contaminated Land</i>            This guideline provides a summary of management approaches for land contamination due to anthropogenic releases of hazardous materials, wastes, or oil, including naturally occurring substances. Releases of these materials may be the result of historic or current site activities, including, but not limited to, accidents during their handling and storage, or due to their poor management or disposal. Contaminated lands may involve surficial soils or subsurface soils that, through leaching and transport, may affect groundwater, surface water, and adjacent sites.            When contamination of land is suspected or confirmed during any project phase, the cause of the uncontrolled release should be identified and</p>	<p>The Contractor(s) Will ensure that hazardous materials, wastes, or oil will not be discharged or released onto soils and land. All servicing and maintenance of construction vehicles such as trucks and equipment shall not be done on site.</p>

Aspect	Relevancy to the proposed project
corrected to avoid further releases and associated adverse impacts	
<b>Occupational Health and Safety</b>	
<p><i>Communication and Training</i> This includes guidelines for OHS Training, Visitor Orientation, New task employee and contractor training, Area signage, labelling of equipment, communicate hazard codes, among others. Provisions should be made to provide OHS orientation training to all new employees to ensure they are apprised of the basic site rules of work at / on the site and of personal protection and preventing injury to fellow employees.</p>	Supervising Consultants and Contractors for the Project will have to ensure that OHS requirements for the Project are met in line with these guidelines
<p><i>Physical Hazards</i> Physical hazards represent potential for accident or injury or illness due to repetitive exposure to mechanical action or work activity. Single exposure to physical hazards may result in a wide range of injuries, from minor and medical aid only, to disabling, catastrophic, and/or fatal. Multiple exposures over prolonged periods can result in disabling injuries of comparable significance and consequence. Sources of potential for such injury include rotating and moving equipment, noise, vibration, eye hazards, industrial vehicle driving and site traffic, ergonomics, repetitive motion, manual handling, among others.</p>	During the construction of the BWSS such as dredging, equipment and machinery which generate noise and vibrations will be used. These operations will be guided by these guidelines.
<p><i>Personal Protective Equipment (PPE)</i> Personal Protective Equipment (PPE) provides additional protection to workers exposed to workplace hazards in conjunction with other facility controls and safety systems. PPE is considered to be a last resort that is above and beyond the other facility controls and provides the worker with an extra level of personal protection.</p>	Supervising Consultants and Contractors for the Project will have to ensure that PPE requirements for the Project are met in line with these guidelines. PPE will be provided (as required) for eye and face protection, head protection, hearing protection, foot protection, hand protection, respiratory protection, body/leg protection
<p><i>Monitoring</i> Occupational health and safety monitoring programs should verify the effectiveness of prevention and control strategies. The selected indicators should be representative of the most significant occupational, health, and safety hazards, and the implementation of prevention and control strategies</p>	Stringent monitoring of HSE aspects will be crucial for the successful implementation of the Project, to have risks reduced to levels that are as low as reasonably practicable.
<b>Community Health and Safety</b>	
<p><i>Water Quality and Availability</i> Groundwater and surface water represent essential sources of drinking and irrigation water in developing countries, particularly in rural areas where piped water</p>	In the project area, there's no potential for the Project to impact on water quality and availability. There are no other water pipes crossing or traversing near the proposed project

Aspect	Relevancy to the proposed project
<p>supply may be limited or unavailable and where available resources are collected by the consumer with little or no treatment.</p> <p>Project activities involving wastewater discharges, water extraction, diversion or impoundment should prevent adverse impacts to the quality and availability of groundwater and surface water resources. Project activities should not compromise the availability of water for personal hygiene needs and should take account of potential future increases in demand</p>	<p>area which could cause disruption during Project implementation to guarantee measures in line with these guidelines to be put in place. Any discharge of water sludge/semi-solid slurry from the sludge drying beds shall meet the standards for effluent before discharge into water or land as prescribed under Part II on Standards for Effluent in the National Environment (Standards for Discharge of Effluent into Water or Land) Regulations, 2020 (specifically as provided for under Schedule 2 and Schedule 3).</p>
<p><i>Structural Safety of Project Infrastructure</i></p> <p>Hazards posed to the public while accessing project facilities may include: Physical trauma associated with failure of building structures; Burns and smoke inhalation from fires; Injuries suffered as a consequence of falls or contact with heavy equipment; Respiratory distress from dust, fumes, or noxious odors; Exposure to hazardous materials; Reduction of potential hazards is best accomplished during the design phase when the structural design, layout and site modifications can be adapted more easily.</p>	<p>This guideline will be referenced in line with the integrity of the structures and any hoarding installed. PPE will be provided to persons accessing the project facilities. For all public roads and access roads used by the construction activities, dust suppression using water will be carried out by the Contractor(s). All visitors will be inducted in EHS requirements before accessing any construction site/area. Safety signs and safe systems of work will be developed for each workstation.</p>
<p><i>Traffic Safety</i></p> <p>Traffic safety should be promoted by all project personnel during displacement to and from the workplace, and during operation of project equipment on public roads. Prevention and control of traffic related injuries and fatalities should include the adoption of safety measures that are protective of project workers and of road users, including those who are most vulnerable to road traffic accidents. Road safety initiatives proportional to the scope and nature of project activities.</p>	<p>Though the proposed sites are not near residential areas, this may pose a risk of accidents to residents especially from the trucks delivering construction materials to the site along the access roads. Accessibility to the BWSS is along the Buhweju community roads and work at the proposed site will disrupt traffic. Delivery of materials and movement of equipment for the Project will also impact traffic. This guideline will be referenced in line with traffic safety during Project implementation</p>
<p><i>Disease Prevention</i></p> <p>Communicable diseases pose a significant public health threat worldwide. Health hazards typically associated with large development projects are those relating to poor sanitation and living conditions, sexual transmission and vector-borne infections.</p> <p>Communicable diseases of most concern during the construction phase due to labor mobility are sexually transmitted diseases (STDs), such as HIV/AIDS. Recognizing that no single measure is likely to be effective in the long term, successful initiatives typically involve a combination of behavioral and</p>	<p>The risk of spread of communicable and vector-borne diseases exists, particularly due to potential influx of Project workers and water impoundment in some cases, as required during construction. This guideline will be referenced in line with disease prevention in the Project communities.</p>

Aspect	Relevancy to the proposed project
<p>environmental modifications.</p> <p>Reducing the impact of vector-borne disease on the long-term health of workers is best accomplished through implementation of diverse interventions aimed at eliminating the factors that lead to disease.</p>	
<p><i>Emergency Preparedness and Response</i></p> <p>All projects should have an Emergency Preparedness and Response Plan that is commensurate with the risks of the facility and that includes the following basic elements: Administration (policy, purpose, distribution, definitions, etc.); Organization of emergency areas (command centers, medical stations, etc.); Roles and responsibilities; Communication systems; Emergency response procedures; Emergency resources; Training and updating; Checklists (role and action list and equipment checklist); Business Continuity and Contingency.</p>	<p>On any construction site, there is a potential that risks will occur. It is important to have measures in place to readily contain and respond to any risks when they occur. This guideline will be referenced in line with emergency preparedness and response.</p>
<b>Construction and Decommissioning</b>	
<p><i>Environment</i></p> <p>Guidelines on prevention and control of community health and safety impacts that may occur during new project development, at the end of the project life-cycle, or due to expansion or modification of existing project facilities include:</p> <p>Noise and vibration, soil erosion, sediment mobilization and d transport, air quality, solid waste, hazardous materials, wastewater discharges, and contaminated land.</p>	<p>These impacts are applicable to this Project, and will be addressed in line with these specific guidelines</p>
<p><i>Occupational Health and Safety</i></p> <p>Guidelines are provided on aspects of OHS including over-exertion, slips and falls, work in heights, struck by objects, moving machinery, dust, confined spaces and excavations, and other site hazards.</p>	<p>These impacts are applicable to this Project, and will be addressed in line with these specific guidelines</p>
<p><i>Community Health and Safety</i></p> <p>Projects should implement risk management strategies to protect the community from physical, chemical, or other hazards associated with sites under construction and decommissioning. Risks may arise from inadvertent or intentional trespassing, including potential contact with hazardous materials, contaminated soils and other environmental media, buildings that are vacant or under construction, or excavations and structures which may pose falling and entrapment hazards</p>	<p>These impacts are applicable to this Project, and will be addressed in line with these specific guidelines.</p>

## 2.7 INSTITUTIONAL FRAMEWORK

Table 8: Institutional framework for the project

Institution	Role
Ministry of Water and Environment	<ul style="list-style-type: none"> <li>Review and approve the ESIA report (ESIS)</li> <li>Through Buhweju District Natural Resources Office (DNRO), undertake environmental monitoring during project implementation.</li> </ul>
Directorate of Water Resources Management (DWRM)	<ul style="list-style-type: none"> <li>Issue water abstraction and wastewater discharge permits.</li> <li>Ensure monitoring of surface water resource, laboratory and field works and ultimately water pollution control..</li> </ul>
National Environment Management Authority (NEMA)	<ul style="list-style-type: none"> <li>The Environmental Monitoring and Compliance Department of NEMA will be responsible for the review and approval of ESIA's, post-implementation audits and monitoring of approved projects. Although project sponsors have a responsibility for monitoring their own activities, NEMA carries out its own monitoring largely through District Environmental Officers and environmental inspectors at NEMA's head office/ Lead Agencies.</li> <li>Coordinate, inspect, supervise and monitor project activities to ensure that the environment and natural resources are not depleted but managed sustainably.</li> </ul>
Ministry of Lands, Housing and Urban Development (MLHUD)	<ul style="list-style-type: none"> <li>Through the Chief Government Valuer (CGV) in the Valuation Department, MLHUD is responsible for reviewing and approving the Valuation Report developed as part of this RAP.</li> <li>The valuation report is critical in ensuring timely payment of fair and adequate compensation as well ensure that the Project Construction and next steps commence in time.</li> </ul>
Ministry of Tourism, Wildlife and Antiquities	<ul style="list-style-type: none"> <li>In-charge of protecting and preserving the sites with remain of cultural or archaeological importance when identified during construction activities for conservation, preservation, restoration and salvage.</li> </ul>
Directorate of Environment Affairs (DEA)	<ul style="list-style-type: none"> <li>Coordinate, inspect, supervise and monitor the environment and natural resources.</li> <li>Ensure that environmental policies and laws are respected while implementing water resources related projects.</li> </ul>
District Local Administration Structures (Bitsya District Local Government)	<ul style="list-style-type: none"> <li>Local government structures are important for mobilising support for the project as well as monitoring its social-environmental impacts both during construction and operation phases.</li> <li>Facilitate and/or coordinate activities of the developer in their areas of jurisdiction.</li> <li>Mobilize local communities and key stakeholders to participate in EIA consultations and/or public hearings.</li> </ul>
Ministry of Gender, Labour and Social Development (MGLSD)	<ul style="list-style-type: none"> <li>The department of Occupational Health and Safety (OHS) is responsible for inspecting and registering the workplace and monitoring of conditions under which employees on the project are</li> </ul>

	subjected.
Developer (Ministry of Water and Environment/ Rural Water Supply and Sanitation Department)	<ul style="list-style-type: none"> <li>▪ Apply for Surface Water Abstraction Permits from DWRM.</li> <li>▪ Compensate local Project Affected Persons (PAP) for any loss or negative effect of the project before implementing the project.</li> <li>▪ Implement mitigation measures and actions to protect the environment and monitor implementation of proposed measures in the specific site- ESMPs.</li> </ul>
Contractor	<ul style="list-style-type: none"> <li>▪ The Contractor(s) must include in their schedule of works, all proposed mitigation measures.</li> <li>▪ The Contractor(s) must have designated personnel (Supervising Consultants) to monitor environmental, safety and health matters during construction works, and report regularly to the Developer.</li> <li>▪ 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.</li> </ul>

## 3 PROJECT DESCRIPTION

### 3.1 LOCATION OF THE PROPOSED PROJECT

The water supply area of the proposed Bitsya piped water supply system is located in Bitsya Sub County with an area of 63.78 km<sup>2</sup> and Karungu Sub County with an area of 50.28 km<sup>2</sup> (with an LC III administrative status) in Buhweju District. Buhweju Town is about 49 km from Kabwohe located along the Mbarara-Buhweju road. Under the Government of Uganda decentralization policy, the delegated political guidance, policy formulation and legislative authority is vested in the directly elected Local Council III Chairman together with the Councillors. The administrative affairs of the sub county are handled by a Sub-County Chief, who is also the head of the subordinate civil servants. The project targets to serve the six parishes in two sub counties with a total of 51 Villages (Local Council I).

Buhweju District was carved out of Buhweju district in July 2010. The District has a land area of 700.6 square kilometres and population of 126,200 with 62,400 females and 60,200 Males with the average house hold size of 5.4, with a total of 15,353 households. The literacy levels are at 64.1% females and 78% male according to a projection by UBOS statistics. The district found in a hilly environment with farming as the main activity undertaken by the residents is comprised of 8 sub counties and one town council. The water supply area of the proposed BWSS is located in Bitsya and Kurungu Sub Counties in Buhweju district. Table 9 below summarizes the project area beneficiaries:

Table 9: Proposed Water Supply Areas

Sub County	Parish/Supply area	Proposed Villages (to be supplied)
Bitsya	Bitsya	Bitsya, Rujjuga, Kasana, Kanoni, Kakuto, Muzigure, Kibandama, Kabutega, Kazirwa A, Kazirwa B.
	Kitega	Kitega I, Kitega II, Karingoma A, Karingoma B, Kyanzi, Kanyabitta, Nyakabungo
Karungu	Karungu central	Nyabugando A, Nyabugando B, Ntoboora A, Ntoboora B
	Kasharara	Karungu I, Karungu II, Rwankondo, Kyeshero 1, Bishenyi, Ahambuga, Ibogora, Kasharara 1, Kyeshero 2, Kabare, Kasharara 2
	Katara	Nyakasa, Nyakitoma, Rwemisha, Kamukaki A, Kamukaki B, Mutojo, Kyesika, Nyakahanga B, Kamahanda, Nyakahanga A
	Rugongo	Rugarama A, Rugarama B, Ekinoni, Nyakakongi, Nyangoma, Ryakabunu, Kabingo, Buturo, Rugongo Central

Figure 1 below presents the project areas.



Figure 1: Maps of Uganda showing the location of Buhweju District - Project Sub-Counties.

## 30 3.2 PROJECT DESCRIPTION AND DESIGN

### 3.2.1 Design Criteria and Standards

Based on the detailed Engineering Design Report (January 2022), the following design criteria and standards were followed. The design criteria adopted for the detailed design of the Water Supply System were based on the requirements stipulated in the Consultancy Services Terms of Reference and in accordance with various design standards of countries in the East African region as described in the following sections in this chapter.

a) *Water Treatment Plant Output*

Design output capacity of 2,200m<sup>3</sup>/day.

b) *Water Source*

River Nyarwambu is the source due to its reliability with a dependable flow of 0.11m<sup>3</sup>/s.

c) *Raw Water Abstraction*

The raw water abstraction to comprise of intake works, raw water pumping station and raw water pumping mains sized to deliver 2,200m<sup>3</sup>/day operated for 20 hours.

Raw water pump(s) to be installed in duplicate to allow time for resting of the duty pump(s) and for standby precaution.

The number of standby pumps provided is 50% of the number of the duty pumps.

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Intake weir designed for 50 year return period flood flow of  $3.3\text{m}^3/\text{s}$  based on the following formula for the broad crest weirs.

$$Q = 1.7.C_v.b.h^{3/2} \text{ (Reference AC Twort, Second Edition, Section 3.4)}$$

*Broad Crest Weir Formula*

Where;

- Q = Flow rate,  $\text{m}^3/\text{s}$
- $C_v$  = Velocity Coefficient
- b = Effective Width of Weir, m
- h = Effective head, m

d) *The justification for the proposed water treatment units:*

- High Colour and Turbidity needs a coagulation dose of  $25\text{mg/L}$  and clarification for effective removal of turbidity and Colour to required levels i.e Turbidity, 1.5 NTU and Colour 10 Ptco based on the Jar test done.
- High levels of Faecal Coliforms. This calls for disinfection by chlorination, after filtration.
- pH correction is also needed after filtration in order to improve potability and protect network lines (from 5.60 to 6.70) hence a dose of  $2.00\text{mg/l}$ , Sodium carbonate solution.
- The results of the raw water tests indicated that the iron content is on the margin. Hence considering future changes and probable increase of Iron levels as more rains influence increase in Iron content by erosion and rocks weathering, it is better to include aeration before clarification.

e) *Water Treatment Process*

A conventional treatment process providing full treatment is adopted comprising of the following unit operations and processes in sequence:

- Aeration: this treatment step will oxidize iron, aluminium and possibly manganese (Mn) present in the raw water to facilitate removal in downstream treatment steps. Aeration will also aid in the removal of taste and odour causing constituents which may be also present;
- Coagulation (cationic polyelectrolyte): to facilitate removal of turbidity and colour;
- Flocculation: gentle mixing of the chemically-dosed water will be provided by hydraulic means in a serpentine style configuration to promote the development of larger size floc particles which can be readily removed by gravity clarification (settling), clarification: using rectangular, horizontal flow settling basins, fitted without sludge scraper mechanism, to settle out flocculated solids;
- Filtration: to provide final polishing of the clarified water and to act as positive barrier against chlorine resistant parasites which may be present, especially *Cryptosporidium* and *Giardia*;
- Disinfection: of the filtered water by dosing of calcium hypochlorite followed adequate contact time to ensure that it is safe for consumption.

The capacity of the treatment units are based on the plant capacity of the maximum water demand of  $2,200\text{m}^3/\text{day}$  respectively.

f) *Chemical Dosing*

Chemical dosing will comprise aluminium sulphate (alum) for coagulation (for surface waters) and chlorine dosing for disinfection for surface water using gravity dosers in order to minimize potential problems with electrical feeding pumps and save on electricity costs.

In the absence of local data typical dosing rates would be:

- 10 - 80 g/m<sup>3</sup> for alum (use 40 g/m<sup>3</sup> for study as average throughout the year)
- 1 - 4 g/m<sup>3</sup> for chlorine (use 3 g/m<sup>3</sup> for design)

The dosing of calcium hypochlorite will follow the design criteria below:

- **Chlorine solution strength** - **10%**
- Effective chlorine content - 65%
- Specific gravity of hypochlorite solution - 1.1.

*g) Treatment Plant Loadings*

The following loadings of the treatment units were adopted from the Water Supply Design Manual, Ministry of Water and Environment (Uganda) 2013 have been applied.

Cascade Aerator:	Surface Loading	35 m <sup>3</sup> /m/hr
	Number of steps	4-6 Steps
Multiple Tray Aerator:	Surface Loading	70 m <sup>3</sup> /m <sup>2</sup> /hr
	Number of trays	4 – 8 trays
	Tray Interval	300 – 500mm
Flocculator/Coagulator:	Channel Flow Velocity	0.1-0.3 m/s
	Velocity gradient, G	30-60 s <sup>-1</sup>
	Detention time, t	900-1200 s
Horizontal flow clarifier:	Surface Loading	1.2 - 1.5 m <sup>3</sup> /m <sup>2</sup> /hr
	Detention Time	1 – 3 hours
Rapid gravity filter:	Filtration rates	5 – 15 m <sup>3</sup> /m <sup>2</sup> /hr
	Backwash water rate	40 m <sup>3</sup> /m <sup>2</sup> /hr
	Air scour rate	60 m <sup>3</sup> /m <sup>2</sup> /hr
Lamella Plates:	Plates inclination	45-55°
	Plate spacing	50 – 100mm

*h) Power for Pumping*

The power requirement of a water pumping system is given by:

$$P = \frac{\rho \times g \times Q \times H}{3600 \times e}$$

Where:

- P** = **Power required (watts-hours/day)**
- g** = Acceleration due to gravity = 9.8m/s<sup>2</sup>
- ρ** = Density of water = 1000 kg/m<sup>3</sup>
- Q** = Daily water requirement (m<sup>3</sup>/d)
- H** = Total pumping head (m)

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$e$  = Overall mechanical efficiency of the system

Power supply will be grid power as primary source and a prime generator as secondary source.

i) *Water Storage*

Storage reservoirs are required to store water to form a balance between continuous supply and day demand in the distribution area. A storage capacity of at least 30% of the maximum demand will be provided in the system.

j) *Hydraulic Calculations*

- Head loss

If the design flow rate (Q) and the velocity of flow (v) are known, the required size of the water pipe is computed using the Darcy-Welsbach head loss Formula.

$$H_L = \frac{fLv^2}{2Dg}$$

Where:

$H_L$  = Head loss (m)

$g$  = acceleration of gravity in (m/s<sup>2</sup>)

$L$  = pipe length (m)

$D$  = pipe diameter (m)

$v$  = flow velocity (m/s)

$f$  = friction factor (unit less)

The friction factor,  $f$  is a function of ( $e/D$ ) and the Reynolds number, where  $e$  is a roughness coefficient (measure the wall roughness of the pipe, with units of length).

The calculation for the pumping mains has been determined using the Hazen Williams formula below.

$$Q = K.C.A.R^{0.63}.S^{0.54}$$

Where:

Q	=	Flow rate	m <sup>3</sup> /s
K	=	Conversion factor to SI units	= 0.85
C	=	Coefficient	
A	=	Flow area	m <sup>2</sup>
R	=	Hydraulic radius	= D/4 m
S	=	Head loss	m/m

- Pipe roughness

The pipe roughness coefficient is dependent on a number of factors, including the type of pipes, corrosiveness of the water, and the age of the installation. The C-values of 90-110 for steel and 140-150 for plastic pipes have been adopted based on the MWE Water Supply Design Manual of Uganda.

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- Design software

The above-mentioned values and formulas have been used within a hydraulic network calculation program EPANET 2 (Water Supply and Water Resource division, US Environmental Protection Agency, Cincinnati Ohio). This is an internationally recognized computer program to calculate the performance of water supply networks under various conditions. EPANET performs extended period simulation of hydraulic behaviour within pressurized pipe networks.

*k) Flow velocities*

Velocities in the primary distribution pipes should be between 0.5 m/s and 1.5 m/s. A minimum velocity of 0.5 m/s should be a design goal, only in exceptional case however should the velocity be less than 0.2 m/s. Secondary distribution pipes should have a velocity of more than 0.2 m/s. It is preferable to limit the dynamic head loss to 5 m/km as much as possible.

*l) Pipe materials*

HDPE or uPVC pipes which are Flexible plastic pipe are preferred because they are corrosion-resistant and their flexibility protects the system against uneven settlement. Pipeline of 100 mm diameter and below are to be HDPE pipe unless site conditions dictate otherwise. DI or steel pipes will be used for pipe diameters larger than 400mm and at stream crossings, rough terrain and for installation of the pipeline above ground surface.

*m) Pressures*

The operating head of water in the pipeline under peak flow conditions should never be less than 5m. The pipe material must be strong enough to withstand the highest pressure that can occur in the pipeline. The maximum pressure rarely occurs under operating conditions. It is the static pressure when the flow is closed that governs. Suitable pipe classes for the maximum static pressure will be selected.

Also, it is important to maintain sufficient pressure in the distribution system in order to protect it against contamination through seepage of polluted ground or surface water. The minimum pressure in the distribution network that is still thought to be acceptable is 15 m, even at conditions of maximum demand for water. A system that is constantly under pressure is a guarantee that no groundwater or air can enter the distribution network by seepage in case of leaks. The following pressure requirements should be applied:

- Minimum distribution pressure = 15 m
- Minimum transmission pressure (secondary pipes) = 5 m
- Minimum operating pressure at tap points = 4 m
- Maximum working pressure 100 m with class PN 10
- Under peak hour flow and with reservoir fully drawn down pressures to be not less than 5 m.
- Under zero flow pressures not to exceed 100 m (use break pressure tanks and not pressure reducing valves where pressures exceed 100 m).
- Pipelines of 100 mm diameter and below are to be HDPE pipe unless site conditions dictate otherwise.

*n) Appurtenances*

- Air valves

Air valves serve mainly three purposes, namely:

- To release air from the pipeline during the filling process
-

- To release air from the pipeline during the normal operation of the water supply
- To allow air to enter the pipeline in order to prevent the occurrence of a vacuum

Anti-shock and anti-surge (triple action) air valves are proposed to be installed at all high points with respect to the pipeline profile and hydraulic gradient. Furthermore, it shall be ensured that there is at least a minimum of one air valve for every 1,000m of pipeline to prevent air accumulation. All air valves shall be equipped with isolating valves for easy removal and repair of the air valves.

- Isolating and Section valves

Isolating valves shall be installed at each branch. Section valves should be located every 2 or 3 km along main pipelines. Whenever possible the section valves should be placed in a joint valve chamber with air valves or washouts and upstream of these valves. All branch pipelines should have section valves at their points of connection to the main pipelines. Wherever the siting of a section valve brings it adjacent to an air valve or a washout, the section valve should be installed upstream of and in the same chamber with the air valve or the washout.

- Washouts

Washouts should be placed only at accentuate low points on pipelines of inside diameter DN 80 or larger. In this context it may be considered that a low point is accentuate if the succeeding major high point is situated 10 m higher. Assuming a shear stress of 10 N/m<sup>2</sup> on the walls of the main pipe and an available pressure of 0.1- 0.2 MPa the diameter, d, of the washout should be:

- d = 0.6 D if the upstream and the downstream sides of the main are washed simultaneously.
- d = 0.4 D if only one side is washed at a time

Where:

**d** = **diameter at the washout (mm)**

**D** = diameter of the main pipe (mm)

There shall be a valve only on the washout pipe and not on the main pipeline unless the valve can be combined with a section valve. There shall be an open drain leading the water from the washout to a suitable steam or discharge point nearby.

*o) Water points*

Households and institutions that would like to have private connections or yard taps shall have to apply for the water connections and will be provided with the same at a fee. Those that cannot afford a connection will obtain water from yard taps in the neighborhood or at public stand pipes.

*p) Access roads*

The access road to the water treatment works is designed to Class C gravel in accordance with Ministry of Works and Transport Road Design Manual.

*q) Structural Engineering Design*

The structural engineering designs are based on the following design standards:

- EN 1992 - 3 (2006) : Eurocode 2 – Design of Concrete Structures - Part 3 Liquid retaining and containment structures
- BS 8110 – Design of Reinforced Concrete Structures for other structures
- BS 8002: 1994 Code of Practice for Earth Retaining Structures
- BS8007 1987 Code of Practice for Design of Concrete Structures for Retaining Aqueous Liquids

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r) *Electrical Installations*

Electrical installation designs are based on the following standards:

- BS 3676 - Lighting Switches
- BS 4782 – Control gear ballast/choke for capacitor correction
- BS 5424 – Electromagnetic Air Break type contactor
- BS EN 62305 – Lightning protection
- EN 62208 Earthing Protection
- BS EN 50525 – 1384 IEE Wiring Regulations
- BS EN 7071 – 17671 IEE Wiring Regulations
- BS 6004 Non-armoured Cables

s) *Fire Fighting*

Portable fire extinguishers are recommended for firefighting.

### 3.2.2 Water Abstraction and Intake Works

The proposed abstraction and intake works for the raw water from River Nyarwambu is composed of the following components: (a) Intake weir across the river, (b) Raw water collection channel, (c) Intake sump, (d) Raw water pumps, (e) Raw water abstraction main and (f) High rise main.



*Plate 1: Proposed site for the intake/Abstraction point along River Nyarwambu*

The following components of the proposed water supply have been designed according to the design criteria. The designing involved hydraulic designs and sizing of the system components with due consideration of best practice. The components of the intake works include the following:

- **Intake weir** - **A reinforced concrete broad crest weir**
  - **Intake channel** - Channel to be lined with reinforced concrete
  - **Intake sump** - Sump to be constructed in reinforced concrete
-

- 
- Raw water pump
    - Q = 160 m<sup>3</sup>/hr
    - H = 30m
  - Pump house
    - Pump house of floor area 7.2 x 10m to house both the raw water pumps and the treated water pumps.
  - Raw water mains
    - DN 200mm DI, 150m length pipeline

### 3.2.3 Water Treatment Works

A conventional water treatment works of output capacity equivalent to the projected maximum day demand of 2,200 m<sup>3</sup>/day sized for 20hour/day production is proposed comprising of the following plant:

- Aerator
- Flocculation/ Coagulation Unit
- Clarifiers
- Rapid sand filters
- Disinfection / Chlorination
- 125m<sup>3</sup> hot pressed steel section panel water storage tank elevated 6m above ground level to double as backwash tank and service water for the water treatment works
- Treated water tank
- Treated water pumping station
- Air blowers for the backwash system
- Surge protection unit
- Electrical installations
- Mechanical Installations including chemical mixing equipment
- Unit interconnection pipework including control valves
- Chemical dosing equipment
- Sludge drying beds

The details of the sizing of the above components are in the subsequent sections of this ESIA report. As a general design principle, all major process units (chemical feeders, mixing basins, flocculation tanks, clarification tanks and filters) which require frequent servicing or cleaning should be provided at least in duplicate. Clarification tanks and filters should preferably be provided in triplicate, in order to limit the temporary overloading when one unit is being serviced.



*Plate 2: The proposed site for the Water Treatment Plant near the intake point*

#### a) Ancillary Buildings

The following buildings are necessary for the operation of the water works;

- Pump/Air Blower house
  - 7 x 14m room dimension to house both the raw water and treated water pumps
  - 2 x 3m room dimensions abutting to the pump house for the air blowers
- Chemical stores
  - 6 x 6m building equally partitioned for the coagulation and disinfection chemicals storage
- Office building
  - For the water supply system operation staff.
- Laboratory
  - For the laboratory activities for water quality monitoring and quality control.

#### b) Power supply

Buhweju District experiences unstable power supply as was observed during the study. Hence, two alternative sources of power supply have been considered for the running of the water treatment plant, viz;

- Grid power
- Generator sets

Grid power is to be the primary source and prime generator as secondary source. A 3-phase grid power line of 500m length will be extended to the water treatment works by the utility owners. This will be under a provisional sum to be included in the bills of quantities. A prime generator set of 250KVA is recommended as the secondary source of power for the water treatment works and a 90 KVA generator set for Kasharara Booster Station.

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### c) Sludge Management System

The sludge from the clarifiers will flow by gravity to sludge drying beds sized to serve one clarifier unit at a time. The dried sludge can be sold to the farmers for soil conditioning for the gardens or disposed of at a designated sanitary landfill site in Buhweju and or Mbarara District.

The sludge drying beds have been designed to allow for filtration of the liquid component prior to discharge into the river. The system is composed of a 600mm deep filtration medium with 150mm thick coarse gravel (20-40mm) laid at the bottom, 150mm thick medium gravel (10-16mm) middle layer and 300mm thick coarse sand top layer. The typical treated effluent from the sludge drying beds meets discharges standards in accordance with Part II on Standards for Effluent<sup>3</sup> in the *National Environment (Standards for Discharge of Effluent into Water or Land) Regulations, 2020 (Under section 179 of the National Environment Act No.5 of 2019)*, the Operator for Bitsya water supply system will ensure that, the effluent meets the standards for effluent before discharge into water or land as prescribed in the above mentioned Regulations (as provided for under Schedule 2 and Schedule 3 of the above mentioned Regulations).

Furthermore, the Operator under Regulation 9 is expected to apply to the lead agency responsible for water resources for an effluent discharge permit (as provided under Schedule 5 of the mentioned Regulations).

### d) Site drainage

The site drainage system is to cater for the disposal of the wash water/wastewater and stormwater from the following facilities at the water treatment works to safe outfall:

- Sludge from the flocculator and clarifiers - Comprising of inspection manholes and OD 160mm uPVC pipes and draining to the Sludge drying beds.
- Filter backwash water and leachate from the sludge drying beds - The typical treated effluent meets discharges standards in accordance with Part II on Standards for Effluent in the National Environment (Standards for Discharge of Effluent into Water or Land) Regulations, 2020. It is discharged through OD 160mm uPVC pipes to the River Nyarwambu.
- Wastewater from the offices, washrooms, the laboratory staff and housing accommodation - Comprising of inspection manholes and OD 100mm uPVC sewer pipes and draining into a septic tank with a soak away pit.
- Storm water - Open channel drains draining into River Nyarwambu.

Figure 2 is a schematic diagram for illustration of the water works site drainage system.

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<sup>3</sup> "effluent" means liquid, including agricultural, domestic and industrial wastewater, discharged, either treated or untreated, directly or indirectly into the environment

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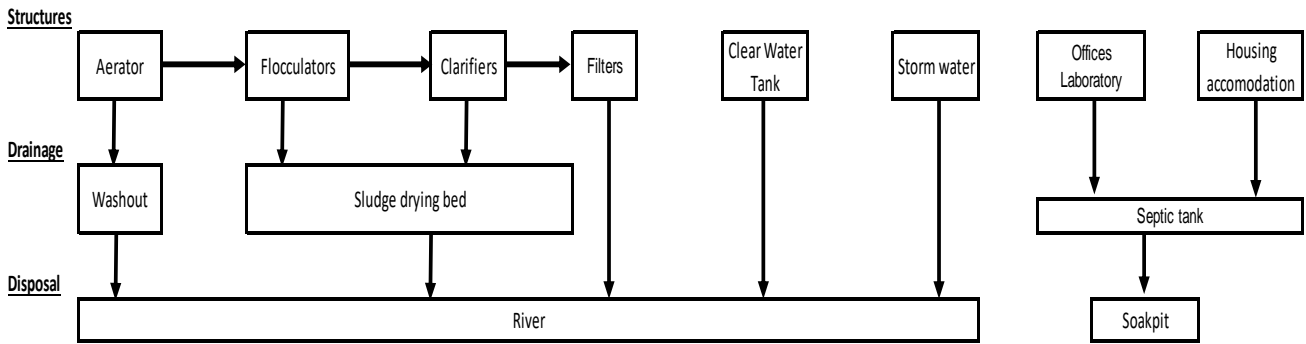


Figure 2: Schematic of Water Works Site Drainage System

e) External Works

The external works at the water treatment works include the following:

- Access road and parking
- Landscaping
- Chain-link fencing on concrete posts,
- Metallic frame gate and guard house
- Walkways paved with 80mm thick pre-cast concrete pavers laid on well compacted gravel earth material and sand base material.
- Stone masonry retaining walls

f) Treated water main

The treated water main comprises of:

- 3.6km long DN 200mm PN25 DI pipeline provided with washout valves installed in reinforce concrete chambers at strategic location to facilitate easy draining of the pipeline when required and air valves at pronounce high points and crest locations and at intervals of not more than 1.0km along the mains.
- Reinforced concrete pipe anchor blocks provided at the horizontal and vertical bends and at tees to bear the thrust forces in the pipeline to prevent dislodgment of the pipe and the fittings to resist respective axial thrust.

The standard detail of the washout and air valve chambers and the anchor blocks are included in the book of drawings.

g) Water storage / balancing reservoir

The water storage reservoirs have been sized with the capacities for at least 30% of the maximum day demand in Table 10.

Table 10: Water Storage Reservoirs

Tank location	Demand area	Average Demand	Max. Demand	Required tank capacity	Rounded capacity	Adopted Capacities
		m <sup>3</sup> /d	m <sup>3</sup> /d	30%	m <sup>3</sup>	m <sup>3</sup>
Bitsya	Bitsya	284.13	369.37	110.81	176.18	<b>180.00</b>
	Kitega	167.61	217.89	65.37		
Karungu	Karungu Central	184.87	240.33	72.10	199.25	<b>200.00</b>

Tank location	Demand area	Average Demand	Max. Demand	Required tank capacity	Rounded capacity	Adopted Capacities
		m <sup>3</sup> /d	m <sup>3</sup> /d	30%	m <sup>3</sup>	m <sup>3</sup>
(Kabingo)	Katara	326.02	423.83	127.15		
Kasharara	Kasharara	326.35	424.25	127.28	127.28	<b>150.00</b>
Main tank	Rugongo	304.85	396.31	118.89	370.24	<b>400.00</b>
	Balancing capacity to feed 50% the above tanks			251.35		
<b>Total storage capacity</b>					<b>872.95</b>	<b>930</b>

All the above tanks are to be ground tanks to be installed on dwarf reinforced concrete walls 1.5m above ground level with a reinforced concrete mat foundation. The tank elevation is based on the required residual pressures in the distribution mains. All proposed tanks are basically ground tanks to avoid excessive residual pressures. The raise of 1.5m on dwarf walls is for ease of operation and accessibility to the tank drain pipework which is rendered difficult in case the steel panel tank was founded on a ground slab.

### 3.2.4 Pumping Stations

The pumping stations are comprised of the following:

Table 11: Composition of the Pumping Stations

Parameter		Location
<b>Raw water pumps:</b>		Water Treatment Works
	2 No.	
• Duty pumps	1 No.	
• Standby pumps	1 No.	
Capacity of each pump	110 m <sup>3</sup> /hr	
Pumping head	30 m	
<b>Treated water pumps :</b>		
	2 No.	
• No of duty pumps	1 No.	
• No of standby pumps	1 No.	
Capacity of each pump	110 m <sup>3</sup> /hr	
Pumping head	270 m	
<b>Kasharara booster pumps :</b>		Hambuga
	2 No.	
No of duty pumps	1 No.	
No of standby pumps	1 No.	
Capacity of each pump	45 m <sup>3</sup> /hr	
Pumping head	230 m	

Grid power is to be the primary source of power and prime generators as secondary source for the pumping stations. 3-phase grid power lines of 500m and 1km lengths will be extended to the water treatment works and to Hambuga location respectively. Prime generator sets of total 250KVA for the water treatment works and that of Kasharara booster station of 90KVA are recommended for secondary power sources. Surge vessels are to be provided for the protection of the pump station against pressure surges in case of abrupt stoppage of the pumps.

## 3.2.5 Transmission Pipelines

The treated water pumping main comprises of DN 200mm PN25 DI 3.54km long pipeline provided with washout valves installed in reinforce concrete chambers at strategic location to facilitate easy draining of the pipeline when required and air valves at pronounce high points and crest locations and at intervals of not more than 1.0km along the mains. Reinforced concrete pipe anchor blocks are provided at the horizontal and vertical bends and at tees to bear the thrust in the pipeline to prevent dislodgment of the pipe and the fittings. The designed transmission pipelines from the main tank at Rugarama delivering water to various locations are summarized below.

Table 12: Specifications of the designed transmission pipelines from the main tank at Rugarama

Gravity mains	Nominal Diameter (mm)	Pressure Rating	Pipe Material	Length (m)	
Transmission line 1 (Rugarama to Karungu)	OD 280	PN 10	uPVC	1,900	6,100
	OD 250	PN16	uPVC	625	
	DN 250	PN 25	DI	2,675	
	DN 200	PN 25	DI	900	
Transmission line 2 (Karungu to Bitsya)	OD 180	PN 16	HDPE	3,716	6,448
	OD 125	PN 16	HDPE	2,732	
Transmission line 3 (Branch main off Transmission Line 1 to Kabingo)	ND 200	PN 25	DI	1,425	3,450
	OD 225	PN 10	uPVC	2,025	
<b>Total length of gravity transmission line lines</b>					<b>15,998</b>

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### Booster Mains

Booster pumping main to Kashaarara Tank	DN 150	PN25	DI	3,600m
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## 3.2.6 Water Tanks

The following reservoirs are proposed in the detail design. A main reservoir of 400 m<sup>3</sup> ground pressed section steel panel tank supported on reinforced concrete dwarf walls with a mat foundation structure has been proposed at Kamukachi Hill as a balancing tank for the ultimate year with the following three satellite tanks:

- 1 No. 200 m<sup>3</sup> at Kibingo Karungu Sub County to serve Katara Parish
- 1 No. 180m<sup>3</sup> at Bistya
- 1 No. 150m<sup>3</sup> at Hambuga in Kashaarara parish



Plate 3: One of the proposed sites for the Reservoir tank at Kamukachi hill

### 3.2.7 Distribution Pipelines

The designed distribution pipelines are summarized below.

Table 13: Specifications of the designed distribution pipelines

Tank	Diameter (mm)	Pipe material	Length (m)
Bitsya Tank supply area network	OD 160	uPVC	230
	OD 110	HDPE	2,187
	OD 90	HDPE	513
	OD 75	HDPE	1722
	OD 63	HDPE	4300
	OD 50	HDPE	3790
	OD 40	HDPE	1812
Kabingo Tank supply area	DN 200	DI	1675
	OD 225	uPVC	1500
	OD 280	uPVC	1800
	OD 140	uPVC	1150
	OD 125	HDPE	4775
	OD 90	HDPE	8250
	OD 63	HDPE	487
	OD 50	HDPE	3088
OD 40	HDPE	1075	
Kasharara Tank supply area	OD 160	HDPE	3,600
Rugongo supply area	OD 180	uPVC	1,350
	OD 125	uPVC	800
<b>Total length of distribution lines</b>			<b>44,104</b>

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### 3.2.8 Sanitation

A lot more wastewater is expected to be generated when the sanitation systems are installed. Properly designed and constructed soak away pits are the recommended option for households, private and public institutions that are without water borne sewerage system for the disposal of the wastewater.

Well designed and constructed lined pit latrines are recommended for households, private and public institutions without water borne sewerage system for faecal waste disposal. Promotional and sensitisation campaigns are necessary in the project area for the proposed interventions.

Households and institutions without plumbing fixtures will continue using pit latrines for human faecal waste disposal. Households and institutions with water borne sanitation facilities and private water service connection are expected to have septic tanks for faecal waste treatment. The above facilities should be private installations. Households and institutions should be encouraged to construct lined pits that can be emptied when filled. Line pit latrines save on cost and space in constructing new latrines when the old ones are full. The pit lining also minimizes ground water pollution in the area. Consideration for allocation of sanitation facilities is proposed to be distributed between schools and HCF's as follows:

- 2 No. water borne toilet facilities with septic tanks for the three government health centres
- 5No. 5-stance lined VIP toilet blocks for the following schools i.e. Bitsya Primary School, Rugongo Primary School, Kasharara Primary School, Ibogora Community Primary School and, Kihabure Town School, Public places such as taxi / bus parks, market places and stadia need to be provided with public water borne sanitation facilities. The maintenance of the public sanitation facilities should be the responsibility of the authorities of the respective public places.

Table 14: Location of Public Toilet Facilities

#	Toilet Site Name	Institution	Location (Village, Parish, Sub County)	Remark
1.	Bitsya Health Centre II	Bitsya Health Centre II	Kasana, Bitsya, Bitsya	For Rehabilitation (10 X 10 metres)
2.	Karungu Health Centre III	Karungu Health Centre III	Nyabugando A, Karungu Central, Karungu	For Rehabilitation (10 X 10 metres)
3.	Bitsya Primary School Toilet Site	Bitsya Primary School	Kanoni, Bitsya, Bitsya	For Rehabilitation (10 X 10 metres)
4.	Rugongo Primary School	Rugongo Primary School	Rugarama A, Rugongo, Karungu	New Toilet Facility (10 X 10 metres)
5.	Kasharara Primary School	Kasharara Primary School	Kabare, Kasharara, Karungu	New Toilet Facility (10 X 10 metres)
6.	Ibogora Community Primary School	Ibogora Community Primary School	Kyeshero, Kasharara, Karungu	New Toilet Facility (10 X 10 metres)
7.	Kihabure Town School	Kihabure Town School	Kyeshero, Kasharara, Karungu	New Toilet Facility (10 X 10 metres)

### 3.2.9 Pipe materials

Pipe materials commonly used in Uganda include ductile iron (DI), steel, galvanized steel (GS), unplasticized polyvinyl-chloride (uPVC) and High Density polyethylene (HDPE). The suitability of a given pipe type for a particular application is influenced by the following factors:

- Its availability on the market in respect of sizes and pressure classes.
- Its cost price and that of its associated valves and fittings.
- Susceptibility to corrosion, mechanical damage, ageing and other causes of material deterioration.
- Storage costs.
- Ease of transportation.

The design team recommended use of HDPE for piped of diameter of utmost OD 90 mm, while uPVC for larger diameters Bitsya piped water supply based on the above factors. The minimum piped pressure rating we have recommended is PN10 because pipes with a pressure rating of PN 6 have lower thickness and prone to damage although they can be used when the static pressure is less than 50m.

### 3.2.10 Standards

The materials that will be specified for implementation of the scheme shall meet the relevant ISO specifications especially imported otherwise the materials must meet the national standards of the country in which they are manufactured and shall not be lower than the corresponding BS specifications. The existing UNBS, BS, ISO standards and also new standards by the same institutions will also be taken into account in the design of the water supply infrastructure.

The Civil Engineering standard method of measurement issued by the Institution of Civil Engineers, London, CESMM3, 1995 or an updated version CESMM4, 2012 shall be used as the standard for the preparation of bills of quantities in civil engineering work in Uganda unless a different method is stated and modified to suit local conditions.

### 3.2.11 Summary of Design Outputs

Below is a summary of the design outputs for the water supply system components meeting a daily production capacity of 2,200m<sup>3</sup>/d when operated for 20 hours in a day.

a) *Intake Weir*

Broad crest weir details are as summarized in Table 15.

Table 15: Broad Crest Weir Details

Parameter	
• 50 years return period design flow	3.3m <sup>3</sup> /s
• Effective width of weir	10m
• Effective head	0.32m
• Free board	0.5m
• Height of weir above river bed	1.5m
• Length of weir axis including wing walls	40m

b) *Intake Channel and Sump*

Intake channel and sump details are as summarized in Table 16.

Table 16: Intake Channel and Sump Details

Parameter	
Intake channel	

Parameter	
• Channel Width	1.0m
• Water depth in relation to the height of weir	1.5m
• Freeboard	0.5m
• Length of channel	10m
<b>Intake sump</b>	
• Length	1.25m
• Width	1.0m
• Water depth	2.5m
• Freeboard	0.5m

c) *Raw Water Pump and Transmission Mains*

Raw water pump and pipe details are as summarized in Table 17. Two pumps are designed, one duty and one standby. The pumps will be operated in turns of 5 hours intervals during the 20hours system operation.

Table 17: Raw Water Pump and Transmission Mains Details

Parameter	
No. of raw water pumps	2
No of duty pumps	1
No of standby pumps	1
Capacity of each pump	110 m <sup>3</sup> /hr
Pumping head	30 m
Raw water transmission pipeline Size (mm) and Material	DN 200mm DI
Flow velocity, V	0.97m/s
Raw water transmission pipeline length	150m
Power requirement for duty pump	12.85 KW
Total power control demand capacity	20.6 KW
Power factor	0.8
Capacity of prime generator set required	30 KVA

d) *Treated Water Pump Design (From Clear Water Well to the Storage Reservoir)*

Treated water pumps and mains design details are as Table 18. Two pumps are designed, one duty and one standby. The pumps will be operated in turns of 5 hours intervals during the 20 hours system operation.

Table 18: Treated Water Pump Design Details from clear water well to storage reservoir

Parameter	
No. of pumps	2
No of duty pumps	1
No of standby pumps	1
Capacity of each pump	110 m <sup>3</sup> /hr

Parameter	
Pumping head	270m
Raw water transmission pipeline Size (mm) and Material	DN 200mm DI
Flow velocity, V	0.97m/s
Treated water transmission pipeline length	3,540 m
Power requirement for each pump	115.6 KW
Total power control demand capacity	185.0KW
Power factor	0.8
Capacity of generator set required	250 KVA
Surge protection vessel recommended for the pumping station	

e) *Treated Water Booster Pump Design (From Elevated Reservoir into Distribution Network) Kasharara Parish*

Booster pump and mains details to Kasharara reservoir are as per Table 19. Two pumps are designed, one duty and one standby. The pumps will be operated in turns of 5 hours intervals during the 20hour system operation.

Table 19: Treated Water Booster Pump Design to Kasharara Reservoir

Parameter	
No. of pumps	2
No of duty pumps	1
No of standby pumps	1
Capacity of each pump	45 m <sup>3</sup> /hr
Pumping head	230 m
Water transmission pipeline Size (mm) and Material	DN 150mm DI
Flow velocity, V	0.71m/s
Treated water transmission pipeline length	3,600m
Power requirement for each pump	40 KW
Total power control demand capacity	64.5 KW
Power factor	0.8
Capacity of generator set required	90 KVA

f) *Aerator*

Aerator design details are as per Table 20.

Table 20: Aerator Design Details

Type of Aerator – Reinforced concrete Cascade Tray Aerator	
Surface loading	70 m <sup>3</sup> /hour/m <sup>2</sup>
Total aeration bed area	2.29 m <sup>2</sup>
No. Trays (with perforated bottoms at intervals of 300 – 500 mm)	4 no.
Unit tray area	0.57 m <sup>2</sup>
Top Tray No. 1 diameter, d	1.00 m Adopted 1.00 m
Tray No. 2 diameter, d	2.00 m
Tray No. 3 diameter, d	3.00 m
Tray No. 4 diameter, d	4.00 m

<b>Type of Aerator – Reinforced concrete Cascade Tray Aerator</b>	
<b>Outlet pipe diameter design</b>	
Design pipe diameter	200 mm
Adopted pipe diameter (based on the interconnection pipework design)	DN 300 mm DI
Flow velocity, V	0.43 m/s

g) *Flocculation Tanks*

Flocculator design details are as per Table 21.

Table 21: Flocculation Tank Design Details

<b>Reinforced concrete Mixing Channel</b>	
Number of units	2 No
Flow length of each mixing channel per unit	6.0 m
Channel Width	0.5 m
Depth of flow	0.75 m
Freeboard	0.5 m
Channel flow velocity	0.06 m/s
No. of baffles	4 No
<b>Reinforced concrete Vertical Flow Flocculation Chamber</b>	
Number of units	2 No
Length of each unit	5.0 m
Width	2.5 m
Depth	2.4m
No. of baffles	3 No

h) *Clarifiers*

Clarifier design details are as per Table 22.

Table 22: Clarifier Design Details

<b>Reinforced concrete Clarifier Units</b>	
Total No. of Clarifiers	4No
Dimensions of each unit	
• Width	3.0m
• Length	9.0m
• Depth	3.25 m
• Tank floor slope	2%
Surface loading for all 4 units in operation	1.02 m <sup>3</sup> /m <sup>2</sup> /hr
Detention period	2.45 Hours
Surface loading of 3 units in operation to allow maintenance of one unit	1.36 m <sup>3</sup> /m <sup>2</sup> /hr
Detention period	1.88 Hours

i) *Rapid Sand Filters*

Rapid sand filters design details are as per Table 23.

Table 23: Rapid Sand Filter Design Details

<b>Reinforced concrete rapid sand filters</b>	
<b>Total No. of filter units</b>	<b>3No</b>
Dimensions of each unit	
• Width	2.0m
• Length	4.0m
• Depth	3.0m
• Total area of filter bed	24.0m <sup>2</sup>
Filter medium depth	1.0m
Effective Grain Size range	1.2mm
Height between filter medium & bottom of wash-water troughs	1.0m
Filtered water collection system (per filter unit):	
• Diameter of manifold pipe	300mm
• Number of lateral pipes	64No
• Diameter of lateral pipes	40mm
• Length of lateral pipes	800mm
• Spacing of lateral pipes (centre to centre)	120mm
• Total No. of orifices per filter unit	1019No
• Diameter of lateral pipe orifices	5mm
• Spacing of lateral pipes orifices (centre to centre)	100mm
<b>With the 2No. units in operation</b>	
• Total filter bed area	16m <sup>2</sup>
• Filtration rate (5 - 15 m <sup>3</sup> /m <sup>2</sup> /hour)	6.88m <sup>3</sup> /m <sup>2</sup> /hour
<b>With the 2No. units in operation to allow maintenance of one unit</b>	
• Total filter bed area for the 2No units	16m <sup>2</sup>
• Filtration rate (5 - 15 m <sup>3</sup> /m <sup>2</sup> /hour)	10m <sup>3</sup> /m <sup>2</sup> /hour

j) *Filter Backwash System*

Filter backwash system design details are as per Table 24.

Table 24: Filter Backwash System Design Details

<b>Parameter</b>	<b>Value</b>
Filter media size	1.2mm
Temperature	20°C
Backwash rate	73 m <sup>3</sup> /m <sup>2</sup> /hr
Backwash time	8min
Filter bed area	8 m <sup>2</sup>
Volume of water required for backwashing	77.9 m <sup>3</sup> (9.7% of the treated water output = non-revenue water)
Volume of backwash tank required (including domestic water for the water works operators)	100m <sup>3</sup>
Air scour system	
• Flow rate	480m <sup>3</sup> /hr
• Against water head	6m
• Power control demand capacity	17.9KW
• Power factor	0.8
• Capacity of generator set required	25 KVA

k) Clear Water Tank Design

Clear water tank details are as per Table 25.

Table 25: Clearwater Tank Design Details

Parameter	
Hourly flow rate	110 m <sup>3</sup> /hour
Required storage tank 30% of the maximum day demand	56 m <sup>3</sup>
<b>Tank design</b>	
<ul style="list-style-type: none"> <li>Two compartment reinforced concrete each with the following:</li> </ul>	
<ul style="list-style-type: none"> <li>Dimensions</li> </ul>	<ul style="list-style-type: none"> <li>Width = 4.0m</li> <li>Length = 5.0m</li> <li>Depth = 3.0m</li> <li>Freeboard = 0.5m</li> <li>Rounded capacity = 60m<sup>3</sup></li> </ul>

l) Interconnecting Pipework between Units

The interconnection pipework between units has been designed of ductile iron material to the following sizes:

Unit	Inlet	Outlet
• Flocculator	DN 200mm	DN 400mm
• Clarifiers	DN 200mm	DN 200mm
• Rapid sand filters	DN 200mm	DN 200mm

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m) Water Storage Tank

Pressed section steel panel water storage tank of plate sizes of 1.22m with details as per Table 26.

Table 26: Water Storage Tank Pressed Section Steel Panel Details

Tank location	Design capacity	Height	Length	Width	Dimensions (mm)		
	m <sup>3</sup>	plates	plates	plates	Height	Length	Width
Bitsya	180	3	7	6	3,660	8,540	7,320
Karungu (Kibingo)	200	3	7	7	3,660	8,540	8,540
Kasharara	150	3	6	6	3,660	7,320	7,320
Main Tank	400	4	9	8	4,880	10,980	9,760

The overall capacity includes the freeboard and dead volume.

n) Sludge drying beds

Sludge drying beds details are as per Table 27.

Table 27: Sludge Drying Bed Design Details

Reinforced concrete chamber	
No. of sludge drying beds	2No
Dimensions of each unit	
• Width	6.0 m

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<b>Reinforced concrete chamber</b>	
• Length	6.0 m
• Total bed area for the 2No units	72m <sup>2</sup>
• Depth of unit	1.35m
• Filter medium <ul style="list-style-type: none"> <li>○ 150mm thick coarse gravel (20 – 40mm) bottom layer</li> <li>○ 150mm thick medium gravel (10 – 16mm) middle layer</li> <li>○ 300mm thick coarse sand top layer</li> </ul>	600mm total depth of medium

The schematic layout of Bitsya Water Supply System is presented in Figure 3.

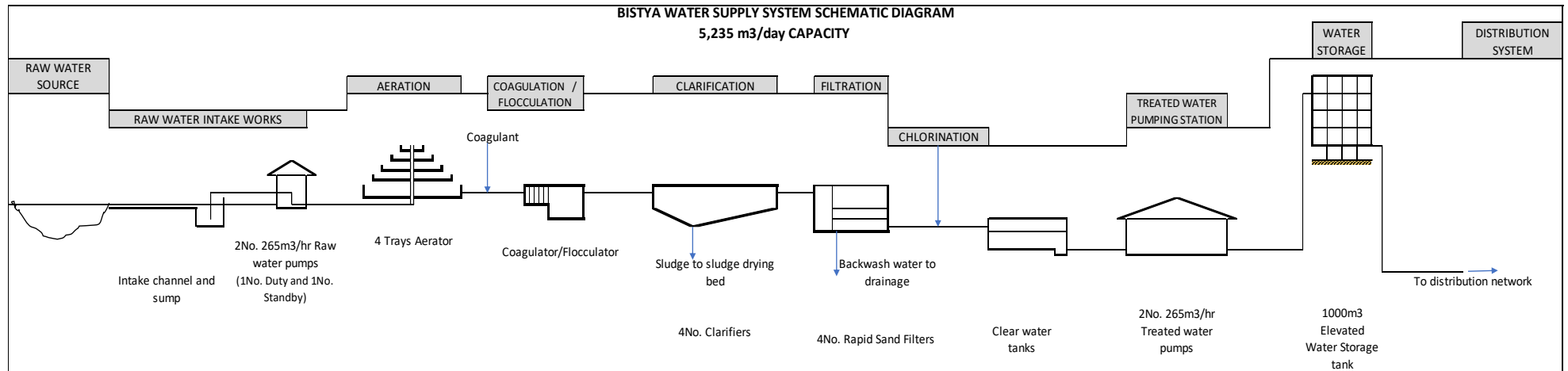


Figure 3: Schematic Layout of Bitsya Water Supply System

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## 3.3 ENVIRONMENTAL FLOW ASSESSMENT

### a) *Review of Environmental Flow methods*

Methods for quantification of minimum environmental flows are generally divided into three major categories: (1) hydrological or historic flow regime, (2) hydraulic rating, and (3) habitat simulation. Methods within these categories tend to be based on similar principles and assumptions. Although all three categories aim to maintain the stream environment, they focus on different aspects of the stream, such as flow, wetted perimeter or physical habitat. In terms of ease of application (time, resources and expertise required) hydrological methods are the easiest followed by hydraulic rating methods and habitat simulation methods. But as discussed in the following write up, habitat methods are founded on biological principles and may be more reliable and defensible than the other two.

### b) *Hydrology/historical based methods*

As the name implies, historic flow methods rely solely on the recorded or estimated flow regime of the river. The Tennant (1976) method (also known as the 'Montana' method) is the most widely known of these methods. The Tennant method assumes that some percentage of the mean flow is needed to maintain a healthy stream environment. Tennant examined cross-section data from 11 streams in Montana, Nebraska and Wyoming. He found that stream width, water velocity and depth all increased rapidly from zero flow to 10% of the mean flow, and that the rate of increase declined at flows higher than 10%. At less than 10% of the mean flow, he considered that water velocity and depth were degraded and would provide for 'short-term' survival of aquatic life. He considered that 30% of the average flow would provide satisfactory stream width, depth and velocity for a 'baseflow regime'. Tennant's assessment of the environmental quality of different levels of flow was based on the quality of the physical habitat that they provided. At 10% of average flow, average depth was 0.3m and velocity 0.25 m/s, and Tennant considered these to be lower limits for aquatic life. He showed that 30% of average flow or higher provided average depths of 0.45-0.6m and velocities of 0.45-0.6 m/s and considered these to be within good to optimum range for aquatic organisms. Fraser (1978) suggested that the Tennant method could be extended to incorporate seasonal variation by specifying monthly minimum flows as a percentage of monthly mean flows.

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Other historic flow methods recommend flows based on the flow duration curve or an exceedance probability of a low flow, where the level of protection is implicit in the magnitude of the percentage. For example, both a percentage (30–75%) of the 1 in 5 year low flow, and the flow equalled or exceeded 96% of the time have been used to assess 'minimum' flows in New Zealand. In Australia, Arthington *et al.* (1992) suggested an 'holistic' approach that 'rebuilds' a natural flow regime, where monthly minimum flow would be based on either a percentage exceedance for each month or a low flow that occurs 'often'. This is similar to Fraser's (1978) suggestion, but with added requirements for wet season flows and floods to preserve the pattern of natural variability.

### c) *Hydraulic methods*

Hydraulic methods relate various parameters of the hydraulic geometry of stream channels to discharge. The hydraulic geometry is based on surveyed cross-sections, from which parameters such as width, depth, velocity and wetted perimeter are determined. Because of the field and analytical work involved in this, they are more difficult to apply than historical flow methods. Variation in hydraulic geometry with discharge can be established by measurements at different flows, prediction from cross-section data and stage–discharge rating curves, Manning's or Chezy's equations, or calculation of water surface profiles.

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The most common hydraulic method considers the variation in wetted perimeter with discharge. Two criteria have been suggested for specifying minimum flow requirements using hydraulic methods. Wetted perimeter usually increases with flow, sometimes showing a point of inflection. Tennant (1976) used the inflection point criterion when he found that depth and width began to decline sharply at flows less than 10% of the mean in his study of rivers. The other criterion, percentage habitat retention, retains a percentage of the width or wetted perimeter of the river at mean flow. For example, Bartschi (1976) suggested that a 20% reduction in wetted perimeter at mean flow might be the maximum allowable degradation. If flow requirements are based on retaining a percentage of the wetted perimeter at mean flow and there is a linear or near linear relationship between wetted perimeter and flow, the criterion is, in effect, the same as a percentage of the mean flow. Hydraulic methods are not usually used to assess seasonal flow requirements.

*d) Habitat methods*

Habitat is an encompassing term used to describe the physical surroundings of plants and animals. Some habitat features, such as depth and velocity, are directly related to flow, whereas others describe the river and surroundings. Habitat methods are a natural extension of hydraulic methods. The difference is that the assessment of flow requirements is based on hydraulic conditions that meet specific biological requirements rather than the hydraulic parameters themselves. Hydraulic models predict water depth and velocity throughout a reach. These are then compared with habitat suitability criteria to determine the area of suitable habitat for the target aquatic species. When this is done for a range of flows, it is possible to see how the area of suitable habitat changes with flow. Because habitat methods are quantitative and based on biological principles, habitat methods are considered to be more reliable and defensible than assessments made by other methods. The most widely known method is the physical habitat simulation component (PHABSIM) of the instream flow incremental methodology. When using habitat methods, there are more ways of determining flow requirements than for either historic flow or hydraulic methods.

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Habitat methods are more flexible than either historic flow or hydraulic methods. It is possible to examine the variation of the habitat utilized by many species and life stages throughout the year and to select flows that provide this habitat. However, this means that it is necessary to have a good knowledge of the stream ecosystem and some clear management objectives in order to resolve potential conflicting habitat requirements of different species or life stages. Habitat methods are particularly suitable for 'trade-off' situations, where incremental change in habitat can be compared with the benefits of resource use. Habitat/flow relationships can be used to evaluate alternative flow management strategies and are part of the information base used in the process of choosing appropriate flow rules for river management.

*e) Selected method*

The Tennant method (Tennant, 1976) was adopted for the environmental flow study. According to the Tennant method, the percentage of mean annual flow (MAF) is assumed to roughly describe aquatic habitat conditions. Tennant proposed that percentages of less than 10 % of the mean annual flow (MAF) would offer "poor" habitat conditions, 30 % is "fair" and 40 % or more is "good". Based on existing conditions in R. Nyarwambu that are quite modified and also considered that the site is not located in a sensitive ecosystem, a working paradigm was to ensure that the 30% of the mean annual flow be left in the river all the time to support ecosystem services downstream of the water abstraction site.

*f) Assessment results*

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If the environmental flow is taken as 10% of the mean annual flow (MAF) which translates to poor habitat conditions, this would translate to 0.032 m<sup>3</sup>/s. The 10% flow is equivalent to the 10 year 7-day low flow estimated. If the environmental flow is taken as 30% of the mean annual flow (for fair habitat conditions), this would be equivalent to 0.095 m<sup>3</sup>/s. The computed amount of water that is available for abstraction for each calendar month is shown in Table 28.

Table 28: Available flow with allowance for environmental flow

Month	Monthly Flow (m <sup>3</sup> /s)	E-flow – (30% of MAF) - m <sup>3</sup> /s	Available flow (m <sup>3</sup> /s)	Available monthly total flow (m <sup>3</sup> )
Jan	0.21	0.095	0.11	296,226
Feb	0.19	0.095	0.09	245,922
Mar	0.29	0.095	0.20	508,457
Apr	0.44	0.095	0.35	906,818
May	0.33	0.095	0.24	616,418
Jun	0.26	0.095	0.16	427,399
Jul	0.15	0.095	0.06	144,447
Aug	0.19	0.095	0.09	240,613
Sep	0.32	0.095	0.22	578,831
Oct	0.46	0.095	0.36	942,282
Nov	0.58	0.095	0.49	1,258,126
Dec	0.36	0.095	0.27	696,457
Mean annual flow	0.32	0.095	0.22	571,833

## 3.4 NET DISCHARGE AVAILABLE AT ABSTRACTION POINT

There are no documented water use permits upstream of the R. Nyarwambu abstraction point. To estimate the net available flow at the abstraction point, reduction on the monthly flow estimated were made to cover the Environmental flow considerations as shown in Table 14. Upstream population – as a gross amount to cover the needs of people is assessed below.

### a) Allowance for upstream population

All the upstream population may not use the river currently as their main water source. A gross allowance was made to demonstrate the availability of sufficient water, should the population need it. The population in the catchment upstream of the abstraction point was extracted from a map of population densities in the area from Uganda Bureau of Statistics (UBOS) 2014 population census. These were then projected to population totals for the years 2023 and 2043 using population growth rate for Buhweju district which covers most of the Nyarwambu watershed. A per capita water demand of 20 l/day was assumed for the population living in the catchment. An additional amount equivalent to 50% of this was added to cater for livestock demand. Therefore a per capita water demand of 30 l/day was considered. The estimated demand is 1,747 m<sup>3</sup>/day as shown in below.

Table 29: Domestic and livestock water demand in Nyarwambu catchment

Catchment	Nyarwambu
Population density/ km <sup>2</sup>	358
Area (km <sup>2</sup> )	62
Total population	22,090
Population growth rate	3.4%

Estimated population in year 2023	29,846
Estimated population in year 2043	58,249
Water demand per capita (l/day) including livestock	30
Total water demand in year 2023 (m <sup>3</sup> /day)	895
Total water demand in year 2043 (m <sup>3</sup> /day)	1,747

b) *Environmental flow allowance*

As shown in Section 3.5, the environmental flow was estimated as 0.095 m<sup>3</sup>/sec or 8,169 m<sup>3</sup>/day.

c) *Sufficiency of available flow for proposed project*

The projected demand for year 2043 for the proposed project is 2,200 m<sup>3</sup>/day. Considering the upstream water users (domestic and livestock) and the environmental flow requirements, **Error! Reference source not found.** shows that the available flow at the abstraction site is more than sufficient to meet the requirements of the proposed project. The total available flow is 17,316 m<sup>3</sup>/day and the project requirement is only 12.71% of this.

Table 30: Net available flow at abstraction site

Variable (m <sup>3</sup> /day unless otherwise stated)	Value
Available flow (m <sup>3</sup> /s)	0.32
Available flow	27,232
Upstream domestic and livestock water demand	1,747
Environmental flow	8,169
Net flow available at abstraction point	17,316
Projected demand for proposed scheme (Year 2043)	2,200
Flow available for downstream users	15,116

## 3.5 LOW FLOW ANALYSIS

a) *Assessment method*

Low flow assessment was aimed at determining the historically lowest flows that provide some information on the scale of the required environmental flows for supporting basic ecological functions. The assessment was carried out on a dataset of minimum flows during 7 consecutive days using daily discharge data. Assessment was carried out for annual data. The low flows corresponding to different recurrence intervals are useful for estimating the flows required for the protection of river water quality and sustaining river ecological functions. Low flow analysis is also one of the many methods used for estimating environmental flows. One approach that finds common usage is the 7Q10 approach (i.e. the 7-day low flow with a 10-year return period). This approach was adopted for the current study.

b) *Assessment results*

R. Rwizi data was used for assessing low flows which were then transferred to the R. Nyarwambu site. To estimate the low flows, minimum flows were selected for R. Rwizi and a lognormal distribution was fitted to the 10-day annual minimum flows (**Error! Reference source not found.**). The parameters of the lognormal distribution were then used for estimating the low flows corresponding to the different return periods. The low flow analysis was carried out at an annual timescale. Figure 18 shows the lognormal fits for annual flows at R. Rwizi. These were used for deriving low flow estimates for R.

Nyarwambu for various return periods. The derivation was carried out by applying ratios of areas and mean annual rainfall between R. Rwizi and R. Nyarwambu shown below.

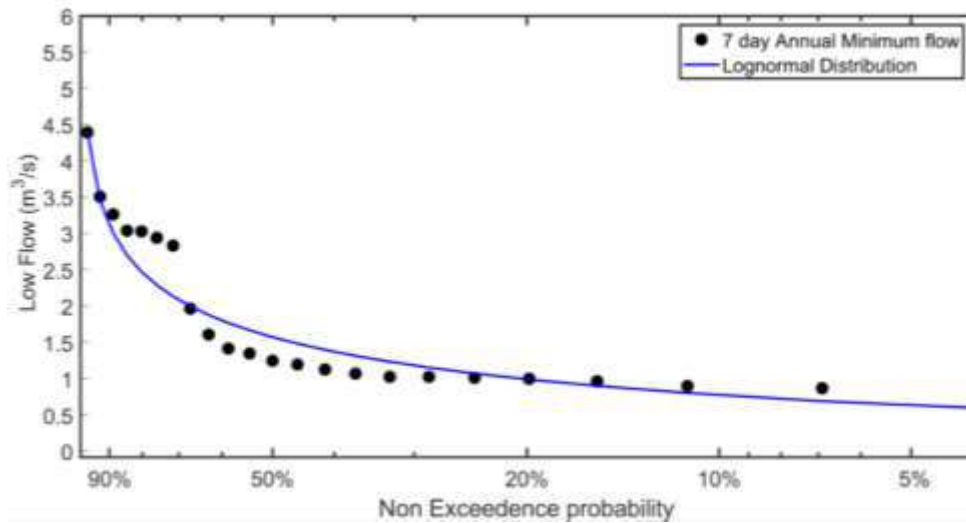


Figure 4: Lognormal fit for annual minimum flows for R. Rwizi

Table 31: Transferred low flow estimates from R. Rwizi to R. Nyarwambu

T (years)	Min flow (Rwizi) m³/s	Area ratio	Rainfall ratio	Min flow (Nyarwambu) m³/s
2	1.637	0.034	1.108	0.062
5	1.065	0.034	1.108	0.040
10	0.851	0.034	1.108	0.032
25	0.669	0.034	1.108	0.025
50	0.573	0.034	1.108	0.022

## 3.6 CONSTRUCTION ACTIVITIES

### a) Project Phases

- Mobilization Phase** - This phase will involve mobilization 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 contractor.
- Construction Phase** - All project activities under this phase are supposed to be carried along the tracks, route and access paths within the boundaries of the identified project sites without disturbing or obstructing the neighbors and businesses. To ensure this, the contractors will seal off the site perimeter 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. Upon completion of preliminary activities and on-site investigations, actual construction of the project components and facilities will start which will involve:

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- 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 lines;
  - Trench sheeting and bracing to protect collapsible trench side walls;
  - Placing concrete to bases of foundations;
  - Laying of mains water pipes; and
  - Backfilling, disposal of overburden and surface restoration to at least match the condition that existed prior to the water works construction.
- *Demobilization Phase* - Demobilization phase will involve clearing of the project site 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, the client.
  - *Operation Phase* - This will involve employment of operators both skilled and unskilled, operation of the water supply system, maintenance of the facilities put in place, etc.

#### **b) Construction Method**

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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.

#### **c) 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.

#### **d) 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.

#### **e) 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.

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#### **f) Structural Steel**

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

#### **g) 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.

#### **h) Masonry**

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

#### **i) 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.

#### **j) Electro-Mechanical Installations**

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

#### **k) 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 32.

*Table 32: Implementation schedule*

<b>Activity</b>	<b>Duration (Months)</b>
Tendering Process	4
Tender Evaluation	
Contract Negotiation and Award	
Construction of Works	20
Defects Liability Period	12
<b>Total</b>	<b>36</b>

### **3.7 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.

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## 4 METHODOLOGY

### 4.1 INTRODUCTION

This section outlines the methodology that was used to assess the environmental and social baseline and to identify, predict & assess the environmental and social impacts of the project on each relevant environmental component. It also covers the methodology for the identification of mitigation and monitoring measures that was 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 and social impacts of the proposed project will be predicted in relation to environmental and social 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 will be guided by the Environmental Impact Assessment (EIA) Guidelines (NEMA, 1997) and the process is schematically presented in Figure 5.

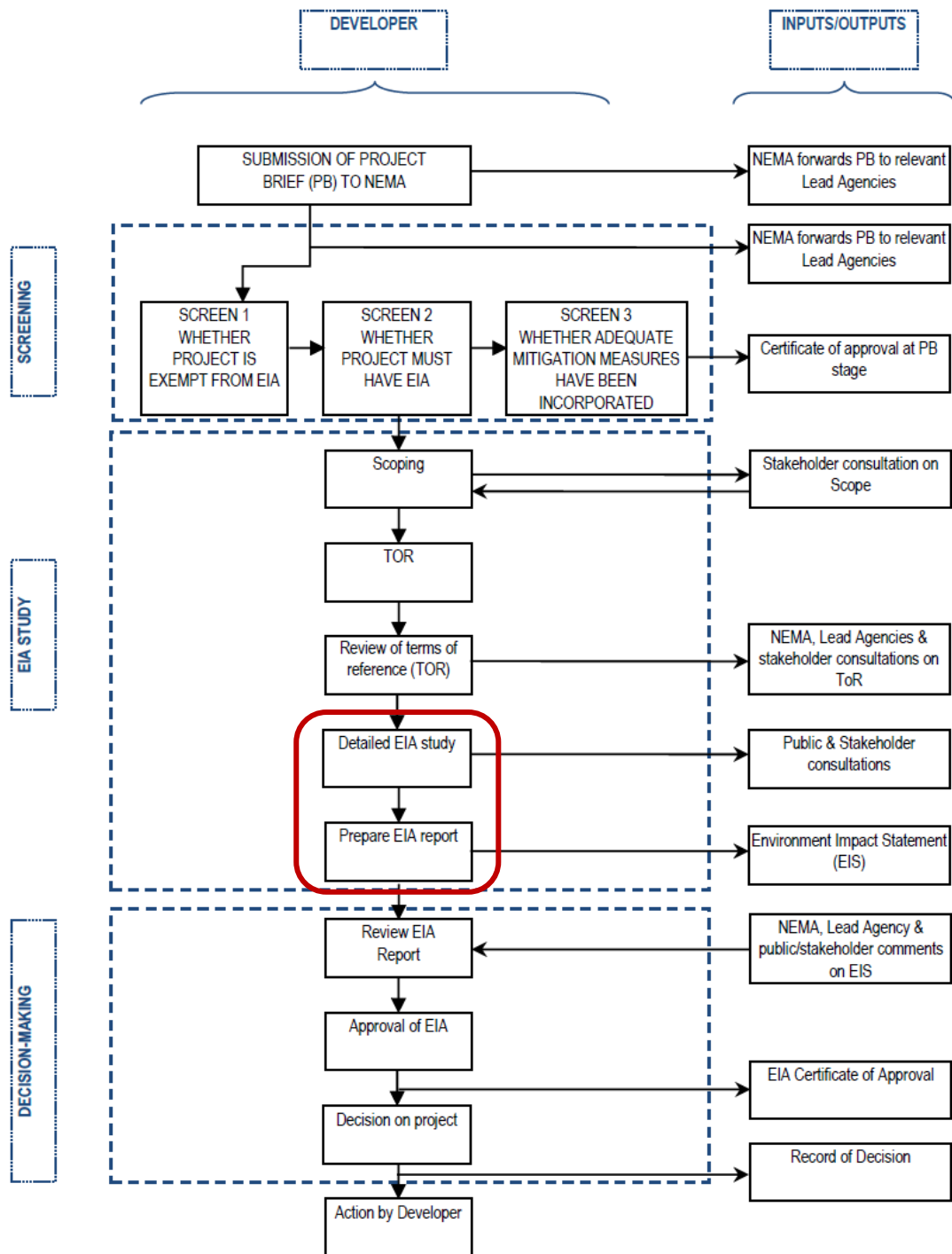


Figure 5: ESIA process that will be adopted as provided for under the Laws of Uganda

## 4.2 PHYSICAL ENVIRONMENT SURVEY

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

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## 4.2.1 Ambient Noise Assessment

Baseline noise measurements were undertaken at locations around the proposed construction sites with potential receptors such as water abstraction point, proposed site for construction of water treatment plant etc. Measurements 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 was 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 Global Positioning System (GPS) receiver and the noise sources together with the ambient environment at each location noted. The obtained results were 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 8 hours in a day should be provided with requisite hearing protection.

## 4.2.2 Air Quality Assessment

Baseline air quality was measured using Digital MultigasRAE Meter for air composition (Oxygen, VOC and CO<sub>x</sub>), Casella Microdust Pro Digital meter (PM<sub>2.5</sub> concentrations) and a Ibrid MX 6 Portable Multi Gas Monitor (SO<sub>x</sub>, NO<sub>x</sub>). Measurement points or locations were selected basing on presence of potential receptors (such as construction sites for water treatment 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 will be followed by 10 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 Carbon monoxide (CO), Oxygen (O<sub>2</sub>), Volatile Organic Compounds (VOCs), Sulfur oxides (SO<sub>x</sub>) and Nitrogen Oxides (NO<sub>x</sub>) were recorded.

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For particulate matter.

- The equipment was allowed for two minutes for zeroing down and thereafter, it captured the samples for 5 minutes with an interval of 10 seconds.
- For every sampled point, a GPS coordinate was recorded.

## 4.2.3 Water Quality

In situ water quality measurements were recorded at the proposed water abstraction point. In situ water quality sampling is the measurement of physical and chemical parameters in a water body at the time of sampling. A multi-parameter water quality instrument (Multi-probe Hach HQ40d) was used for in situ measurements and the following parameters were assessed i.e. dissolved oxygen (DO), temperature, potential of hydrogen (pH), electrical conductivity (EC) and turbidity. In situ measurements were done because the measured parameters change rapidly (e.g. temperature) and the data was required to aid the interpretation of other water quality results.

Water samples for physical, chemical and bacteriological quality were further collected at the source of raw water. Water samples were transported in a cooling box on ice to the laboratory for analysis. The water samples were analysed at the Directorate of Government Analytical Laboratory, Ministry of Internal Affairs, Wandegeya and the Test Results of the Water Quality Analysis are presented in this ESIA report. Metal ions were quantified from an acidified sample, at respective wavelengths, using Atomic Adsorption Spectrometry technique, Shimadzu 6300. A five-point calibration curve was used to get the concentration of each metal ion. Nitrates, phosphates, sulphates, chlorides and ammonia were

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determined by UV-VIS Spectrometry technique, Shimadzu, 1601 at respective absorption wavelengths. Coliforms and *E. coli* were determined by Membrane Filtration technique at 37°C and 44°C respectively. All determinations were done in duplicate. The tests were measured in conformity to US EAS 12: 2014 Specification of natural Potable Water and in conformity to Uganda's National Standards for Potable Water, which are within World Health Organisation (WHO) standards.

## 4.3 BIOLOGICAL ENVIRONMENT SURVEY

### 4.3.1 Flora Assessment

Transect walks were taken along the banks of River Nyarwambu and edges of the swamp; routes proposed for the pipelines, water storage tanks and records were made of the vegetation along the stretch. While some plant species were identified on site, specimens of others were collected and taken for confirmation at the Makerere University Herbarium. Additional information was obtained through consultation with communities on the local names, use and importance of some plant species. An inventory of the impacted vegetation was taken. The International Union for Conservation of Nature's Red List of Threatened Species (IUCN 2022) 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.

### 4.3.2 Fauna Assessment

#### 4.3.2.1 Birds

Surveys were conducted along the areas planned for the water supply and sanitation systems. Bird species occurrences were surveyed through point count surveys using observations, hearing and consultations during which all species detected and encountered were recorded. Great emphasis was placed on species of conservation importance. Species identification was based on Stevenson and Fanshawe (2002) while some species were categorised according to IUCN (2022). Some of the tools that were used included: Binocular and camera.

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#### 4.3.2.2 Butterflies

Random sweeping using sweep net was done (biodiversity rapid assessment) and it involved a transect walk through the areas recording all butterfly species encountered on wings. Sample specimens were taken for most of the species, except for those whose identification could be easily confirmed in the field. Opportunistic observations were included to help build the species list. Each of the butterfly species was assigned to one of the ecological categories (Akite, 2008). Some of the tools that were used include: insect net and camera.

#### 4.3.2.3 Herpetiles

Both reptiles and amphibians were surveyed using Visual Encounter Survey (VES) method (Rodda *et al.*, 2007). Visual Encounter Surveys were conducted by observation while walking through sites proposed for the project for a prescribed period of time, visually searching systematically along transects for animals. VES involved a search on the ground, trees and grasslands. Herpetiles were surveyed during the day from 08:00 am to 07:30 pm (Spawls *et al.*, 2006). Some of the tools that were used include: A camera and snake stick.

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## 4.4 SOCIAL ENVIRONMENT SURVEY

### 4.4.1 Stakeholder Identification and Analysis

A rigorous stakeholder analysis was carried out prior to the commencement and during the consultation process. This activity enabled the consultants to identify all the key entities- individuals, groups and communities, with a stake or those likely to be affected or to affect the proposed project in any way. Key stakeholders were identified at the national, regional, District, Sub County and community level through interviewing experts, brainstorming and document review. Stakeholder identification and engagement is an on-going process that requires regular review and updating. Therefore, the stakeholder list was updated from time-to-time.

The ESIA team collected and analysed data and held consultations with various stakeholders and other interested and affected parties involved, to ensure that all existing data and information relevant to the assignment was obtained. The ESIA team undertook site survey to determine the area of influence and gathered information under several key areas such as:

- Socio-economic conditions in the surrounding communities such as health and infrastructure,
- Current land use in the proposed project sites.

Participatory stakeholder identification was used in identifying and analysing the key stakeholders, including planning for their participation. Therefore, it was the starting point of the participatory processes and provided the foundation for the design of subsequent stakeholder activities throughout this study. Identified stakeholders are summarised in Table 33 together with the method of engagement:

Table 33: Categorization of Stakeholders to be engaged during ESIA

Category	Identified stakeholders	Method of engagement	Role
National	National Environment Management Authority; Ministry of Gender, Labour and Social Development (MGLSD) among others	Key Informant Interviews (KIIs)	-NEMA is be responsible for the review and approval of ESIA's, post-implementation audits and monitoring of approved projects. -Coordinate, inspect, supervise and monitor project activities to ensure that the environment and natural resources are not depleted but managed sustainably. -MGLSD under department of Occupational Health and Safety (OHS) is responsible for inspecting and registering the workplace and monitoring of conditions under which employees on the project are subjected.
Regional	Regional offices of the Ministry of Water and Environment including: Rural Water and Sanitation Regional Centres (RWSRCs),	KIIs	Construction supervision including the implementation of the proposed ESMP and implementation of the WSPP.

	Umbrella Authorities (UAs), NEMA, Water Management Zones (WMZs) etc		
District	District Local Government of Buhweju. Specifically, the following offices of Water, Natural Resources, Planning, Health, Production and Community Development and the political wing including the Chairperson LC V and Councillors representing the beneficially areas etc	KIIs	Mobilize support for the project. Monitor social-environmental impacts both during construction and operation phases.
Sub County	Sub county Chief, Community Development Officer, LC III Chairpersons etc	Focused Group Discussions (FGDs and KIIs	Mobilize local communities and key stakeholders to participate in EIA consultations and/or public hearings.
Community	Local Council I, Landlords of sites where the water infrastructure will be constructed	FGDs and KIIs	-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.

#### 4.4.2 Sampling and Selection of Respondents

The sampling process was primarily purposive. The ESIA targeted particular individuals, groups and communities that have a stake in the proposed project. As thus, only such entities as identified in the stake holder analysis were selected to participate in the consultation process. Key informants at various levels and from different specialties, right from the community were also purposively selected to contribute their views on the impact of the project. This widened the perspectives on the projects, enrich the data collected and ultimately provided deep insights about the knowledge and attitudes of the various stakeholders towards the project.

Socio-economic surveys were conducted to define impacts and to provide a monitoring baseline following an initial desktop data review. Effective resettlement planning entails conducting a displaced persons' census and an inventory of affected land and assets at the household, enterprise, and community levels. The data was collected via a mixed-method approach incorporating both quantitative and qualitative assessments, as well as an assessment of available secondary resources. Quantitative surveys were conducted for all PAHs.

A total of 255 households were surveyed. The vast majority 87.84% of the survey respondents were the head of their household. Perspectives of both genders were captured and represented, with 75.69% male and 24.31% female respondents in addition to gender-specific Focus Groups (FGs) and Key Informant Interviews (KIIs).

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Qualitative data was gathered to provide supporting details for the quantitative data collection surveys. Qualitative data collection was based on KIIs, FGs, and participatory methodologies including village transect walks. Household socio-economic surveys was undertaken alongside the cadastral and asset surveys. The land and asset component measured and described fixed assets for each household including land holdings, land type, buildings, crops, and trees. This information was collected to inform compensation agreements and to assist in resettlement impact assessments. Details of the household survey are presented in the RAP and Evaluation Report.

### 4.4.3 Study Methods

Stakeholder analysis sought to answer the following fundamental questions: Who are the key stakeholders (primary/secondary)? What are the interests of these stakeholders? How have they been and or will be affected (positively/negatively)? Which stakeholders are most important for the success of the study? How will various stakeholder groups participate throughout the study? The following methods will be used for the social environment survey.

An interview guide was used for both KIIs and FGDs to elicit both baseline information and key concerns/issues from the selected key informants. KIIs and FGDs also aimed at information feedback, education and communication (IEC) to both the interested and affected stakeholders/ community and the following questions were utilized for ESIA among others:

- i. How will the proposed project for water supply and sanitation benefit the targeted communities?
- ii. How can the anticipated positive impacts and or benefits be enhanced?
- iii. Do you feel the proposed project is likely to have risks and or impacts on the environment and the population? If yes, how will the proposed project impact negatively on the following aspects:
  - Physical environment (geology and soils, hydrology and water resources (quantity and quality, visual and aesthetic quality, air quality, noise etc.)
  - Biological environment (vegetation and wild animals)
  - Social environment (land use, population, housing, employment, transportation and traffic, public services, utilities, public health and safety, cultural resources etc.)
- iv. Can you propose possible mitigation measures that can be put in place to ensure that the anticipated negative impacts are either avoided, minimized and mitigated from causing unintended harm to the environment or people?

#### 4.4.3.1 Document Review

These include: existing data, existing environmental data, existing reports/documents, pre- and post-implementation of management/construction decisions, EIA reports and ESMPs in place. Examples of these documents include: Buhweju District Development Plan, District State of Environment Report, Engineering Design Report for Bitsya Water Supply and Sanitation System (Feb. 2022) etc.

#### 4.4.3.2 Key Informant Interviews

Key Informant Interviews (KIIs) were held with civil servants (e.g. Chief Accounting Officer, District Natural Resources Officer, District Environment Officer, District Community Development Officer, District Water Officer, Sub County Chiefs etc.), political leaders (LC V Chairperson, LC III Chairperson) and representatives of the management structures who are responsible for environmental management activities on various levels (e.g. the Village Natural Resources Management Committees). Key informants were interviewed and selected on the basis of their roles as leaders, specialized knowledge and experience on the subject under study.

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### 4.4.3.3 Focus Group Discussions

Focus Group Discussions (FGDs) were held with stakeholders at Sub County, Parish and Village levels. FGDs were used as a qualitative approach to gain an in-depth understanding of social issues. The method aimed at obtaining data from a purposely selected group of individuals on the proposed project activities. Groups of people with the same social, economic and/gender characteristic were clustered together (with between 8-12 members each) and a guided discussion was held with these groups with the ultimate goal of eliciting community baseline information regarding the project development, impacts and issues of concern and the mitigation measures.

### 4.4.3.4 Transect Walks

Transect walks were carried around to gather more information through observation regarding the social and economic activities taking place, impact extents and also stimulating informal interaction with the community members and their experiences that helped in understanding the community dynamics in the project areas. A camera was used to take pictures of interest within the project areas that are presented in this report.

## 4.5 IMPACT ASSESSMENT AND EVALUATION

Based on the project details and the baseline environmental and social status, potential impacts as a result of the construction, operation and decommissioning of the proposed project activities have been identified. An impacts analysis criteria that takes into account the magnitude or intensity of impacts based on project activities and sensitivities in the project area that was identified in the environmental and social baseline. Impact characteristics considered are described in Table 34 and include:

- Type of impact, where direct or indirect
- Status, where positive or negative
- Duration of impact
- Intensity of impact
- Likelihood of impact occurring
- Spatial extent of area of impact
- Sensitivity of receptor of impact

The first six parameters give a sense of magnitude of impact, which together with sensitivity; result in an overall severity of impact.

*Table 34: Impact Assessment and Evaluation*

Criteria	Description
Type of Impact	<ul style="list-style-type: none"><li>▪ 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.</li><li>▪ 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.</li></ul>
Status	<ul style="list-style-type: none"><li>▪ Positive</li><li>▪ Negative</li></ul>
Duration	<ul style="list-style-type: none"><li>▪ The lifetime of the impact; this is measured in the context of the life-time of the</li></ul>

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	<p>proposed development. Whether the Impact will be:</p> <ul style="list-style-type: none"> <li>▪ Intermittent – not occurring at all times.</li> <li>▪ Temporary-only for a short period.</li> <li>▪ Short term - the impact will either disappear with mitigation or will be mitigated through natural process in a span shorter than the construction phase.</li> <li>▪ Medium term - the impact will last for the period of the construction phase, thereafter it will be entirely negated.</li> <li>▪ 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</li> <li>▪ Permanent</li> </ul>
Intensity	<ul style="list-style-type: none"> <li>▪ Whether or not the intensity (magnitude) of the impact would be high, medium, low or negligible (no impact). An attempt to quantify the impacts of components on the affected environment will be described as using following definitions:</li> <li>▪ Negligible</li> <li>▪ Low - where impact alters the affected environment in such a way that natural processes of functions are not affected in any significant way.</li> <li>▪ Moderate - where the affected environment is altered, however, function and process continue, albeit in a modified manner.</li> <li>▪ High - where function or process of the environment is seriously altered and disturbed to the extent where it temporarily or permanently ceases.</li> </ul>
Spatial Extent	<ul style="list-style-type: none"> <li>▪ The physical and spatial size of the impact; a description of whether the impact would occur on a scale described as follows:</li> <li>▪ Site - whether the impact will be within limited locale of the project site / study area affecting the whole or measurable portion of the area.</li> <li>▪ 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.</li> <li>▪ Regional - whether the impact extends beyond the study area affecting areas on a regional scale.</li> </ul>
<ul style="list-style-type: none"> <li>▪ Likelihood</li> </ul>	<ul style="list-style-type: none"> <li>▪ 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 occur on scale described below:</li> <li>▪ Uncertain - insufficient information to determine its probability. Because the precautionary principle is followed, this increases the significance of the impact.</li> <li>▪ Improbable - the impact is unlikely to occur.</li> <li>▪ Probable - the impact could possibly happen, and mitigation planning should be undertaken.</li> <li>▪ Highly probable - it is most likely that the impact will occur at some or other stage of the development.</li> <li>▪ Certain - the impact will take place regardless of any prevention plans, and only mitigatory actions can be relied on to contain the effect.</li> </ul>
<ul style="list-style-type: none"> <li>▪ Sensitivity</li> </ul>	<ul style="list-style-type: none"> <li>▪ Degree of change effected on natural processes or people's livelihoods; the sensitivity of the receptor of the impact to change</li> <li>▪ Very low</li> <li>▪ Low</li> <li>▪ Moderate</li> <li>▪ High</li> </ul>

Table 35 below presents a quantitative format for ranking impacts based on parameters above, summarised as magnitude and sensitivity.

Table 35: 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 36 below presents the overall impact rating criteria, with illustrations of such impacts.

Table 36: Overall Impact Rating and Description

Overall Impact Rating	Description of Impact	Significance
<b>Severe</b>	<ul style="list-style-type: none"> <li>▪ Non-compliance with national policy, environmental laws and regulations</li> <li>▪ Highly noticeable, irreparable effect upon the environment</li> <li>▪ Significant, widespread and permanent loss of resource</li> <li>▪ Major contribution to a known global environmental problem with demonstrable effects</li> <li>▪ Causing mortality to individuals of a species classified as globally or regionally endangered</li> <li>▪ Major exceedance of water/air quality and noise guidelines representing threat to human health in long and short term</li> <li>▪ Causing widespread nuisance both on and off site</li> <li>▪ Extensive property damage or loss,</li> <li>▪ Widespread effects on livelihoods.</li> </ul>	> 12
<b>Moderate</b>	<ul style="list-style-type: none"> <li>▪ Frequent breaches of national regulations, including water/air quality and noise guidelines, wetlands and river banks regulations causing localised nuisance both on and off site</li> <li>▪ Noticeable effects on the environment, reversible over the long term.</li> <li>▪ Localised degradation of resources restricting potential for further usage</li> <li>▪ 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</li> <li>▪ Elevated contribution to global air pollution problem partly due to preventable releases</li> <li>▪ Unplanned immigration flows</li> <li>▪ Increased traffic in sensitive environments</li> <li>▪ Increased serious crime rates</li> <li>▪ Widespread physical resettlement, affecting livelihoods</li> </ul>	6 – 12
<b>Minor</b>	<ul style="list-style-type: none"> <li>▪ Noticeable effects on the environment, but returning naturally</li> </ul>	2 – 4

Overall Impact Rating	Description of Impact	Significance
	<ul style="list-style-type: none"> <li>to original state in the medium term</li> <li>▪ Slight local degradation of resources but not jeopardising further usage</li> <li>▪ Disruption/disturbance to normal behaviour of a globally or regionally endangered species returning to normal in the short term</li> <li>▪ Small contribution to global air problem through unavoidable releases</li> <li>▪ Elevation in ambient water/air pollutant levels greater than 50% of guidelines</li> <li>▪ Infrequent localised nuisance</li> <li>▪ Population increase not expected to stress existing infrastructure</li> </ul>	
<b>Negligible</b>	<ul style="list-style-type: none"> <li>▪ No noticeable or limited local effect upon the environment, rapidly returning to original state by natural action</li> <li>▪ Unlikely to affect resources to noticeable degree</li> <li>▪ No noticeable effects on globally or regionally endangered species</li> <li>▪ No significant contribution to global air pollution problem</li> <li>▪ Minor elevation in ambient water/air pollutant levels well below guidelines</li> <li>▪ No reported nuisance effects.</li> <li>▪ Temporary or intermittent changes to livelihoods or life quality aspects</li> </ul>	< 2

## 4.6 IDENTIFYING MITIGATION MEASURES AND ESMP PREPARATION

Possible mitigation measures considering all the project implementation phases have been identified and described in detail. Measures and actions to address negative impacts have followed the risk management hierarchy of avoidance and prevent, minimization, mitigation or restore and compensation. Measures proposed are in compliance with the Ugandan legislation and those of the World Bank Operational Policies.

The ESMP is well defined with performance indicators, targets and acceptable criteria that can be tracked over defined periods, with estimates of the resources 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 is 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 what 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 also addresses capacity building requirements.

- b) *Context the ESMP* - briefly describes project activities and major environmental and social components that will likely be affected positively or negatively by the project. It describes and analyses 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) *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.
- g) *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.

Table 37 provides a summary template for Monitoring Requirements.

Table 37: 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 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.

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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 also provides 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 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

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# 5 BASELINE CONDITIONS

## 5.1 PHYSICAL ENVIRONMENT

### 5.1.1 Topography

The elevation in the project area ranges from 1887 to 1515 m.a.s.l. The project area (water works and pipeline network) is a mountainous area and most water sources are located in valleys while people stay on slopes of hills and mountain tops which have no water sources. The nature of terrain contributes to long distances to be covered in order to access water and very tedious for people carrying water on the head. Average walking distance to water source is about 1.5kms while in some communities, people walk as far as 3kms to access safe water. In both Karungu and Bitsya Sub County, people are settled on top of the hills but water is found in the valleys. Evidently, the slopes are very steep which are not easy to climb.



*Plate 4: A view of a typical hilly terrain of Bitsya and Karungu water supply area in Buhweju District*

### 5.1.2 Climate

Data from Rubaare weather station (0 ° 34' S, 30° 21' E) shows that rainfall in the project area exhibits a bi-modal distribution as seen in Figure 2 with two distinct rainfall seasons, from: 1) March to May with the peak in April and 2) September to November with the peak in October. The annual mean rainfall is about 1072 mm. This study area lies within the climatic zone, MW, which receives an annual rainfall of 1223 mm (Detail Engineering Design Report, 2022).

Temperature as reported here is based on monthly data from Mbarara meteorological station for the period 1963 - 2006. Mean monthly air temperatures show a narrow range, from 20 to 21 °C, indicating small variations in seasonal temperatures. The mean annual potential evapotranspiration estimated

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from the maximum and minimum temperature is 101 mm and varies from a minimum of 90 mm in May to a maximum of 112 mm in September as seen in Figure 6. Evaporation exceeds rainfall during most months of the year except in April, October and November.

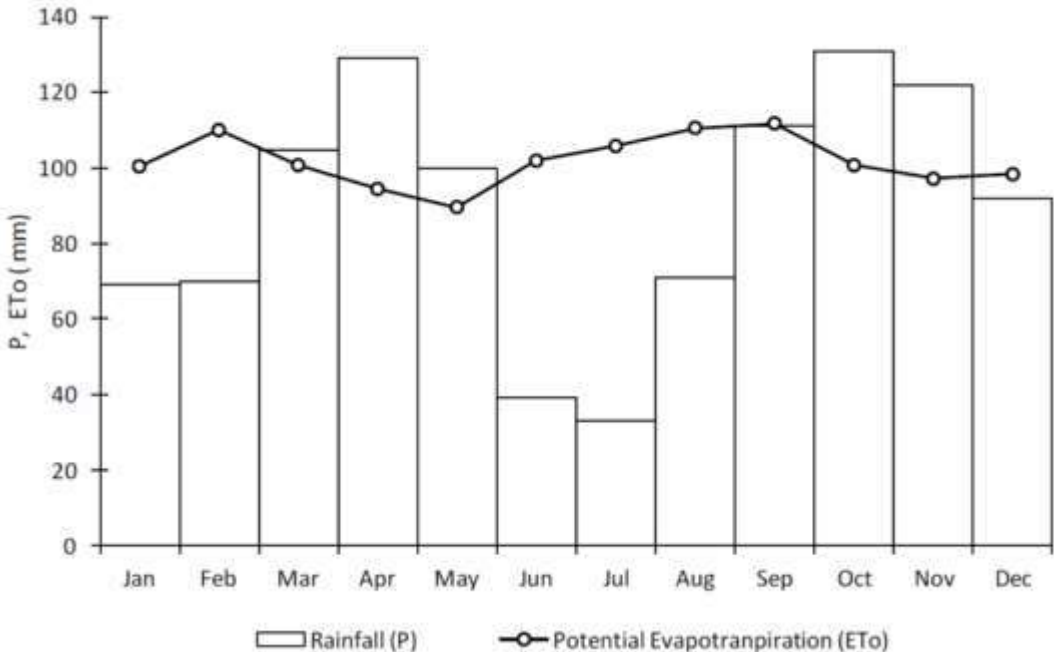


Figure 6: Annual distribution of mean monthly rainfall and potential evapotranspiration for Bitsya project area

74 **5.1.3 Geology and Soils**

Several bedrock outcrops were observed during the field visits and the exposed basement rocks are primarily composed of granite and gneiss as well as schists and phyllites. Hence, the geology shows early stages of development, believed to have been caused by the mid-Pleistocene formations that involved tectonic uplifts (Taylor and Howard, 1999a). These formations are evidenced from the high hills that form the boundary between Lake Victoria and the Albert Management zones and the rocky outcrops. This implies that the weathered mantle is thin and is believed to be about 2 - 3 m (ascertained from the average depth of pit latrines in the area).

The existing soil cover is of laterite formation and believed to occur as a result of progressive weathering of the shallow parent bedrock rock. It is largely comprised of sandy loams in the upper areas and humose loams in the lower areas. Over 70% of the land cover is characterized by subsistence farming (mainly banana plantations, sorghum and maize). Many trees have been cut and the hills are generally characterized by short grass and shrubs (approx. 23% of the land cover). In the lower areas, there is open water (i.e., River Kisikibi) and wetlands. At the time of this assessment, large scale encroachment on wetlands and the banks of the river was seen with large and small fields of banana plantations and eucalyptus trees.

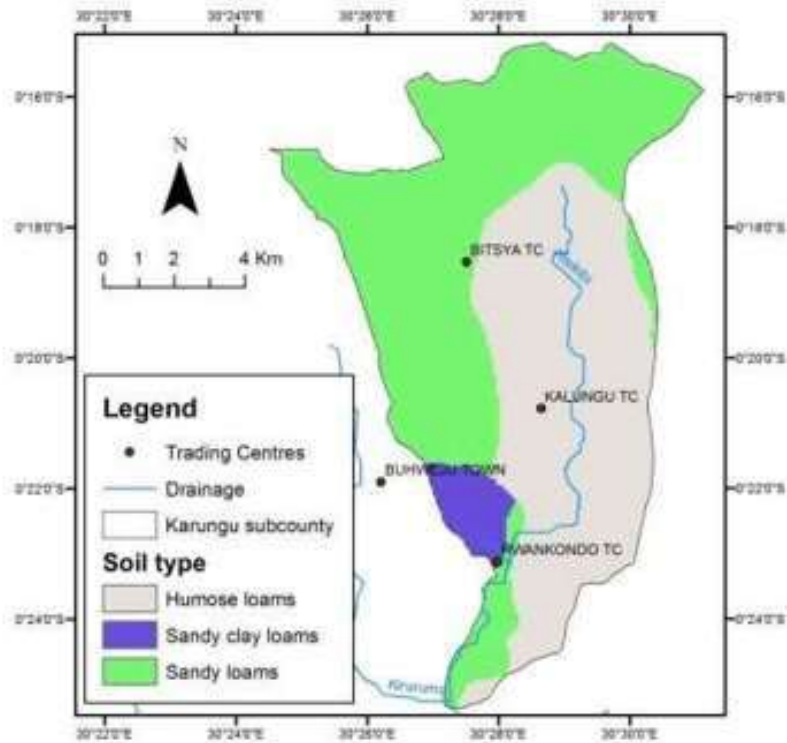


Figure 7: Soil map in Bitsya and Karungu sub-counties in Buhweju District

## 5.1.4 Water Resources

Previously the three springs identified as potential sources of water for the proposed scheme: Rujuga with 3 eyes, Kagyera and Rwakina, had relatively high yields and it was reported by the locals that the flows were less affected by the dry season. The total yield of the springs was determined as 12.5 l/s and it was estimated to meet the demand of 775m<sup>3</sup>/day in the ultimate year 2039 (Detail Engineering Design Report, 2022).

With the field investigation carried out in 2021, the yields of the springs have changed drastically with the total yield determined as 2.53l/s (218.6m<sup>3</sup>/day). This yield is insufficient to meet the projected maximum water demand estimated at 2,200m<sup>3</sup>/day in the current studies of the 20-year design horizon with 2024 as the initial year and 2043 as the ultimate design year (Detail Engineering Design Report, 2022).

River Nyarwambu found in the project area was investigated with the assessed 95% dependable flow of 0.11m<sup>3</sup>/s (equivalent to 9,504m<sup>3</sup>/day) and considered as an alternative source of water which is found to be adequate in terms of quantity and treatability quality to meet the projected estimated demand (Detail Engineering Design Report, 2022).

A flood analysis was undertaken as part of the detail engineering design. Flood analysis was based on two methods:

- Flood frequency analysis using measured annual maximum series extracted from the river flow hydrograph of R. Rwizi and then transferred to the R. Nyarwambu site using a flood transposition method.
- An SCS model that involves derivation of the flood hydrograph from peaks of rainfall intensities and catchment characteristics. The catchment characteristics are defined using runoff curve number (CN), to represent the combined hydrologic effect of soil, land use,

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agricultural land treatment class, hydrologic condition, and antecedent soil moisture. Curve Numbers are the watershed factors that will have the most significant impact in estimating the volume of runoff.

The following approach was used for application of the flood frequency approach:

- a) Selection of the annual maximum 24-hour flows from the measured flow
- b) Selection of the distribution that best fits the data. Lognormal distribution was shown to provide an acceptable fit to the annual maximum data. Four candidate distributions were considered, namely Log Logistic, Extreme Value Type 1, Lognormal and Generalised Extreme Value.
- c) Estimation of the flood magnitudes corresponding to various return periods
- d) Transfer of the peak flows at R. Rwizi to R. Nyarwambu from R. Mubuku using a flood transposition method based on ratios of catchment area and annual rainfall for the two catchments (Rwizi and Nyarwambu).

The extracted annual maximum series for R. Rwizi are shown below. From the plot of the fitted distributions, it is clear that the Generalised Extreme Value (GEV) distribution overestimates the peak flows while the extreme value type 1 distribution underestimate the peak flow. The lognormal distribution seems to be more accurate and was selected for further frequency analysis.

R. Rwizi stream gauge has a catchment area of 1826 km<sup>2</sup> while that of R. Nyarwambu at the intake site is 62 km<sup>2</sup> giving an area ratio of 0.034 (3.4%). The mean annual rainfall for R. Rwizi is 1082 mm while that for R. Nyarwambu is 1199 mm giving a rainfall ratio of 1.10. The estimated maximum flows for R. Nyarwambu (based on station data and transposed data) are shown in Table 18. The peak flows transposed from R. Mubuku are higher than those generated using R. Rwizi data. A 'peakedness' factor of 1.3 was applied to derive the peak flows since smaller catchments tend to have more peaky flows because they have less damping of the peak flows as they have smaller storage (swamps, etc). The factor also takes into account the fact that peak flows may be higher than the daily values that are captured by the gauge measurements.

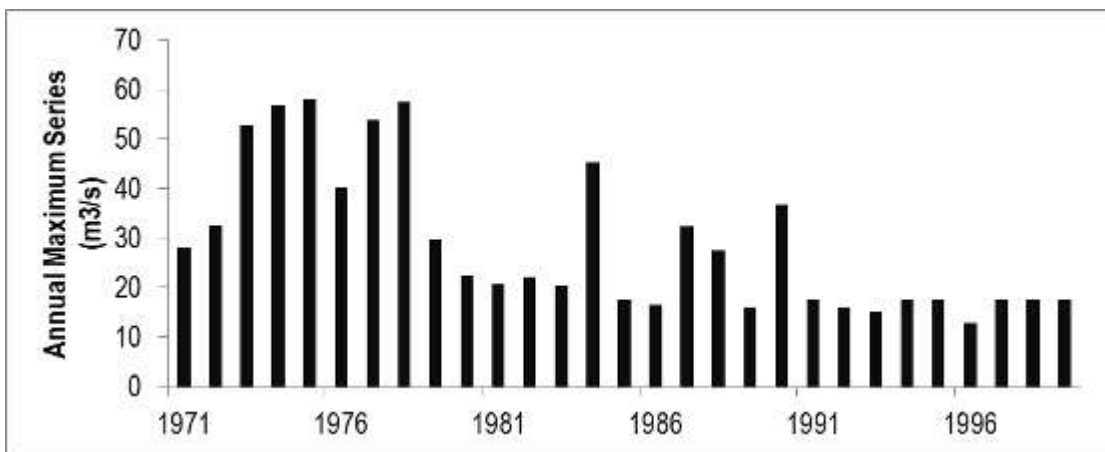


Figure 8: Annual maximum series for R. Rwizi

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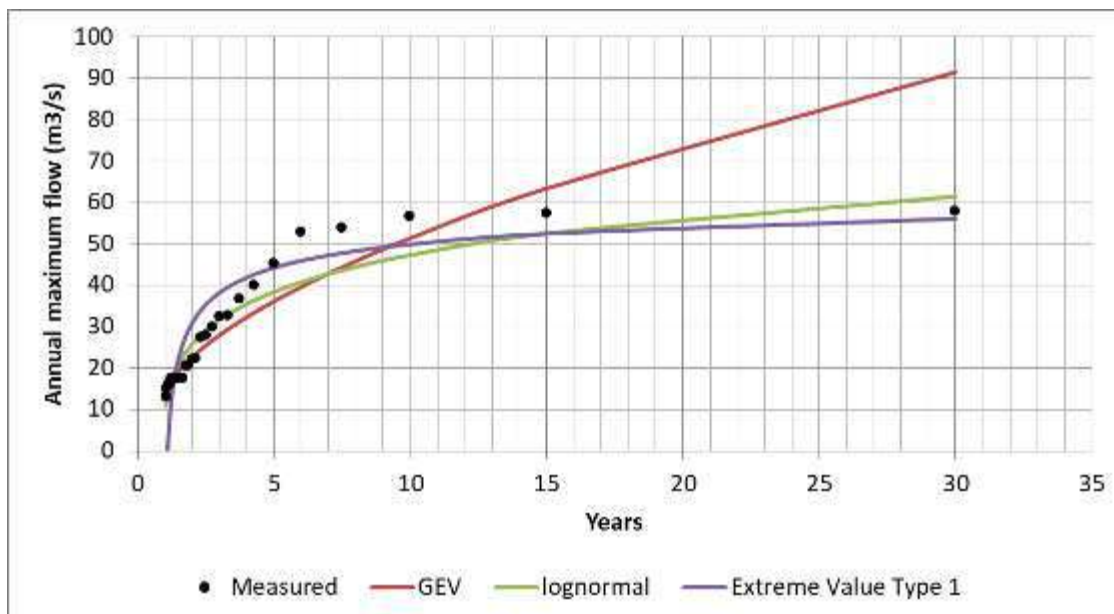


Figure 9: Fits of different distributions to R. Rwizi data

Table 38: Flood magnitudes ( $m^3/s$ ) corresponding to various return periods

T (years)	River Rwizi Peak flows ( $m^3/s$ )	Area ratio (Nyarwambu/Rwizi)	Annual rainfall ratio (Nyarwambu/Rwizi)	R. Nyarwambu Peak Flows (transferred) $m^3/s$	Peak factor	R. Nyarwamba adjusted flow $m^3/s$
2	25.7	0.034	1.108	1.0	1.3	1.3
5	38.4	0.034	1.108	1.4	1.3	1.9
10	47.3	0.034	1.108	1.8	1.3	2.3
25	59.1	0.034	1.108	2.2	1.3	2.9
50	68.2	0.034	1.108	2.6	1.3	3.3
100	77.7	0.034	1.108	2.9	1.3	3.8
200	87.4	0.034	1.108	3.3	1.3	4.3

### 5.1.5 Ground Water Resources

Springs are the most common form of groundwater in the region. They support livelihoods of local communities through both untapped and tapped springs. Many springs have been protected to provide water for the rural communities. Other sources included rivers and open wells. Only 4 shallow wells were reported in Karungu and one was non-functional. These were in Rugongo, Kabingo LCI, 2 in Rugarama A in Rugongo and another in Nyakasa Katara Parish. While access to protected springs (20 functional and 11 non-functional) seemed to be high, there were several complaints regarding the quality of water from these facilities (Detail Engineering Design Report, 2022).

### 5.1.6 Water Quality Analysis

Water quality tests (physical, biological and chemical) were carried out in January 2022 and analysed at the MWE central laboratory for the proposed abstraction along River Nyarwambu during the detailed engineering design stage (Detail Engineering Design Report, 2022). The proposed water source was subjected to water quality tests in order to establish the suitability for domestic use. Both onsite and laboratory water quality assessment was conducted; some of the key onsite water quality parameters tested include Electrical conductivity, Salinity and Dissolved oxygen, while the laboratory tests include Colour, Turbidity, Total suspended solids, alkalinity and chemical composition.

During ESIA stage, in situ water quality measurements were recorded at the proposed water abstraction point (-0.360269°, 30.484149°) and the following parameters were assessed i.e. DO (4.63 ppm), temperature (26.7°C), pH (6.94), EC (246µS/cm) and turbidity (28 NTU). A raw water sample was collected at the proposed water abstraction point and delivered to the Government Analytical Laboratory in Wandegeya, Kampala for analysis. **Annex 2** presents the analysis report.

Table 37 below presents a summary of a comparison of the water quality analysis results for the samples that were collected during site visits by the ESIA team in March 2022 from the proposed uptake/abstraction point and compared with those that were taken in January 2022 during the detailed Engineering designs. The variation in Total Dissolved Solids (TDS) can be attributed to the different seasons when the sampling was done i.e. the ESIA stage sampling was carried out during the intensified rainy season/after a heavy down pour while the design stage was carried out a rain storm. This had the advantage of sampling for the possible worst physical quality parameters. Primary sources for TDS in receiving waters are attributed to increased agricultural runoff and residential (urban) runoff, clay-rich mountain waters, and leaching of soil contamination.

Table 39: Water quality analysis during both the Design stage and ESIA process

Parameter	Units	Design Stage	ESIA Stage	National drinking water standards
pH	-	6.46	6.8	6.50 - 8.50
Electrical Conductivity	µS/cm	54	247	2500 Max
Total Dissolved Solids	mg/l	27	1678	1500 Max
Total Suspended Solids	mg/l	20	24	Not detectable
Total Hardness, CaCO <sub>3</sub>	mg/l	100	94	600 Max
Turbidity	NTU	23.3	28	25 Max
Arsenic	mg/l	-	0.01	0.01 Max
Cadmium	mg/l	-	≤0.01	0.003 Max
Calcium	mg/kg	39.75	32.8	150 Max
Chromium	mg/l	-	≤0.01*	0.05 Max
Copper	mg/l	-	0.8	1.0 Max
Iron, Total	mg/l	0.289	6.4	0.3 Max
Lead	mg/l	-	≤0.001*	0.01 Max
Magnesium	mg/l	26.0	34.2	100 Max
Manganese	mg/l	-	1.2	0.1 Max
Mercury	mg/l	-	≤0.001*	0.001 Max
Sodium	mg/l	-	38.8	200 Max
Ammonia	mg/l	-	1.2	0.5 Max
Chlorides	mg/l	1.56	132	250 Max
Fluorides	mg/l	0.02	1.2	1.5 Max
Nitrates	mg/l	0.36	8.4	45 Max
Phosphates	mg/l	0.87	3.4	2.2 Max
Sulphates	mg/l	12.0	135	400 Max
Total Coliforms	Cfu/100ml	-	22	Absent
E-coli	Cfu/100ml	0	8	Absent

From the analysis done, the following parameters were found to be within acceptable limits for potable water: pH, EC, Hardness, Arsenic, Cadmium, Calcium, Chromium, Copper, Lead, Magnesium, Mercury, Sodium, Chlorides, Fluorides, Nitrates and Sulphates. The Sample also had undetectable levels of TSS.

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The water generally has low nitrate, chloride and fluoride concentrations falling within the recommended standards; therefore, no health risk is anticipated with the observed levels in the water.

On the other hand, the following parameters exceeded national standards for drinking water: TDS, TSS, Turbidity, Fe (Total), Manganese, Ammonia, Phosphates, Total Coliforms and E-coli. The interpretation for the existence of these parameters is as follows:

**Dissolved solids** in water supplies originate from natural sources, sewage, urban and agricultural run-off, and industrial wastewater. Reliable data on possible health effects associated with the ingestion of TDS in drinking water are not available.

**Suspended solids** consist of an inorganic fraction (silts, clays, etc.) and an organic fraction (algae, zooplankton, bacteria, and detritus) that are carried along by water as it runs off the land. The geology and vegetation of a catchment affect the amount of suspended solids.

**Turbidity** in water is due to suspended solids and colloidal matter. It may also be due to eroded soil or growth of micro-organisms.

**Iron** exists naturally in rivers, lakes, and underground water. It may also be released to water from natural deposits and industrial wastes. Iron can be present in water in two forms; the soluble ferrous iron or the insoluble ferric iron. Water containing ferrous iron is clear and colourless, and when exposed to air the water turns cloudy causing a reddish-brown precipitate of ferric iron. The basic approach to remove iron is to convert the soluble or dissolved forms of iron into insoluble or precipitate forms so that they can be filtered out. The catchment area has no industrial waste generation.

**Manganese** is one of the most abundant metals in the Earth's crust, usually occurring with iron. Of most importance and concern are the oxidative states  $Mn^{2+}$ ,  $Mn^{4+}$  and  $Mn^{7+}$ . Manganese is naturally occurring in many surface water and groundwater sources, particularly in anaerobic or low oxidation conditions. Levels of manganese in fresh water typically range from 1 to 2 mg/litre, although levels as high as 10 mg/litre in acidic groundwater have been reported; higher levels in aerobic waters are usually associated with industrial pollution. Manganese can be removed by chlorination followed by filtration.

**Ammonia** includes the non-ionized ( $NH_3$ ) and ionized ( $NH_4^+$ ) species. Ammonia in the environment originates from metabolic, agricultural and industrial processes and from disinfection with chloramine. Natural levels in groundwater and surface water are usually below 0.2 mg/litre. Anaerobic groundwaters may contain up to 3mg/litre. Intensive rearing of farm animals can give rise to much higher levels in surface water. Ammonia in water is an indicator of possible bacterial, sewage and animal waste pollution. Ammonia is a major component of the metabolism of mammals. Ammonia in drinking-water is not of immediate health relevance, and therefore no health-based guideline value is proposed (WHO, 2008), but the Guidelines stated that ammonia could cause taste and odour problems at concentrations above 35 and 1.5 mg/litre, respectively.

**Phosphates** may result from poor agricultural practices, runoff from urban areas and lawns, leaking septic systems or discharges from sewage treatment plants. Phosphates are chemical compounds that contain phosphorous. Phosphorous is a key nutrient that both plants and animals use for growth and development. Whilst phosphate is essential for plant and animal life, too much of it can cause a form of water pollution known as eutrophication.

**Total coliform bacteria** (excluding E. coli) occur in both sewage and natural waters. Some of these bacteria are excreted in the faeces of humans and animals, but many coliforms are heterotrophic and able to multiply in water and soil environments. Total coliforms can also survive and grow in water

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distribution systems, particularly in the presence of biofilms. Total coliforms should be absent immediately after disinfection, and the presence of these organisms indicates inadequate treatment.

**Faecal Coliforms** in a drinking water sample often indicates recent fecal contamination, meaning that there is a greater risk that pathogens are present than if only total coliform bacteria are detected. This could be as a result of animal waste within the area since the water source is located and surrounded by livestock farm and livestock were observed to be watered directly along the River Nyarwambu.

Sampling for the raw water quality analysis was a one-off after a rain storm. This had the advantage of sampling for the possible worst physical quality parameters i.e. TSS, turbidity and partly colour. It must be noted that seasonal variations in the raw water quality will continue to take place during the life of the proposed water source.

Generally, the water samples from the proposed intake point do not meet the national drinking water standards. **As such, water from River Nyarwambu is not suitable for direct consumption and would therefore need conventional treatment (aeration, coagulation, sedimentation, filtration and disinfection) and boiling to make it suitable for that primary purpose.** In that regard, a conventional water treatment system is the suitable option given the eminent seasonal variations in the raw water quality. Further still, based on experience, most of the nation's surface water sources can best be treated by the conventional water treatment works, with the proposed source not being exceptional.

The processes for the removal / treatment of the above mentioned parameters are described below.

- **Aeration**

It is recommended to include aeration in the treatment process for the following purposes;

- For precaution in case of future increase of iron and manganese levels which require aeration for their removal;
- To increase the dissolved oxygen content of the water;
- To reduce tastes and odours caused by dissolved gases in water;
- To oxidise and remove organic matter.

- **Coagulation**

For removal of colour and turbidity. The Jar Test report of 23 August 2021 by NWSC Mbarara Area laboratory (Appendix B) provides an indicative alum dosage rate of 20 - 30 mg/l is required.

- **Flocculation**

For floc formation.

- **Clarification**

To remove settleable particles in the raw water and flocs formed following the coagulation/flocculation process.

- **Filtration**

To further improve the quality of the clarified water by removing flocs, iron and manganese, some colour, turbidity and microorganisms.

- **pH Correction**

This is needed after filtration in order to improve the potability of the water and for protection against corrosion. Based on the tests carried out pH correction from 5.6 to 6.7 with a dose of 2mg/l of sodium carbonate solution of 10% concentration will be necessary.

- **Disinfection**

Using chlorine to disinfect the water making it safer for human consumption.

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The proposed combination of water treatment unit processes and unit operations for the River Nyarwambu water to make it safe for drinking is shown in Figure 10.

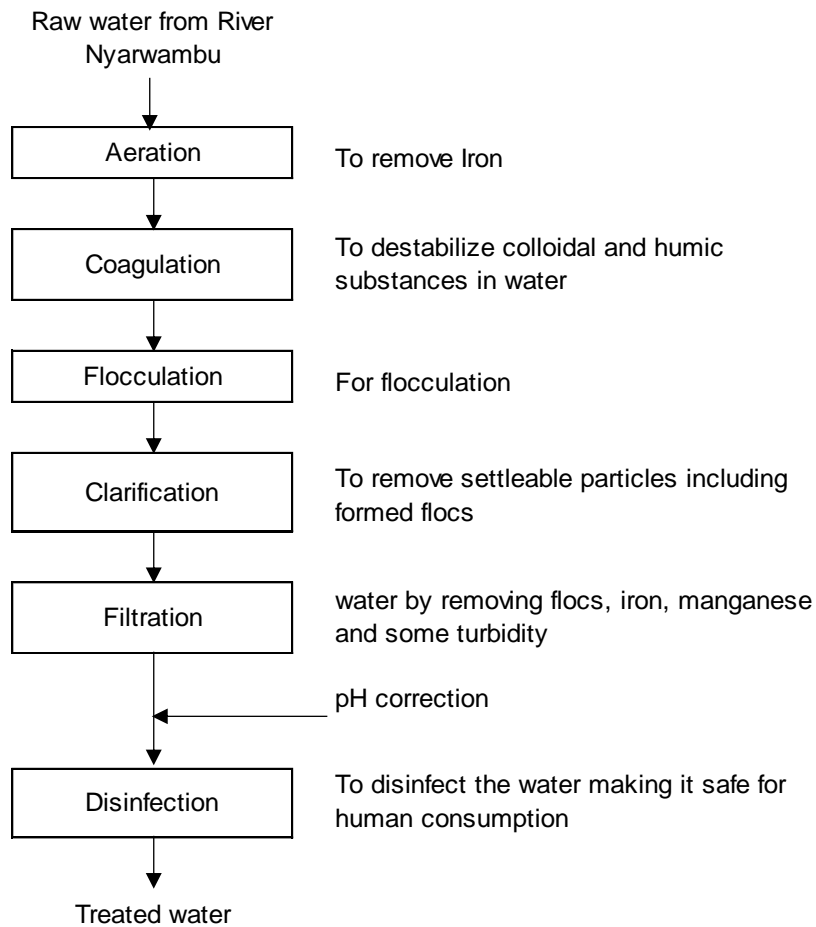


Figure 10: Proposed Treatment Processes for the raw water from River Nyarwambu

It must be noted that seasonal variations in the raw water quality will continue to take place during the 20 years horizon of the proposed water source. In that regard, the proposed conventional water treatment system is the considered to be the suitable option given the eminent seasonal variations in the quality and the unforeseen shock contaminants for such surface raw water of the river source.

It is proposed that chemical dosages determination (where applicable) and further tests are undertaken during the operation of the water supply system. Of critical importance are:

- Coagulation jar tests to determine the optimum coagulant dose and pH for an effective treatment process. It is proposed that Alum and polymer (recently used in most NWSC drinking water treatment plants given the low dosages required) both be tested so as to identify the most suitable.
- Where there is need for pH adjustment, the dosage should also be determined say when lime ( $\text{Ca(OH)}_2$  or soda ash ( $\text{Na}_2\text{CO}_3$ ) is utilised.

### 5.1.7 Noise Levels

There are no cases of noise pollution at the proposed intake. Thus, the project site indicates 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. Noise levels recorded at selected locations within the proposed project area are presented in Table 40 below.

Table 40: Noise levels measured at the proposed project sites.

Area	Location	LA <sub>min</sub> dB	LA <sub>max</sub> dB	LA <sub>Eq</sub> dB	Comments
Intake Point	0.377856, 30.481256	32	39	35.5	River Water flow, twittering birds, Swishing tree leaves and consultants' conversations
Water Treatment Plant (WTP)	0.377728 30.481511	36	45	40.5	Vehicular movement, twittering birds and consultants' conversations
Reservoir site 1	0.373552, 30.504648	34	38	36	Swishing tree leaves, twittering birds and human conversations
Reservoir Site 2 at Kabingo	0.341344, 30.504729	37	47	42	Vehicular movement, twittering birds and human conversations
Reservoir Site 3 at Bitsya P/S	0.307423, 30.458670	30	39	34.5	Twittering birds, Swishing tree leaves and teachers' conversations

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. All measurements were conducted during daytime.

## 5.1.8 Air Quality

The ambient air quality is assumed to be good as there are no major industrial sources of air emissions. The primary sources of air emissions in the area are automobiles (vehicles and motor cycles). Fugitive dust is attributed to vehicular movements along loose surface/murram roads, which dust levels, are exacerbated during dry, sunny and windy periods. Air quality measurements indicated a reasonably clean environment with respect to air quality as presented in Table 41 below.

Table 41: Results of air quality measurements taken in the project area

Area	Location	O <sub>2</sub> (%)	CO (ppm)	VOC (ppm)	PM <sub>2.5</sub> (µg/m <sup>3</sup> )	Air pollutant
NEMA (Draft Air Quality Standard for Ambient Air)		19.5- 23.5	9.0	15	25	
IFC, 2007 Standard					25	
Intake Point	0.377856, 30.481256	20.9	0.0	0	Max 287 Ave 12	Dust elevated by wind
Water Treatment Plant (WTP)	0.377728 30.481511	21.1	0.0	0	Max 407 Ave 6	Dust elevated by wind and moving vehicles
Reservoir site 1	0.373552, 30.504648	21.0	0.0	0	Max 97 Ave 1	Dust elevated by wind
Reservoir Site 2 at	0.341344,	19.0	0.0	0	Max 406 Ave 4	Dust elevated by

Kabingo	30.504729					wind and moving vehicles
Reservoir Site 3 at Bitsya P/S	0.307423, 30.458670	20.9	0.0	0	Max 67 Ave 3	Dust elevated by wind

All the assessed parameters were within the within permissible values in accordance with the NEMA (Draft Air Quality Standard for Ambient Air) and IFC, 2007 Standard. There were no detectable levels of NO, NO<sub>2</sub>, CO, H<sub>2</sub>S, Cl<sub>2</sub>, ClO<sub>2</sub> and SO<sub>2</sub> at all measurement locations.

## 5.2 BIOLOGICAL ENVIRONMENT

### 5.2.1 Flora

The project area is currently being utilised for agricultural activities mainly livestock grazing and watering. Eucalyptus woodlots dominates the tree species observed planted along the river system and along the hilly areas. The identified flora were mainly belonging to the families of *Myrtaceae*, *Papilionaceae* for tree species and *Poaceae* family for grass species. The identified common species at the water abstraction point included: *Cyprus papyrus*, *C. latifolia*, *Miscanthidium sp*, *Vossia sp* and *C. raphia*. The project area is greatly characterised with a limited range of habitats for plants.

Fruit trees especially, mangoes, avocados, jackfruit trees and paw paws are common. Agricultural crops include coffee, beans, peas, maize, banana, millet, sweat and potatoes. Although the majority of the locals are engaged in peasant farming, there is a significant number of farmers engaged in commercial farming with the most viable economic activities in the project area being the sale of Matooke, beans and sweet potatoes. Vegetation in the area is mostly composed of short grasses, short herbs, short shrubs and scattered Eucalyptus plantations and banana plantations.



Plate 5: Landscape characterized by cultivated and farm lands in the project areas

The natural vegetation is largely simplified and/or cleared to open up space for agriculture. The vegetation is very simplified that not a single species recorded was found in more than 45% of the areas surveyed. All the species recorded are fairly common in the area to be impacted as they were recorded in 2 or 3 of the survey areas especially reservoir sites.

Plant diversity recorded within the proposed site for water abstraction and treatment plant are presented under Table 42 below.

Table 42: Plant species encountered within the proposed water abstraction and treatment plant area

Species	Family	IUCN Status	Growth form
<i>Hyparrhenia rufa</i>	Poaceae	Least Concern (LC)	Grass
<i>Tagetes minuta</i>	Poaceae	LC	Grass
<i>Vernonia lasiopus</i>	Poaceae	LC	Grass
<i>Chloris gayana</i>	Poaceae	LC	Grass
<i>Andropogon schirens</i>	Poaceae	LC	Grass
<i>Eragrostis mildbraedii</i>	Poaceae	LC	Grass
<i>Guizotia scabra</i>	Poaceae	LC	Grass
<i>Hyparrhenia filipendula</i>	Poaceae	LC	Grass
<i>Ageratum conyzoides</i>	Asteraceae	LC	Herb
<i>Cassia mimosoides</i>	Asteraceae	LC	Herb
<i>Desmodium uncinatum</i>	Asteraceae	LC	Herb
<i>Digitaria abyssinica</i>	Asteraceae	LC	Herb
<i>Melinis repens</i>	Asteraceae	LC	Herb
<i>Psidium guajava</i>	Asteraceae	LC	Herb
<i>Perenni rufus</i>	Caesalpiniaceae	LC	Herb
<i>Bidens grantii</i>	Compositae	LC	Herb
<i>Alysicarpus rugosus</i>	Papilionaceae	LC	Herb
<i>Brachiaria platynota</i>	Papilionaceae	LC	Herb
<i>Conyza floribunda</i>	Myrtaceae	LC	Tree

Plant diversity recorded within the proposed site for water reservoir areas, distribution and transmission mains/routes for the treated water are presented under Table 43 below. However, there was very minimal vegetation (mainly grass) recorded along the water distribution and transmission mains that run along the road reserves.

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Table 43: Plant species encountered within the proposed project sites for water reservoirs, distribution and transmission mains

Species	Family	IUCN Status	Growth form
<i>Leersia hexandra</i>	Poaceae	LC	Grass
<i>Panicum trichocladum</i>	Poaceae	LC	Grass
<i>Hyparrhenia filipendula</i>	Poaceae	LC	Grass
<i>Paspalum scrobiculatum</i>	Poaceae	LC	Grass
<i>Cyperus latifolius</i>	Cyperaceae	LC	Grass
<i>Melanthera scandens</i>	Asteraceae	LC	Grass
<i>Phytolacca dodecandra</i>	Phytolaccaceae	LC	Grass
<i>Cassia bicapsularis</i>	Caesalpiniaceae	LC	Grass
<i>Cyphostemma ukerewense</i>	Vitaceae	LC	Sedge
<i>Spermacoce princeae</i>	Rubiaceae	LC	Sedge
<i>Cyperus papyrus L.</i>	Cyperaceae	LC	Sedge
<i>Kyllinga bulbosa</i>	Cyperaceae	LC	Sedge
<i>Erythrina abyssinica</i>	Papilionaceae	LC	Tree
<i>Maesa lanceolata</i>	Myrsinaceae	LC	Tree
<i>Euphorbia tirucalli</i>	Euphorbiaceae	LC	Tree
<i>Lannea barteri</i>	Anacardiaceae	LC	Tree
<i>Ehretia cymosa</i>	Polygonaceae	LC	Tree
<i>Morella kandtiana</i>	Myricaceae	LC	Tree

<i>Bridelia micrantha</i>	Phyllanthaceae	LC	Tree
<i>Eragrostis mildbraedii</i>	Poaceae	LC	Palm tree
<i>Setaria sphacelata</i>	Poaceae	LC	Climber
<i>Clerodendrum rotundifolium</i>	Boraginaceae	LC	Climber
<i>Tragia brevipes</i>	Euphorbiaceae	LC	Climber
<i>Clematis hirsuta</i>	Ranunculaceae	LC	Climber
<i>Rubia cordifolia</i>	Rubiaceae	LC	Climber
<i>Cissampelos mucronata</i>	Menispermataceae	LC	Climber
<i>Miscanthus violaceus</i>	Poaceae	LC	Scrambler
<i>Phoenix reclinata</i>	Arecaceae	LC	Scrambler
<i>Ocimum lamifolium</i>	Lamiaceae	LC	Shrub
<i>Rytigynia beniensis</i>	Papilionaceae	LC	Shrub
<i>Clausena aniseta</i>	Rutaceae	LC	Shrub
<i>Pavetta ternifolia</i>	Rubiaceae	LC	Shrub
<i>Neotononia wightii</i>	Papilionaceae	LC	Shrub
<i>Maytenus gracilipes</i>	Celestraceae	LC	Shrub
<i>Eragrostis tenuifolia</i>	Poaceae	LC	Herb
<i>Perscaria strigosa</i>	Rubiaceae	LC	Herb
<i>Desmodium hirtum</i>	Fabaceae	LC	Herb
<i>Crotalaria mespenticia</i>	Papilionaceae	LC	Herb
<i>Dissotis brazzae</i>	Melastomataceae	LC	Herb
<i>Vigna parkeri</i>	Papilionaceae	LC	Herb
<i>Jussiaea abyssinica</i>	Onagraceae	LC	Herb
<i>Desmodium adscendens</i>	Papilionaceae	LC	Herb
<i>Kalanchoe crenata</i>	Crassulaceae	LC	Herb
<i>Laportea ovalifolia</i>	Urticaceae	LC	Herb
<i>Pychnostachys coerulea</i>	Lamiaceae	LC	Herb
<i>Tristemma mauritianum</i>	Melastomataceae	LC	Herb
<i>Triumfetta rhomboidea</i>	Tiliaceae	LC	Herb
<i>Crassocephalum vitellinum</i>	Asteraceae	LC	Herb
<i>Cyathula uncinnulata</i>	Amaranthaceae	LC	Herb
<i>Achyranthera aspera</i>	Amaranthaceae	LC	Herb
<i>Solanum anguivii</i>	Solanaceae	LC	Herb
<i>Pellaea viridis</i>	Adiantaceae	LC	Fern
<i>Christella parasitica</i>	Thelypteridaceae	LC	Fern

None of the plant species in the project areas appears on the list of endangered species for IUCN. The proposed project will therefore likely not result in loss of habitat and common plant species. The majority of non-agricultural plant species recorded are fairly widely occurring meaning that the area of impact is not the most important for their conservation. This coupled with the fact that most natural vegetation cover has already been cleared and converted for agriculture. It was anticipated at the scoping stage that the aquatic biodiversity will not be affected due to the upstream human activities (especially cultivation, direct watering of livestock, alcohol brewing etc.) that have modified the river system to the point where it no longer provides valuable ecosystem and aquatic corridor functions.

## 5.2.2 Fauna

There was generally low faunal species diversity and abundance at all the project sites (water abstraction and treatment area, water reservoir areas, distribution and transmission mains) 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. Distribution and transmission mainly will traverse areas along the road reserves not conducive as faunal habitats. 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. Based on the scoping stage, with the observed level of disturbance within the riverbed including removal of riparian species that would have been habitats for aquatic fauna, there was no justification for aquatic studies.

### 5.2.2.1 Birds

Some long stretches of wetlands along the streams flowing through the project area provides refuge to bird communities as a natural habitat. It is this natural habitat mix that boosts the species diversity of birds in the area. All the encountered bird species are listed as Least Concern on the IUCN Red List of Threatened species as presented under Table 44 below.

Table 44: Bird species encountered in the area and their conservation status

Common Name	Scientific Name	Conservation Status
Hadada Ibis	<i>Bostrychia hagedash</i>	LC
Bronze Mannikin	<i>Lonchura cucullata</i>	LC
Black headed Weaver	<i>Ploceus cucullatus</i>	LC
African Pied Wagtail	<i>Motacilla aguimp</i>	LC
Common Waxbill	<i>Estrilda astrild</i>	LC
African Thrush	<i>Turdus pelios</i>	LC
Red-cheeked Cordon-bleu	<i>Uraeginthus bengalus</i>	LC
Fan-tailed Widowbird	<i>Euplectes axillaris</i>	LC
African Firefinch	<i>Lagonosticta rubricata</i>	LC
Spectacled Weaver	<i>Ploceus ocularis</i>	LC
African Palm Swift	<i>Cypsiurus parvus</i>	LC
Grey-headed Sparrow	<i>Passer griseus</i>	LC
Ruppell's Long-tailed Starling	<i>Lamprotornis purpuropterus</i>	LC
Pied crow	<i>Corvus albus</i>	LC
White-crested Helmet-shrike	<i>Prionops plumatus</i>	LC
Tawny-flanked Prinia	<i>Prinia subflava</i>	LC
Scarlet-chested Sunbird	<i>Chalcomitra senegalensis</i>	LC
African Blue-flycatcher	<i>Elminia longicauda</i>	LC
Grey-backed Camaroptera	<i>Camaroptera brachyura</i>	LC
Speckled Mousebird	<i>Colius striatus</i>	LC
Common Bulbul	<i>Pycnonotus barbatus</i>	LC
White-browed Robin-Chat	<i>Cossypha heuglini</i>	LC
Little Bee-eater	<i>Merops pusillus</i>	LC
Mackinnon's Fiscal	<i>Lanius mackinnoni</i>	LC
Collared Sunbird	<i>Hedydipna collaris</i>	LC
Grey Heron	<i>Ardea cinerea</i>	LC
Black-and-white Mannikin	<i>Lonchura bicolor</i>	LC

### 5.2.2.2 Butterflies

Butterflies belonging to three families Nymphalidae, Hesperidae and Pieridae were encountered within the project area but mostly in the low lying areas that are waterlogged and or swampy areas. Examples of the recorded butterflies included: Brown Pansy (*Junonia chorimene*), Broad-bordered grass yellow (*Eurema brigitta*), Common Three Ring (*Ypthima asterope*). All of Least Concern as per IUCN Red List.

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### 5.2.2.3 Reptiles and Amphibians

Only one (1) reptile i.e. Monitor lizard (*Varanus exanthematicus*) and two (2) amphibians i.e. Reed frog (*Hyperolius kivuensis*) and the Flat-backed Toad (*Amietophrynus maculatus*) were encountered within the project area. Both the reptile and amphibians recorded are of Least Concern as per IUCN Red List. There were no endangered reptiles and amphibians recorded, and even if they exist, it is unlikely that there will be a large population due to the landscape.

### 5.2.3 Land Use

The major land use in the project area is subsistence agriculture, growing mainly crops such as Maize, Irish potatoes, Sweet potato, Sorghum and beans. Eucalyptus woodlot on hilltops and valleys along wetlands. The woodlots are primarily for sale for building materials although sometimes, fuel wood is also harvested. Other crops grown include wheat, barley in the higher areas, vegetables in the wetlands, tree tomatoes (as a fruit) and bananas. Settlements are concentrated on the higher areas or hill tops while gardens are on lower slopes and in the valleys. Article 237 of the Constitution of the Republic of Uganda (1995), vests land ownership in Uganda citizens and identifies four (4) land tenure systems: Customary; Freehold; Mailo and Leasehold. Within the project area, there are no Mailo land holders. A total of 987 PAPs are in customary tenure. Section 27 of the Land Act Cap 227, as amended, protects the rights of women, children, and disabled persons regarding customary land. It states that any decision in respect to land held under customary tenure; whether in respect to land held individually or communally shall be in accordance with the customs, traditions, and practices of the community concerned. Except when a decision which denies women or children or persons with a disability access to ownership, occupation or use of any land, or imposes conditions which violate articles 33, 34, and 35 of the Constitution on any ownership, occupation, or use of any land shall be null and void.

Seven (7) PAPs are licensees. Licensees in the Bitsya Water Supply and Sanitation Project include relatives who have been given rights to carry out agricultural production as well as building a temporary structure but without necessarily having legal land rights

## 5.3 SOCIAL ENVIRONMENT

### 5.3.1 Socio-Economic Baseline Results

A household survey was undertaken as part of the ESIA and RAP where a total of 255 households were surveyed with the vast majority (87.84% of the survey respondents) being head of their households. The majority of the respondents were male at 75.69% and with female at 24.31%. In Uganda, even though there are more female than male in terms of population, most of the land and property assets are owned by male. This could explain why there are more male respondents than female respondents. Whereas the male own land, women will mostly farm on the land. Women who owned land in the project area either had purchased it with their own money or were widows.

Majority of the survey respondents are above 49 years (52%) with 48% below 49 years and 0% below 18 years.

Majority of the respondents (81.18%) are married, followed by the widows (12.94%), separated (1.96%), Widower (0.78%) while only 3.14% of the respondents surveyed are single. This implies that most of the respondents have families that will be affected by the project.

The vast majority of the Project Area survey respondents are Catholics 74%, followed by Protestants 22%, Born Again 3% and Moslems 1%. The presence of these different religions determines a lot

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when and how sensitizations and consultations should be carried out within the project area and which religious leaders to be involved.

The majority (67.84%) of Project Area households surveyed were born in the project area while 27.45% have lived in the community for ten or more years. This implies that majority of the respondents have knowledge about the project area and can be direct beneficiaries of the water project.

### 5.3.2 Population

Based on the Detail Engineering Design Report (February 2022), Bitsya piped water supply system will serve an area with an estimated population of 26,491 for the initial year 2024 and a design population of 50,003 for the ultimate year 2043. The current population of 23,963 for year 2021 which has been taken as the base population was obtained with the help of LCI officials during the baseline survey based on the population of the previous Uganda Bureau of Statistics (UBOS) census of 2014. The population growth rate in the project area was comparable to the district average population growth rate and has been maintained in the design review. Therefore, a population growth rate of 3.36% was used for population projection from the initial year until the ultimate year design horizon.

### 5.3.3 Economic Activities

Based on the Detail Engineering Design Report (February 2022), the majority of the population is engaged mainly in subsistence agriculture. Bananas are the staple food and cash crop in the area and also a source of a local brew from which some of the local people earn income. Additionally, there are small businesses dealing in general merchandise in the trading centres like Karungu. The area is not connected to the national power grid and thus the only option is use of diesel generators or solar power.

Although there is no gold mining within the catchment area for the water source, alluvial gold mining is common in Bitsya Sub County while stone quarrying and sand mining is common in both sub counties. It is reported that gold mining was a major economic activity for about 50% of the population in Bitsya and animal rearing where main animals reared are cattle, sheep and goats (Detail Engineering Design Report, 2022). A few households also reared chicken. The main methods of animal rearing were tethering while in a few places there were paddocks for dairy cows.

Based on the socio-economic survey done during the ESIA and RAP (May 2022), the major occupation of the household livelihood in the Project areas is subsistence farming (89. %) growing crops that include cassava, rice, maize, beans, ground nuts, sweet potatoes among others. Being largely peasant farmers, they consume domestically what they produce and sell the surplus in local markets for cash. Other activities include gold mining, petty businesses in the village and trading centres (4%), brick making, operating small kiosk grocery shop, and road side sale of farm products.

Farming is the key economic activity, although small numbers of Cattle goats, pigs, sheep, pigs, and chicken are kept. During the field survey it was observed that peripheral communities engage in several other casual activities like, masonry, brick laying, boda riding among others. The common market is readily available within the nearby markets and within the community members who use the products. Since most of the households consider farming as the main source of income, the project should have minimum impact on the crops in the project area. The surveyed population indicated limited access to market (19.6%) and low-quality seedlings (15.3%) alongside lack of knowledge on improving crops (15.7%) as the leading factors limiting their HH incomes among others.

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Plate 6: Alcohol brewing along streams, Lumbering, Livestock rearing and crop cultivation in the Project area

### 5.3.4 Health

Uganda continues to make small strides in improving key health indicators. According to a recently published FAO report, life expectancy is 60 years. The major causes of death are infectious diseases, such as HIV/AIDS, malaria, lower respiratory infections, tuberculosis, and diarrheal diseases. The overall disease burden, expressed as disability adjusted life years (DALYs) or years of healthy life lost, is about 20 500 DALYs. There are nine physicians for every 100,000 people. About 19% of the population uses basic sanitation services while less than half (39%) have regular access to drinking water<sup>4</sup>.

Table 45: Common diseases that affect Households in the Project Area

Disease	Frequency	Percentage
Malaria	161	63.14%
Flu/Coughs	77	30.2%
Headache	11	4.31%
Typhoid	6	2.35%
<b>Total</b>	<b>255</b>	<b>100%</b>

Based on the Detail Engineering Design Report (February 2022), the records obtained from Bitsya health Centre II showed evidence of the disease burden from Water borne related diseases such as diarrhoea, dysentery, typhoid, and intestinal worms. The diseases occur throughout the year and these affect about 80 people on average per month though no death has been reported. The diseases were

<sup>4</sup> FAO. 2019. The future of livestock in Uganda. Opportunities and challenges in the face of uncertainty. Rome.

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common in the rainy seasons (March to May and from August to December). The age group mostly affected were the under 5-year children.

Across all communities, malaria was the most commonly reported illness, followed by flu/cough, and headache. Respondents admitted the existence of other diseases flu, cough, and stomach disorders but insisted that malaria is the most rampant within their community.

The malaria rates align with the national averages reported in the 2016 UDHS study<sup>5</sup> which indicated that in Uganda, three out of ten children tested positive for malaria by Rapid Diagnostic Test (RDT). Malaria prevalence is higher among rural children (35%) than urban children (12%), and ranges from 1% in the Kampala region to 69% in the Karamoja region. It is highest among children whose mothers have no education (42%) and those from the poorest households (52%).

Despite the prevailing common diseases and vulnerability in the project area, several factors were forwarded by the surveyed population as the causes that limit their access to healthcare. 24% of the surveyed population attach cost as their highest limitation to access healthcare, while the absence of medicine or medical personnel at the healthcare facility equally affected 24% of the surveyed population and 20% attached the distance to the healthcare facility. among other reasons that limited them from seeking healthcare services. With the implementation of this project, many people will have atleast access to better sanitation as the area develops further for them to equally access better healthcare within reach.

### 5.3.5 Sanitation

90 According to the ESIA and RAP household surveys (May 2022), the overwhelming majority of survey participants (99%) have access to a pit latrine only, 1% has a flushing toilet. The percentage of survey respondents with access to a flush toilet is aligned with the national rural averages according to the 2016 UDHS. Only 19% of Ugandan households use improved sanitation. Urban households are more likely than rural households to use improved sanitation (27% versus 16%). Eight in ten households use unimproved sanitation: 20% use a shared facility, 55% use an unimproved facility, and 7% have no facility. Households without any form of sanitation and using communal pit latrines was mainly due to the heavy rains in the area destroying their form of sanitation such that they have to share or share with other members in the community. Therefore, the Project will supplement sanitation efforts by constructing 7 public toilet facilities.

Based on the Detail Engineering Design Report (February 2022), it was established that pit latrine sharing is a common practice and some households do not have latrines at all. Cases of sharing latrines among family members is widely practiced in both sub counties. One latrine is shared among parents and their children. Other categories who do not have latrines included those who are renting, those staying in trading centres and those residing in hilly and rocky places. Categories of people without latrines include immigrants/new residents, the poor, widows and the elderly majorly due to lack of money, weak soils, water logged grounds and rocky conditions. All these factors make it hard and expensive to construct latrines for these categories of people.

Lack of operation and maintenance (O&M) for public latrines, for example latrines which were constructed by Rotary International were in a bad state due to poor maintenance. Lack of latrines in sand and gold mining areas, and local distillers which leads to the practice of open defecation. These activities are practiced in the low lands and swampy areas which are isolated. Public latrine designs do not cater for PWDs. Lack of adequate funds for sensitization and construction of hygiene and sanitation demonstrations in communities. Some communities complained about invisibility of extension workers in their areas. Information about this is normally through radios and those without

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<sup>5</sup> Uganda Bureau of Statistics (UBOS) and ICF. 2017. 2016 Uganda Demographic and Health Survey Key Findings. Kampala, Uganda, and Rockville, Maryland, USA. UBOS and ICF.

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radios miss out on this information. Lack of partners to participate in WASH-projects in the district and the sub county.

Lack of transport means for extension workers since most places are hard to reach. Most people do not have HWFs near latrines and in homes. Most households do not have compost pits for dumping rubbish/garbage. Lack of adequate water for maintenance of personal hygiene. Hence not bathing was a key issue identified in all the FGDs. Most latrines at household level were almost collapsing, hygiene was poor and lacked privacy.

Table 46: Latrine Coverage in Bitsya Sub County

No	Parish	Village	HH with Latrines	HH with no Latrine
1	Bitsya	Kasana	91	31
		Rujuga	48	11
		Muziguru	98	22
		Kibandama	54	17
		Kabutega	51	3
		Kazirwa A	74	10
		Kazirwa B	21	1
		Kakuto	22	10
		Kanoni	70	35
		Bitsya	104	15
2	Kitega	Nyakabungo	14	2
		Kitega I	29	25
		Kitega II	84	12
		Karingoma A	57	17
		Karingoma B	65	5
		Kyanyabita	82	10
		Kanyanzi	53	17
<b>Total</b>			<b>1017</b>	<b>243</b>

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Source: 2019 Data Bitsya Health Department

Table 47: Availability of Latrines and HWFs in Households in Karungu Sub County

Parish	Latrine in place	No Latrine	% Sharing latrine	HWF
Kasharara	82.0	7.2	10.8	5.5
Katara	88.1	5.9	6.0	7.5
Karungu central	96.9	3.1	0.0	30.5
Rugongo	93.3	6.7	0.0	18.7
<b>Total</b>	<b>89.2</b>	<b>6.1</b>	<b>4.8</b>	<b>13.5</b>

Source: 2019 Data Karungu Sub county Health Department

A lot more waste water is expected to be generated when the piped water supply system is installed. The dominant traditional pit latrine type across the different parishes of Bitsya and Karungu Sub-counties did not differ significantly. Although the majority of households reported using some form of sanitation facility, most of the observed latrines were poorly constructed and maintained. They are largely made out of improvised structures of mostly mud, wood or polythene, usually built halfway to the waist level, without doors. Properly designed and constructed soak away pits are the

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recommended option for households, private and public institutions that are without water borne sewerage system for the disposal of the wastewater. Well designed and constructed lined pit latrines are recommended for households, private and public institutions without water borne sewerage system for faecal waste disposal. Promotional and sensitisation campaigns are necessary in the project area for the proposed interventions.



Plate 7: Some of the sanitation facilities within the project area of Buhweju District

### 5.3.6 Existing Water Sources

Based on the Detail Engineering Design Report (February 2022), the area has a number of water systems that households rely on. There is an existing pipe water supply system with a source at Kyenjwegyera. The system mainly supplies Karungu Sub County. However, the system has limited supply when compared to the water demand. The other sources of water for households in the communities include boreholes, shallow wells, protected springs, unprotected springs, traditional wells and open water surfaces. Thus, the surveyed area is blessed with a number of water sources. However, through inspection and observation, the study team found that a good number of these water sources are not functional, while others are seasonal and therefore, water supply is limited.

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According to the ESIA and RAP household surveys (May 2022), protected springs are the only main water source for 66%, followed by the ponds/dams (26%), river (5%) and tap (2%). The minority (35%) of the surveyed household surveys confirm that they share water sources with the animals. 41% of the surveyed household surveys buy water whereas the remaining 59% do not. 4% of the surveyed households assert that a cost for a jerry can of water is UGX 1,000 plus whereas 16% assert that it is between UGX 800-1,000, 5% assert UGX 700-800, 6% assert UGX 400-600 and 10% at UGX 100-300. The remaining 60% of the surveyed households do not know the cost for a jerry can of water.



Plate 8: Some of the existing water source in the project area.

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*Plate 9: Truck from Tumu Hospital collecting water from a spring*

### 5.3.7 Solid Waste Management

Based on the Detail Engineering Design Report (February 2022), of the 1,049 households that participated in the survey, 45% had compost pits, and gunny bags while others were disposing off garbage in the gardens. The district has no designated and or a well-developed landfill thus residents mainly practice indiscriminate solid waste dumping (usually along wetlands) and open burning. However, during construction activities the contractor can utilise the services of a private licensed waste handler that have access to a designated landfill for Mbarara City and or Kabwohe Town Council.



*Plate 10: Indiscriminate disposal of solid waste*

### 5.3.8 Energy Sources

Based on the Detail Engineering Design Report (February 2022), the majority of the households 94% (981) use firewood as the main source of energy for cooking. A small number 6% (66) use charcoal as the main source of energy for cooking, only 0.2 % (2) use hydropower as the main source of energy for cooking. It is not surprising that majority of the households are using firewood as main source for cooking, because the Census, 2014 reported that 85% of the rural population were using firewood as

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the main source of energy for cooking. The use of firewood as the main source of energy for cooking enhances environment degradation. Deliberate efforts to find alternative sources of energy must be made to conserve the environment.

According to the ESIA and RAP household surveys (May 2022), 97% Households in the project area use firewood as a source of energy for cooking. This is supplemented with charcoal (at 3%). The use of firewood is mainly due to its cost effectiveness and availability.

### 5.3.9 Communication Infrastructure and Transport

Based on the Detail Engineering Design Report (February 2022), the project area is well covered with mobile telecommunication network services (AIRTEL and MTN). Various FM radios and Television stations are received as well in the area. The main means of transport are taxis and pickups which connect to the neighbouring towns. Boda bodas are also used within the project area. The project area is largely connected to the Hydro Electric Power from the national grid.

### 5.3.10 Cultural Heritage

No cultural and/or historical sites were identified or reported by stakeholders within the proposed construction project sites. However, a Chance Finds Procedure (CFP) has been prepared and annexed to this ESIA report.

### 5.3.11 Education

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Majority of the respondents had attained up to primary six (P6) level of education (49%) according to the survey done during the ESIA and RAP (May 2022). These include all respondents that attained between P1 up to P6. 20% completed primary seven and attained the Primary Leaving Certificate awarded by the Uganda National Examination body (UNEB). Only 11% attained up to secondary level of education (between S1 up to S3) but did not complete the Ordinary Level of education. 3.9% completed the Ordinary Level of education. Only 0.4% completed Advanced Level of education, 2% attained a diploma in various fields while 6.7% had no education at all. while only 4.3% had attained a certificate in different fields of study either after completing A-Level (Advanced Level of education) or through the other options that are left open to anyone who desires to attain the same. Only 2.8% attained a Bachelor's degree. From the findings, majority of the respondents started education but did not complete primary education. The survey results align with the national dropout rate according to UNICEF's 2016 Annual Report, which indicates that 33% of students drop out before completing primary school. The level of education affects the mode of communication in the project area and how implementation of the project will be done.

Amongst the respondents who discussed factors limiting their access to education, 32% believe cost to be their main limiting factor, followed by long distance to education institutions (20%). Other limiting factors to education include low attitude (18%), work (13%), transport (8%), and early marriage (9%). When asked for details on attitudes that limit education, many families cited that a lot of young people do not value education and are only interested in get-rich-quick schemes by working as farmers or casual labourers and working in mines.

### 5.3.12 Vulnerables

Majority (68%) of the surveyed population had no vulnerabilities. However; necessary support should be accorded to the 32% with different types of vulnerability as 10% of the surveyed population were elderly people with limited support, 8% were widows, 7% were female headed households, 5% were

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orphans and only 1% had physical disabilities. Some PAPs have multiple vulnerabilities as shown below.

*Table 48: Summary of Vulnerable Households*

<b>Vulnerability Types</b>	<b>Count</b>
Elderly w/limited support	9
Elderly w/limited support Orphans	1
Elderly w/limited support Widow	2
Elderly w/limited support, Female HoH w/limited resources	5
Elderly w/limited support, Widow, Female HoH w/limited resources	2
Female HoH w/limited resources	5
Female HoH w/limited resources Widow	2
Female HoH w/limited resources Widow Physically Disabled	1
Female HoH w/limited resources, Elderly w/limited support	1
Orphans	7
Physically Disabled	1
Physically Disabled, Elderly w/limited support	1
Widow	9
Widow Elderly w/limited support	1
Widow Orphans	1
<b>Total</b>	<b>48</b>

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# 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. Abstraction of surface water and piped water supply system activities need proper and adequate management in terms of construction activities, occupation health and safety, solid waste management, water quality control, biodiversity management plans, socio-economic issues and re-alignment issues. During review of the engineering designs for the BWSS, the EIA team was actively involved. The environmental considerations were crucial in the process. The developer has further prepared an ESIA report which would be submitted and approved by NEMA and the funders.

## 6.2 NO PROJECT ALTERNATIVE

96 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 project area will be left in its original state. The alternative ignores all positive impacts likely to be realized in Buhweju District due to the proposed BWSSS like Income to material/ equipment suppliers, consultants and contractors; availability of skilled and unskilled job opportunities for residents, especially youths, in the project area during construction; improved quality and quantity of water supplied; reduced morbidity and increased productivity of households; and increased enrolment of children in educational institutions; better livelihood opportunities and induced development and employment opportunities. Besides, project development and operation will provide considerable economic opportunity for material/ equipment suppliers, construction contractors and other project-relevant professionals. The challenges brought about by using unsafe water like spread of communicable diseases and moving longer distances especially by women and children to collect water from wells and springs will be lessened and Small-scale irrigation schemes development in the area.

This option implies that the existing situation prevails (status quo remains) i.e. no construction of BWSSS. 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. BWSSS runs through less ecologically sensitive and no households will be displaced. The land will be secured by Buhweju District Local Government in consultation with Bitsya and Karungu Sub-Counties specifically, the land for the intake points, reservoir tanks, sedimentation tank and for the water offices. The transmission lines will pass along road reserves and to some extent in people’s croplands. However, a Resettlement Action Plan (RAP) has been conducted and the Project Affected Persons (PAPs) were identified and will be compensated where applicable.

The No Project Option is the least preferred option from both the socio-economic, health and partly environmental perspective because individuals, institutions and the business communities would be subjected to continuous access to unsafe and unreliable water sources and lack of access to sanitation systems. On this basis, the ‘No Project Alternative’ is rejected as option to be carried forward for the Project and project implementation option is maintained.

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## 6.3 ALTERNATIVE WATER SOURCES

Selection of an intake (water source) is a complex and lengthy process that involves the examination and balancing of a number of technical and environmental planning issues. One of the most important factors considered here is the yield (amount of water that can sustain supply for a long/specific period of time). The analysis of alternative sites looks at other possible sites that could have suitably been used to implement the project. The alternative water sources were considered and have been discussed exhaustively in sections below.

### 6.3.1 Review of the Potential Water Sources

The proposed water sources to be developed for water supply included; Rwakina, Rujuga, Nyarwambu River and Kagyera. All were visited by the water resources expert assisted by the deputy water officer Buhweju district. The field assessments such as observations, onsite discharge measurements per site are as presented in the subsequent subsections. Their potential yields were estimated and compared, and a selection made of the most reliable source for the proposed water supply scheme.

### 6.3.2 Rwakina Spring

Based on the observations made on water production rate by spring in comparison with projected demand, this water source may not be sufficient to be developed for water supply except if an onsite storage is provided to store runoff during the high peak flow seasons based on the detail engineering design report. Rwakina water source is a protected perennial spring but with very little water during high water demand seasons (dry seasons). The water is located in Ibogora village, Kasharara parish – Karungu s/c and with GPS coordinates 36M E217645 & N9961535.

### 6.3.3 Rujuga Springs

Three springs were identified as potential sources of water for the proposed scheme. Rujuga springs water source is an undeveloped spring inside a banana plantation. The site is located in Rujuga village, Bitsya parish, Bitsya sub County and with GPS coordinates 36M E213881, N9966152. Based on the onsite discharge measurements done during the site visit on 23<sup>rd</sup> of February 2021 by the water resources engineer, an average spring yield of 0.00193m<sup>3</sup>/s was obtained. Comparison of the spring yield with water demand indicates that, the water source may not be sustainable to serve all the proposed target area. There were three spring outlets given names at the time of measurements as spring 1, spring 2 and spring 3. Recorded time in seconds for different trials are indicated below.

Table 49: Discharge measurement results for Rujuga spring

Trials	Time			Volume collected (litres)	Discharge (L/s)			Total discharge (L/s)
	Spring 1	Spring 2	Spring 3		Spring 1	Spring 2	Spring 3	
1	33.12	48.11	70.62	30	0.91	0.62	0.42	1.95
2	34.3	50.13	73.01	30	0.87	0.60	0.41	1.88
3	29.68	51.19	72.66	30	1.01	0.59	0.41	2.01
4	29.24	56.98	89.34	30	1.03	0.53	0.34	1.89
Average	31.585	51.603	76.408	30	0.95	0.58	0.40	<b>1.93</b>

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### 6.3.4 Kagyera Spring

The water source is a community developed spring which is mainly used for domestic water supply. Its location is with GPS coordinates 36M E218151, N9958192 in Rwankondo TC. The spring is in the banana field originating from fractured rocks. The field discharge measurements using filling time method indicated a flow of approximately 0.0006m<sup>3</sup>/s.

### 6.3.5 Nyarwambu River

Discharge measurements were carried out at the upstream (bridge location) to ascertain the current flow of the river. The measurements indicated an average flow of **0.64 m<sup>3</sup>/s**.

Table 50: Average velocity of flow at proposed intake location of river Nyarwambu

Trials	Time (sec)	Length	Velocity (m/s)	Discharge m <sup>3</sup> /s
1	10.94	10	0.91	0.538
2	10.73	10	0.93	0.550
3	8.72	10	1.15	0.680
4	9.92	10	1.01	0.597
5	8.14	10	1.23	0.727
6	7.92	10	1.26	0.745
Average	9.395	10	1.08	<b>0.640</b>

The average cross-sectional area was computed to be **0.591m<sup>2</sup>**. Also, a factor of 0.85 was applied to convert the surface velocity estimated in the above table into an average velocity. The average velocity was obtained as 1.08 m/s by applying continuity equation. A design flow of **0.54m<sup>3</sup>/s** can be adopted for sizing of water supply scheme. Since the proposed downstream intake is not very from the upstream intake, minimal variations in both water quality and quantity especially surface flow are expected. Therefore, the above parameters can be approximately adopted for downstream intake except the flood.

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### 6.3.6 Field based water resources potential estimates

Based on the information obtained from district water personnel and some of the community, the only reliable sources of water are the nearby swamps which are used for domestic and livestock watering. The area is mountainous with limited potential of groundwater water such as boreholes except protected springs. Protected springs provide good quality water. Some of these are seasonal while others are temporal or remain with very minimal discharge to sustain the water demand even up to a village level.

### 6.3.7 Results of field assessment

The outcomes of the field assessments and results were compared with the projected water demand estimated of 2,200 m<sup>3</sup>/day or 110 m<sup>3</sup>/h. The combined discharge from 3 springs Rwakina, Rujuga and Kagyera is insufficient to meet the design discharge for the 20yr horizon. The assessment of the springs undertaken in the dry month of February indicated a discharge value of 200 m<sup>3</sup>/day which is much lower than the projected 20-year water demand. This indicates the springs are not a reliable source and are likely to dry out during the design period.

River Nyarwambu is a more reliable source and can yield about 55,000 m<sup>3</sup>/day which is much higher than the projected water demand of 2,200 m<sup>3</sup>/day. When compared with the water demand for the 20yr design period, it is possible that it can meet the project demand with other in-stream and environmental flow requirements met. The water quality of Nyarwambu is also acceptable as a water

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source when compared with national standards. Being a surface water source, treatment will be required.

Table 51: Summary of field assessments

Source	Yield (l/s)	Yield (m <sup>3</sup> /day)	Classification of in-situ water quality					
			PH	ORP (mV)	Electrical conductivity (mV)	Total dissolved solids (ppm)	Salinity (PSU)	Temp (°C)
Kagyera Spring	0.6	52						
Rwakina Spring	Very low	Very low	6.8	122.9	50	25	0	18.5
Rujuga Spring 1	0.95	82	7.48	97.8	30	15	0.01	19.69
Rujuga Spring 2	0.58	50	6.69	128.8	22	11	0.01	19.89
Rujuga Spring 3	0.4	35	5.95	172.9	33	17	0.01	19.3
Nyarwambu River	640	55,296	5.2	203.6	63	31.3	0.03	20.8
National water quality standard for potable water			6.5 - 9.2	400-800	<2500	<1500	<6	<25

### 6.3.8 Environmental and Social Considerations

The potential impact of the water supply scheme 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 water scheme infrastructure was judged to lie sufficiently distant from dwellings and settlements; that adequate separation distances could be achieved to avoid noise nuisance during both the construction and operation phase given the nature of the development. In addition, apart from the vehicle movements, the noise in this kind of project is minimal.
- **Site Topography:** The project areas especially for the intake is located on a lower altitude compared to the end users. More so the main reservoir will be located on a high altitude compared to end water users.
- **Land ownership:** The proposed site for the intake and other water infrastructure was secured by DWD and Buhweju District Local Government. 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. They are no resettlement issues.
- **Community Opinion:** Water supply systems elsewhere in Uganda have not attracted local concern and resentment among the local residents. Likewise, in the case of the Bitsya Water Supply System, the development would not have much significant negative impact on the dwelling and settlements. The communities consulted welcomed the proposed project.

## 6.4 TECHNICAL AND DESIGN CONSIDERATIONS

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 e.g. Water pipes, Storage Reservoirs, metal bars and fittings that meet the Uganda

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National Bureau of Standards (UNBS) requirements. Implementing the Water Supply System 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 enrolment of children in educational institutions, better livelihood opportunities and induced development and employment opportunities. Therefore, it will be paramount that DWD and the Operator ensure that the Water Scheme has the following in place:

- The sites are recommended for fencing in order to prevent contamination of the source and for the safety of hydraulic structures and installations for each of the project components.
- Well-designed drainage system at the Water offices
- 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 water infrastructure facilities
- There is a potential of utilising solar powered pumps and reference can be made about the proposed energy sources of energy for the water works under Section 3.2.3 (b).
- Well-designed access route from the main road.

## 6.5 THE ACTION ALTERNATIVE AS DESCRIBED IN THIS ESIA

This option implies that MWE 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. Reference to Section 3.3 on environmental flows provides more details. 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 damage to the environment. It is here thus we recommend that this alternative is the most appropriate.

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# 7 STAKEHOLDER 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 Buhweju District, Bitsya Sub County and Karungu Sub County. 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.

According to the household survey done during the ESIA and RAP (May 2022) indicate that the majority of households surveyed are very supportive of the Project at 95% whereas the remaining 5% of the households are somewhat in support of the Project. The very high support of the project implies that water is very much needed in the project and surrounding areas and that there will be minimal disturbances during the construction phase of the water pipelines. However, more sensitization is needed to bring the 5% to support the project so that there is full support for the project.

## 7.2 STAKEHOLDER 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 Bitsya Water Supply System components are to be located and therefore impact on the communities. It further helps them to understand how the MWE and the project team will operate to the highest possible environmental, social, health and safety standards prior, during and after the construction of the Water Supply System 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. 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:

- Who could be adversely affected by environmental and social impacts?
- Who are the most vulnerable among the potentially impacted, and are special engagement efforts necessary?
- Which stakeholders can best assist with the early scoping of concerns and impacts?
- Who strongly supports or opposes the changes that the project will bring and why?
- Who is it critical to engage with first, and why?

### 7.3.2 Stakeholder Analysis

The stakeholder categories and sub categories identified are presented in Table 52 below.

Table 52: Stakeholder Matrix

Category	Stakeholder	Description and key attributes
Funder	World Bank	<ul style="list-style-type: none"> <li>▪ To ensure that the Banks Operational Safeguards have been observed and implemented as appropriate.</li> <li>▪ Support the project with funding</li> </ul>
National Level Stakeholders	Ministry of Lands Housing and Urban Development (MoLHUD)	<ul style="list-style-type: none"> <li>▪ Approves all reports presented by the consultant regarding valuation</li> </ul>
	Ministry of Gender, Labour and Social Development (MoGLSD)	<ul style="list-style-type: none"> <li>▪ Protection of human rights and vulnerable social groups.</li> <li>▪ Occupational and community health and safety of roads.</li> <li>▪ Approval and monitoring of the social safeguards</li> <li>▪ Approval of permits like workplace permits, OHS</li> </ul>

	Ministry of Water and Environment (MWE)	<ul style="list-style-type: none"> <li>▪ Overall mandate to monitor, assess and regulate water resource</li> <li>▪ Monitor and guide the use of wetlands for sustainability and other water bodies within the project areas</li> <li>▪ Approval of the Water abstraction permits</li> <li>▪ The implementer of the Project</li> <li>▪ Overseeing and monitoring the project activities</li> </ul>
	NEMA	<ul style="list-style-type: none"> <li>▪ Regulation of the environmental aspects of the project(s).</li> <li>▪ Legally mandated to handle certain critical environmental issues</li> <li>▪ Provide the necessary permits and approvals for quarries, borrow pits and other auxiliary sites</li> <li>▪ Work closely with the project team to handle all matters related to environmental protection</li> <li>▪ Overall clearance of ESIA and other project briefs about the project facilities.</li> <li>▪ Monitor and supervise the ESIA's compliance</li> </ul>
Local Governments	District (Buhweju District Local Government)	<ul style="list-style-type: none"> <li>▪ Mobilize various stakeholders including the communities/beneficiaries</li> <li>▪ Monitoring and supervision support for the implementation of the projects.</li> <li>▪ Offer security to the project team (RDCs Office)</li> <li>▪ Review the ESIA and give comments (Environment Office)</li> </ul>
	Bitsya and Karungu Sub Counties (Technical and political staff)	<ul style="list-style-type: none"> <li>▪ Make decisions that may affect the project,</li> <li>▪ Offer support and supervision of the project</li> <li>▪ Help in the identification of the location of the water and sanitation facilities.</li> </ul>
	Local Councils	<ul style="list-style-type: none"> <li>▪ Mobilize communities</li> <li>▪ Offer support in the planning, implementation and operation of the project</li> <li>▪ Offer support in the identification of the locations of the water and sanitation facilities</li> <li>▪ Monitoring of the projects</li> <li>▪ Provide social justice to vulnerable communities</li> <li>▪ Incorporate information about the project in their teachings, gatherings/meetings for acceptance especially regarding water and hygiene-related information.</li> </ul>
Different Community groups	Traders, landlords, tenants, business people, affected persons (Landowners who offered land for the pro-poor facilities' installation)	<ul style="list-style-type: none"> <li>▪ Develop construction (works) schedules in their respective areas.</li> <li>▪ Participate in the scheduled meeting regarding the project activities and progress</li> <li>▪ Identify mitigation measures of the</li> </ul>

		environmental and social issues <ul style="list-style-type: none"> <li>▪ Monitor the progress of the project activities</li> <li>▪ Input in the planning and identification of water and sanitation facilities.</li> </ul>
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### 7.3.3 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 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 RAP and ESIA, water-related studies, 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 these meetings as seen in the minutes under annex 3.



Plate 11: Stakeholder meeting held at Buhweju District, and introduction of the Consultant by MWE



Plate 12: Community Consultations with the Local Communities at Bitsya S/C offices



*Plate 13: Community Consultations with the Local Communities at Karungu S/C offices*

### 7.3.4 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 LCV Chairperson's office of Buhweju, the District Engineers office, the Office of Public Health, CDO, Environmentalist among others.

### 7.3.5 Community Meetings

Communities were sensitized about the project to ensure the participation and active involvement of the local community members in the baseline survey and subsequent water interventions. Mobilization of the communities was done through the chairpersons of the respective villages. Both women and men attended these meetings and a number of issues were raised. All the community meetings were conducted in local and understandable language.

### 7.3.6 Feedback from the 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 to the local leaders and community members, the establishment of the water scheme is expected to have the following benefits:

- Improved access to clean and safe water
- Improved health conditions due to access to safe clean water
- Employment during construction and operation of the water scheme
- Eradication of poverty and improved livelihoods of the local people
- Reduced expenditure on water and medical bills due to diseases
- Reduced time spent walking long distances to wells and Springs
- Reduction of child mortality
- Ensure environmental sustainability

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

- Poor waste management practices at construction sites

- Destruction of existing vegetation especially when establishing the intake
- Soil erosion due to loss of vegetation
- Land degradation,
- Dust and vehicle emissions,
- Increase in noise and injuries on duty,
- Increased spread of communicable disease,
- Visual impacts, Issues of land use and destruction of peoples crops along distribution lines.

However, there were issues that cut across during the community consultation meetings and these are:

- *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.
- *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.
- *Payment of compensation awards whether in cash or at bank accounts* - This varies with the magnitude of the compensation awards. However, bank accounts are preferred for safety and easier accountability.
- *Connection to water for households far away from the built system* - Upon completion of the water 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.

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 the Table 53 below.

Table 53: A summary of key environmental and social issues raised by stakeholders

Stakeholder	Issues and comments
Mr. Deo Chairperson ( <i>L.C.V Atuhaire</i> )	<ul style="list-style-type: none"> <li>• He acknowledged in the meeting that Buhweju District is one of the Most Water Stressed Districts in Uganda and welcomed MWE and the Project objectives in the district.</li> <li>• The Chairman was mainly concerned about poor communication flow between the District and the MWE to the extent these changes locations of water sources had not been communicated to the district and other stakeholders well in time.</li> <li>• He therefore requested that going forward, it is important the MWE and all consultants keep the district and other stakeholders updated.</li> <li>• He requested the MWE provides the district with a summary Project Brief/Brochure for their records and reference.</li> <li>• He requested the MWE to urgently plan Engagement Meetings with previous PAPs who will now no longer be affected due to design changes. The meetings should have the focused participation of the district leaders to avoid any hostility or resistance from the formerly affected persons who have been anticipating compensation.</li> </ul>
Mr. Henry Ddamba ( <i>Chief</i> )	<ul style="list-style-type: none"> <li>• He communicated to the meeting that he was still new in the district</li> </ul>

<i>Administrative Officer)</i>	and welcomed the project.
Mr. Nicholas Bashongoka ( <i>District Community Development Officer</i> )	<ul style="list-style-type: none"> <li>• He welcomed the project and pledged support for community mobilization</li> <li>• He did not have any comments as the project was still at inception</li> </ul>
Ms. Birungi Clemencia ( <i>Senior Environment Officer</i> )	<ul style="list-style-type: none"> <li>• She is aware of the project however, she has no comment since she has not visited the water source.</li> </ul>
Ms. Brendah Namara ( <i>Environment Officer</i> )	<ul style="list-style-type: none"> <li>• She had no comment at the time of the ESIA studies.</li> </ul>
Mr. Nuwamanya Venansio ( <i>Bitsya Sub County Community Development Officer</i> )	<ul style="list-style-type: none"> <li>• I worked together with the consultant that was visiting various sites to select which site to get water from and I am currently working with the Karungu Sub County CDO and the RAP team.</li> <li>• There is need to agree with the owner of the farm where the water treatment facility and water tanks will be constructed and these should be compensated for the loss of land.</li> </ul>
Ms. Atuhwera Vitus ( <i>Karungu Sub County Health Assistant</i> )	<ul style="list-style-type: none"> <li>• The project will provide access to safe and clean water for the communities thus will reduce on the disease burden for water related diseases.</li> </ul>
Mr. Twesiime Addams ( <i>Karungu Sub County Chief</i> )	<ul style="list-style-type: none"> <li>• The project is welcome and it is important that the MWE works together with the Sub County in implementing this project.</li> <li>• He did not have any other comments but he is aware that his staff at the Sub County are already working with the RAP team and the Local Council One Chairpersons in the field.</li> </ul>
Mr. Bagarukana Tarasisio ( <i>Chairman LC III</i> )	<ul style="list-style-type: none"> <li>• He is aware of the project and he has not received any complaint from the community and he had no comment.</li> <li>• His people have suffered for a long time without good water.</li> </ul>
Community Members of Karungu Sub County	<ul style="list-style-type: none"> <li>• Water is life and so the project is welcome</li> <li>• Requested that water should be for free</li> <li>• There is a water project in this area which is tapped from Kyenjogyera, so they requested the two water projects to integrate and run together</li> <li>• Jobs especially casual works should be given to the local people</li> <li>• We request that all the villages in this sub county get water. A group of ministry water said there will be public toilets in public institutions. We request its implemented</li> <li>• Activity alternatives which may be considered and financed are; Zero grazing, fish farming, bee keeping and also juice packing machines to replace brewing.</li> </ul>
Community Members of Bitsya Sub County	<ul style="list-style-type: none"> <li>• Community expects safe and clean water</li> <li>• The community expects jobs both skilled and unskilled</li> <li>• They expect water which is near their homes/houses and reduce on distances moved and save time for productive work.</li> <li>• The community expects water which is frequent/regular</li> <li>• They expect compensation of property destroyed like plantations and coffee</li> <li>• The contractor should employ workers with discipline</li> <li>• There should be replacement of activities/alternative of livelihoods in case there some activities are leading to compromise quality and quantity of water are stopped</li> </ul>

	<ul style="list-style-type: none"> <li>• There should be places gazetted for watering of animals</li> <li>• Juice packing machines should be brought in case brewing of alcohol is stopped alongside the rivers</li> <li>• Taps of water should be extended to others areas to facilitate brick laying outside the rivers</li> <li>• The project area should be supplied with bee hives as an alternative activity</li> <li>• Every home or two families should be given a tap to reduce congestion of people in water collecting points since its COVID error</li> <li>• Find farming should be financed as an activity alternative</li> <li>• Zero grazing practices should be encouraged in the project area (financed and extending water to the farming).</li> </ul>
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All the stakeholders consulted supported the project on the basis that it would induce development in their area/district and lead to the establishment of more related projects. However, it was mentioned that the developer should be able mitigate all project related negative impacts such as waste generation, noise, destruction of crops during trench digging and pipe installations and any other negative impact as would be realized.

## 7.4 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:

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- 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 Buhweju 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. KIIs and FGDs were utilized for PCDP. A scoping exercise was undertaken on 8<sup>th</sup> and 9<sup>th</sup> February 2022, and then the consultative meetings on 29<sup>th</sup> March 2022 until 13<sup>th</sup> April 2022 at both Karungu and Bitsya sub counties and were aimed at disclosing key project information (such as changes in the water source etc.) and to generate a master list of Stakeholders to be consulted. 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 29 above.

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### **Grievance Redress Mechanism**

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, Buhweju District Local Government and Bitsya and Karungu Sub Counties.

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 Chair, the IWMDP Project Coordinator, the assigned Resettlement Social Development Specialist, 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.

### **Community Grievance Redress Mechanisms**

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 Buhweju 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 misbehaviour, defilement/child abuse, and others. The project GRMs will have other measures in place to handle sensitive and confidential complaints, including those related to Gender based violence, Sexual Exploitation and Abuse/Harassment ( GBV,SEA/SH), Referral pathways based on the survivor centred approach will be incorporated in the GRM proceses and disseminated in the stakeholder enagement plan. Existing legal and administrative structures will be contacted to resolve grievances of a criminal nature.

### **Workers Grievance Redress Mechanism**

In accordance with the Employment Act (2006), the MWE/RWSSD shall ensure that the Contractor has provided contracts to all workers and has established a GRM and grievance redress committee with

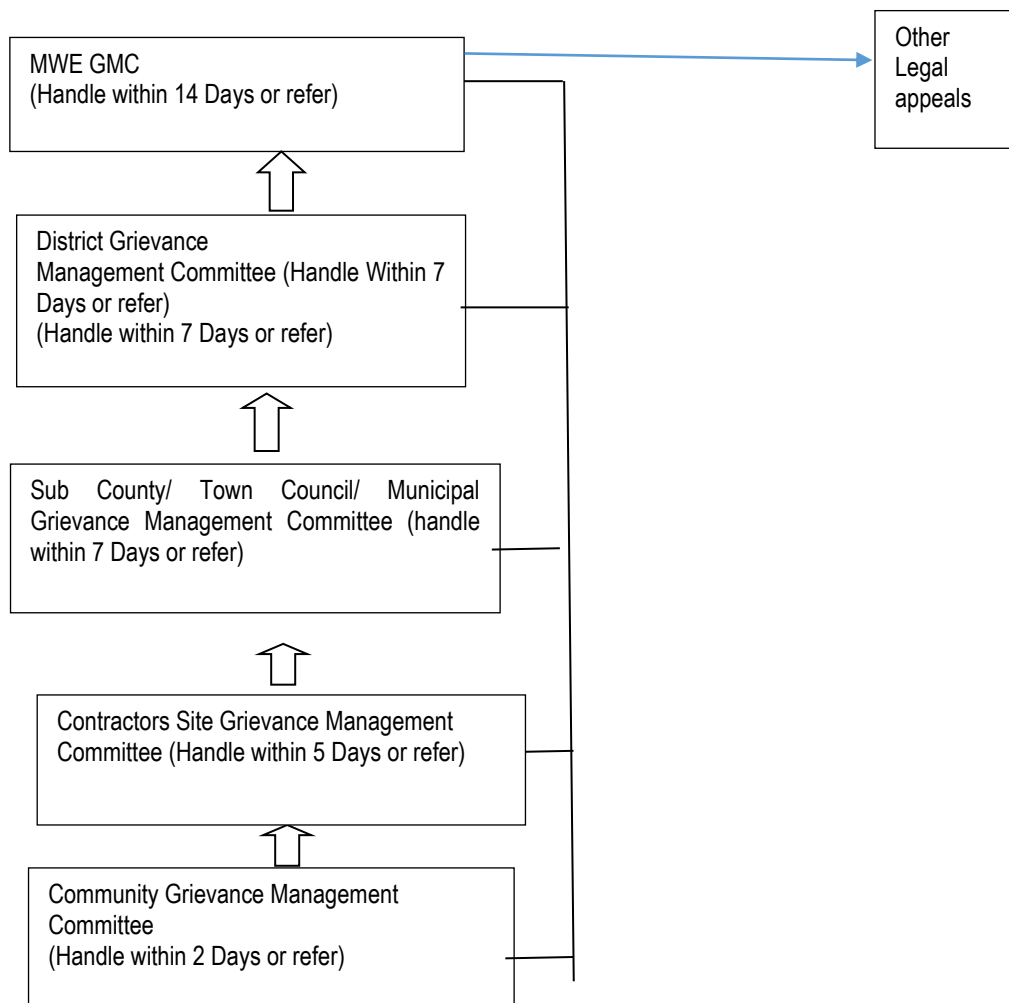
workers representation. It is the responsibility of the Contractor(s) to ensure that Workers GRMs and with redress and appeal processes and institutions is in place and shared with MWE/RWSSD before the commencement of the Construction Phase.

The steps in grievance handling for the PAPs and the community in general are outlined in Table 54 below and once received, all grievances will be responded to in a maximum of 19 days.

Table 54: 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 (19 days)	MWE, RAP Implementation Consultant, and GMCs
6	Corrective Actions, Grievance Follow Up and Closure	MWE

**Flow of Appeals or Referral of Grievances and Timelines**



# 8 ANTICIPATED ENVIRONMENTAL AND SOCIAL IMPACTS

## 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 the Chapter 9. The ESMP seeks to translate mitigation measures into actions. Prediction and analysis of possible positive and negative impacts of construction of the water treatment plant and intake works at River Nyarwambu in Bitsya parish 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.

An improvement in potable water supplies and sanitation may generate interrelated improvements in health, 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 potable water supply and sanitation on health depends on the quality and quantity of the piped water supply; the proportion of population covered; and the utilization of the water and sanitation facilities by the population. In this chapter, prediction and analysis of possible positive and negative impacts of construction and operation of the water extraction and treatment system, water reservoir and establishment of transmission lines is presented, with main focus on the proposed construction of the water treatment plant and intake works at River Nyarwambu. Table 55 below provides a summary of the Positive benefits that will be realised as a result of implementation of this project.

*Table 55: Positive Impacts of the Proposed Project*

No.	Impact	Remarks
1.	Increased access to clean water	<ul style="list-style-type: none"> <li>▪ Elimination of current water shortages.</li> <li>▪ Improvement of water quality.</li> <li>▪ Reduce the time spent and distance travelled to fetch water, which would signify an improvement in the general living conditions of the people.</li> <li>▪ Improvements in public and household sanitation.</li> <li>▪ Awareness of personal hygiene.</li> <li>▪ Overall improved health conditions for the beneficiary population.</li> <li>▪ 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.</li> </ul>
2.	Employment opportunities and increased household incomes and revenues	<ul style="list-style-type: none"> <li>▪ The use of appropriate labour intensive methods for some of the construction activities (e.g. construction of the intake point and Reservoir and sanitary facilities) would present</li> </ul>

		<p>employment opportunities for local people and generate direct income benefits to local households.</p> <ul style="list-style-type: none"> <li>Some people will be employed in the digging of the transmission and distribution network, sand and stone quarries, and sale of earth materials to the proposed project and in the service sector around the project site.</li> </ul>
3.	Income to material/ equipment suppliers and contractors	<ul style="list-style-type: none"> <li>Earth materials needed for construction, for example, aggregate (stones and sand) will be obtained from quarry operations.</li> <li>Number of equipment and materials (such as gravel, bricks, plumber, steel reinforcement and cement for civil works) will be sourced locally within the district and the neighbouring districts.</li> </ul>
4.	Increased Public Revenue / Taxes	<ul style="list-style-type: none"> <li>People who have never worked on such projects would acquire such skills, which they would use to seek employment in future.</li> <li>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.</li> </ul>
5.	Boost to the local Economy	<ul style="list-style-type: none"> <li>Provision for direct employment opportunities to the workforce thus contributing towards alleviation of poverty and income generation for the local community;</li> <li>Stimulation of business activities related to contracting works for local entrepreneurs (sub-contractors);</li> <li>Providing trading opportunities for local communities and other small enterprises in the area;</li> <li>Providing opportunities for provision of basic and other services for the contractors and immediate community. The project will consider employment of locals.</li> </ul>
6.	Gender Benefits	<ul style="list-style-type: none"> <li>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.</li> <li>It will mean more opportunities for girls to attend schools and more time for women to engage in other economically and educational beneficial activities.</li> </ul>
7.	Health Benefits	<ul style="list-style-type: none"> <li>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.</li> <li>Loss of productivity resulting from sickness related to water-borne diseases and expenditure on related medical care will therefore reduce.</li> </ul>
8.	Improved service delivery	<ul style="list-style-type: none"> <li>The proposed project would result in bringing improved water and sanitation services closer to the people.</li> </ul>
9.	Eradication of poverty and improved livelihoods of the local people	<ul style="list-style-type: none"> <li>The proposed project would result in an increase in the volume of water for production which could result in improved livelihoods of the local people and the refugees.</li> <li>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</li> </ul>

		project would, therefore increase productive activities through reduced sick days and time saved in fetching water.
10.	Combat HIV/AIDS, malaria, typhoid, and other diseases	<ul style="list-style-type: none"> <li>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).</li> </ul>
11.	Ensure environmental sustainability	<ul style="list-style-type: none"> <li>Implementation of catchment and water source protection measures would ensure reliability to the water source.</li> </ul>
12.	Develop a global partnership for development	<ul style="list-style-type: none"> <li>The Project would provide opportunities for the GoU and the different Implementing Agencies (IAs) to work together to achieve the sustainable development goals (SDG) specifically SDG 6.</li> </ul>
13.	Increase in investment in the area standard of living	<ul style="list-style-type: none"> <li>MWE will invest heavily in the construction of the water supply systems which would involve use of locally available materials.</li> <li>The business community could take advantage of the proposed development to establish businesses that would otherwise be impossible without safe piped water.</li> </ul>

## 8.2 ANTICIPATED POTENTIAL BENEFITS

### 8.2.1 Positive Impacts during Construction Phase

The anticipated positive impacts of the construction phase for the proposed water supply system may be permanent but 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, if these issues are not properly addressed, the impacts (positive or negative) may 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 is a positive but short-term and reversible socio-economic impact. Contract provisions for the construction works require most of the labour force (at least 50%) to be drawn from the local population with particular emphasis on youth and women. Since construction is estimated to take a certain number of months, this phase will provide short-term job opportunities for local people. The project is estimated to employ around 100 workers during the construction phase.

Furthermore, indirect opportunities for employment will be stimulated in the other sectors related to construction, such as manufacturers 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.

#### *Enhancement measures*

- 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, plumbers) in the project area could be facilitated by the project

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to ensure skills transfer during the construction period.

### **b) Income to material/ equipment suppliers and contractors**

The scale of construction works is moderate in the proposed project area. 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, plumber, steel reinforcement and cement for civil works) can be sourced locally within Buhweju 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 measures*

- Earth materials needed for construction, for example, 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 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.

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#### *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**

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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 proposed water supply system, 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.

## **8.2.2 Positive Impacts during Operational Phase**

### **a) Improved health status of households in the project communities**

The provision of an adequate, safe water supply and sanitation facilities 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 of 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 in the proposed project area.

#### *Enhancement measure*

- Educate users on the proper use, regular cleaning and effective maintenance of both the household and public facilities.

### **b) Educational enrolment and attendance**

Construction and Operation of the proposed water system will lead to considerably increased and consistent access to safe water for the proposed project 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 constructing the piped water supply. Consequently, time spent on searching and waiting for water by women and children will be saved. This

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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 as scholastic material, teachers) school attendance and performance will improve.

### **c) Acquisition of new skills**

Most water supply and sanitation projects 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.

#### *Enhancement measure*

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

### **d) Improvement in household economic status**

The increased provision of potable water supply and sanitation 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 scale gardens: The increased provision of piped potable water supply may have positive beneficial impact on the irrigation of small scale gardens 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. Furthermore, there is a possible increase in agricultural productivity due to use of sludge as manure that will be generated during the water treatment process.
- 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 measure*

- 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.

### **e) Employment opportunities**

Operation of the constructed water supply system will create additional long-term technical and non-technical job opportunities for professionals, casual labourers, etc. Staffing will be required in the area to operate the constructed water supply system 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; Making extensions to the system or assets; Attending to all customers; Keeping records of the operations of the system; and Writing status 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.
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## **f) 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 almost on a daily basis often from sources distant from their houses. 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).

## **g) 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).

## **h) Increase in investment in the area**

Through the MWE investing heavily in the construction of the proposed water system which would involve use of locally available materials, the business community will take advantage of the proposed development to establish businesses that would otherwise be impossible without piped water.

## **i) Environmental sustainability**

The skill for managing water supply and sanitation 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.

## **j) 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.

## **8.3 ANTICIPATED NEGATIVE IMPACTS**

### **8.3.1 Negative Impacts during Construction**

#### **A) Soil Degradation**

The laying of water pipeline from the water treatment plant and associated facilities will result in direct disturbance of soil. Site preparation will involve clearing of strips of vegetation to allow for excavations to begin. Soils excavated may be heaped besides the trenches hence exposed to agents of erosion such as wind and storm water. However, prolonged storage of topsoil can lead to a loss in fertility of the soil as nutrients become leached out by rainfall. This process can lead to impaired vegetation growth once the soil is reinstated. In addition, prolonged topsoil storage can lead to the loss in viability of the seed bank contained within this soil. Also, equipment engaged in activities might cause light contaminations of soil due to leakage of fuels and lubricants from equipment. Topsoil stripping during levelling and grading of the right of way (ROW) and the excavation of subsoil during trenching will break up the soil structure. Depending on the nature of the soil, this may lead to a temporary increase in erosion.

*Impact significance:* These are short term and direct impacts. Given that similar activities have already

taken place and considering the project footprint, receptor **sensitivity** is assessed to be **very low**. The impact **intensity** is **low** given that MWE will employ a well-qualified contractor to carry out the construction activities of the project, the duration of exposure of stockpiles being short and also that areas to be impacted will not be used for agriculture giving rise to **minor** impact significance.

		Sensitivity of receptor			
		Very low 1	Low 2	Medium 3	High 4
Intensity of impact	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 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

*Mitigation strategies:*

- Topsoil and subsoil will be stockpiled for re-use in backfilling and reinstatement;
- To preserve soil structure: there will be minimum handling of soils; loose tipping of soils, that is, without compaction will be employed and temporary spoil heaps will not be higher than 3m;
- Contractor will avoid use of old equipment or even damaged equipment that is most likely to have oil leakages thus contaminate the soils;
- The contractor will be required to develop a waste management plan prior to start of construction activities;
- Contractor will ensure that equipment is properly maintained and fully functional in accordance with the manufacturer’s recommendations;
- During reinstatement, the trench back-fill material will be compacted to a level similar to the original surrounding soils to avoid subsidence as a consequence of rain water channeling.
- Recreation of a stable landform that mirrors the pre-disturbed condition as this will minimise the risk of preferential erosion and therefore facilitate natural re-vegetation.
- Topsoil will be protected through separation from subsoil and storage in a manner that, as far as possible, retains the soil structure and minimises the risk of topsoil loss. The trench will be subsequently backfilled with subsoil, followed by topsoil. In order to prevent loss of fertility and degradation of the seed bank within stored topsoil (where present), the topsoil will be stored for as short a time as possible, allowing for engineering constraints.
- In the re-establishment of the pre-construction condition, vegetation cover particularly the variety and distribution pattern of plant species that existed before will be used.
- Wherever practical, the subsoil will be graded during reinstatement to reflect the original profile across the working width and all other construction areas. In steep areas with highly erodible soils, the ground will be carefully profiled to ensure that the integrity of the pipeline is not compromised.
- Upon completion of subsoil and topsoil reinstatement, disturbed areas will be inspected jointly by the construction contractor and MWE personnel for slope stability, relief, topographic diversity, acceptable surface water drainage capabilities, and compaction.

Adoption of the above mitigation measures will reduce impact intensity to “very low” resulting in a residual impact of negligible significance.

**b) Generation of Noise**

Due to the nature of the construction process, noise levels will fluctuate in line with the combination of

machinery or equipment being used at any one time. Noise and vibrations will mainly result from use of equipment like excavators and including bulldozers, graders and dump trucks during site preparation and construction activities. However, noise levels will also vary depending on time and distance as the construction spread progresses along the pipeline route thus the local residents will not, therefore, be continually exposed to the noise levels for extended periods.

Construction traffic associated with the pipeline 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. Roadside pipe laying activities (such as dust, noise, potential for accidents especially at night), access to schools, markets, shops, etc. night time safety, storage of excess excavated materials on road side, storage of pipes and supplies during pipe laying, equipment parking, etc. are envisaged however, the impact is assessed to be much lower than the construction site limit of 85 dB (A) including the receptor sensitivity.

*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.

		Sensitivity of receptor			
		Very low 1	Low 2	Medium 3	High 4
Intensity of impact	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 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

*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.

### C) Improper Management of Construction Waste

Solid waste and spoil will be generated at the site during site preparation and construction phases. The waste may consist of timber or metal cuttings, excavated materials, paper/cement bags and solvent containers among others. Some of the waste materials such as cement, adhesives and cleaning solvents contain hazardous substances, while some of the waste materials including metal cuttings and plastic containers are not biodegradable and can have long-term and cumulative effects on the environment. Other wastes which will be generated by non-construction activities because of the presence of the workers at the site include food debris, contaminated water from washing, cleaning equipment, construction tools and vehicles.

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

		Sensitivity of receptor			
		Very low 1	Low 2	Medium 3	High 4
Intensity of impact	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 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

*Mitigation strategies:*

- The wastes will be properly segregated and separated to encourage recycling of some useful waste materials, that is, some excavated material can be used as backfills.
- The contractor and MWE will work hand in hand with the District to facilitate sound waste handling and disposal from the site. All wastes must be taken to the approved dumpsites and proof of safe disposal should be secured.
- Hazardous wastes such as paints, cement, adhesives will be managed through a third party contractor certified by NEMA to handle hazardous waste. The contractor and MWE should work hand in hand to facilitate sound waste handling and disposal from the site.

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

## D) Contamination of Water Resources

There is a potential for pollution from chemical contaminants at all stages of the project. Spillage of fuel, lubrication oil or wastewater is potentially important at the watercourse crossings, pump station, and block valves during construction and testing. Contaminants introduced by construction could migrate into key receptors such as the Nyarwambu River/swamp. Activities associated with construction have the potential to produce groundwater and surface water contamination. The principal potential contaminants associated with the construction activities are as follows: Fuels and lubricating oils, Domestic wastes, Welding wastes and field welding and coating materials, Paints and solvents, Hydro testing chemicals if used (e.g. biocides, oxygen scavengers and corrosion inhibitors).

Removal of vegetation whose root systems bind the soil may increase the rate of erosion by water or wind in the area. During heavy rainfall, the loss of the moisture retaining function of the vegetation may lead to increased surface run-off, carrying with it eroded soil particles into the Nyarwambu River. During construction, there may be need to stockpile assorted materials on site. There is a potential pollution risk if construction materials are not stored or handled responsibly such as to lead to stockpiles wash away. The fuels (mainly diesel) and lubricating oils required by the construction equipment have the potential to contaminate nearby water resources (Nyarwambu River) if they leak or are spilled during handling or use. Transportation of pollutants with runoff would affect the water quality hence the communities/ livestock depending on it. General wastes may have the same effect if not handled properly.

*Impact significance:* The gently sloping terrain makes soil erosion and sedimentation likely impacts (Section 4.2.1). The **sensitivity** of the receptor is **medium** because of the Nyarwambu River close to the site and various agricultural activities (crop cultivation and livestock grazing and watering directly) at the in-take point. The **intensity** of the impact is assessed as **medium**. Given the size of Nyarwambu River, intensive sedimentation would have far reaching effects in addition to its flooding nature during the rainy season but the activities taking place in its catchment already largely contribute to the sediment transport. This results in **moderate** impact significance.

		Sensitivity of receptor			
		Very low 1	Low 2	Medium 3	High 4
Intensity of impact	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 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

### *Mitigation strategies:*

The contractor will have a contractual obligation to develop and implement a Construction Management Plan (CMP) to include the following:

- Equipment, materials and chemicals must not be stored within 30 m of a watercourse bank;
- Construct a proper drainage system around the site and to the final storm water retention or disposal point to stop direct run off into the nearby land and water courses;
- All construction equipment will be kept in good operating condition to avoid oil or fuel leakages that might contaminate water resources;
- Materials like sand and aggregates will be kept in bounded areas to avoid being washed away into

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water resources by runoff;

- MWE will ensure the contractor complies with its environmental management policies e.g. the National Environment (Wetlands, River Banks and Lakeshore management regulations, 2000).
- River crossing points have already been determined through pipeline routing surveys to ensure that the crossing points minimise the impact on sensitive hydrological and ecological features. This includes adequate design controls to minimise the impact on the hydraulic regime of the rivers. The contractor will put in place temporary crossings to minimise the impact.
- Any cleaning and hydro test water which could cause contamination of surface (or ground) waters will be tested and treated as necessary prior to discharge, including debris and sediment removal.
- Washing will not be done along the working area but will be restricted to workers' camps and on paved areas to control runoff;
- The pipeline construction activities at certain river crossings, in particular the Nyarwambu River, will reflect their highly seasonal flow regimes. Wherever possible, construction of the pipeline crossings will be undertaken during periods of low flow.

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

### **E) Air Pollution**

The most significant issues that could potentially impact on air quality and climate during construction are combustion gas emissions and nuisance dust. During the construction phase there will be an increase in road traffic associated with material and equipment haulage. The principal sources of combustion gases are the exhausts of vehicles and construction equipment, power generation at the work camps and pipe storage yards and waste incineration. Dust will be generated as a result of vehicle movements and typical construction activities (e.g. stripping, compacting and trenching etc.).

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Construction activities and vehicle movements can cause dust agitation in addition to that already caused by the wind. It is likely that this will be exacerbated as a result of clearance of the ROW. Once airborne, dust will generally travel downwind before resettling. The distance travelled depends primarily on wind speed and particle size. For example, smaller particles and strong winds result in greater dilution effects but mean that the dust is deposited over a larger area. Dust may cause nuisance on a local scale in certain areas along the pipeline due to the nature of the fine clayey, silty and sandy soils that are present. The potential impacts are nuisance to people in the area, coverage of crops (possibly leading to reduced yields) and deposition on natural vegetation and small animals, including bees.

Although emissions of carbon dioxide (CO<sub>2</sub>) and methane (CH<sub>4</sub>) are generally accepted as contributing to global warming the effect has not been quantified. To reduce the threat of global warming it is widely agreed that emissions of greenhouse gases need to be reduced on a global scale. Each individual greenhouse gas has a different potential effect on climate per unit released. Global Warming Potential (GWP) provides a means of equating the potential contribution to global warming arising from different process units/activities which can generate different emissions. GWP is measured in terms of equivalent emissions of CO<sub>2</sub>; hence the GWP factor of CO<sub>2</sub> is 1. CH<sub>4</sub> has a GWP factor of 21 –that is, an emission of 1 kg of methane (CH<sub>4</sub>) is defined as having 21 times the GWP of an emission of 1 kg of CO<sub>2</sub>. Construction vehicles/activities are unlikely to contribute significantly to greenhouse gas emissions due to their relatively small scale, intermittence and temporary nature, and as such are not considered further in this assessment.

The long-term impact of nuisance dust will decline as stripped areas of land re-vegetate. Due to the temporary nature of construction, dust emissions are not anticipated to have a long-term impact on local air quality. The above impacts would mostly be linear and spatial in extent limited to road routes. They would therefore affect roadside communities, communities neighbouring the proposed site and

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road users. The manageability of the impact is high since typical impacts are well understood in conventional infrastructure construction industry and the ability to adapt to the impact is high because construction activities have been going on in the area.

*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 **low** resulting in **minor** impact significance.

		Sensitivity of receptor			
		Very low 1	Low 2	Medium 3	High 4
Intensity of impact	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 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

*Mitigation strategies:*

- Travel speeds of construction vehicles along the road especially at trading/ business centres will be controlled using humps and travel speeds will not exceed 30km/h;
- Trucks will be covered during haulage of construction materials to reduce on spillage of materials;
- Wherever dust suppression is necessary, water will be sprayed over dusty areas;
- It will be ensured that all equipment leaving the site, clean up their tires in case they are dirty;
- Construction work will be undertaken by an experienced and duly registered contractor with a verifiable sense of environmental awareness and responsibility;
- Workers will be provided with PPE (dust masks, safety goggles) and the use of PPE shall be enforced;
- All construction equipment and trucks will be kept in good operating condition by regular servicing to reduce noise and exhaust emissions; and
- As part of the bidding processes, contractors will be required to provide their environment management plans that meet mitigation actions proposed in this ESIA.

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

**F) 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. Inadequate Occupational Health and Safety (OHS) could also result from insufficient medical capability at the construction site; or neglect of safety equipment, precautions and procedures.

*Impact significance:* Accidents could cause considerable ecological damage due to pollution, 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 will procure a qualified contractor who is aware of OHS measures. Nevertheless, this gives rise to an impact of **moderate** significance.

		Sensitivity of receptor			
		Very low 1	Low 2	Medium 3	High 4
Intensity of impact	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 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

*Mitigation strategies:*

- 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.
- Personnel will only undertake tasks for which they are trained/ qualified. A formal 'permit to work' system will be in place and strict instructions will be given for operators of equipment.
- Supervision of works will be done regularly to ensure that safety conditions are met while any deviation from safety regulations is immediately reclaimed following the best practices regarding safety at work equipment.
- Communication line shall be ensured in between workers and drivers of heavy equipment.
- Evacuation procedures will be developed by the contractor to handle emergency situations.
- Adequate OHS personnel protective gear will be provided for the employees. The guide below should be useful:

<p><b>Hearing</b> (Over 85 dB(A) for 8 hours a day requires hearing protection)</p> <ul style="list-style-type: none"> <li>▪ Ear Muffs: One size fits all, comfortable, less ear infection risk</li> <li>▪ Ear Plugs: Small, lightweight, can get dirty and cause infection</li> </ul> <p><b>Face/Eye</b> (Working with any chemical or using any mechanical equipment)</p> <ul style="list-style-type: none"> <li>▪ Face Shield: Protect face from splashing and particles</li> <li>▪ Safety Glasses: Protection from solids (cutting, sanding, grinding)</li> <li>▪ Safety Goggles: Protects eyes from splashing</li> </ul> <p><b>Hand</b> (Use correct gloves for the job)</p> <ul style="list-style-type: none"> <li>▪ Chemical Gloves: (Nitrile, Latex, PVC)</li> <li>▪ Gloves for other use: special gloves for cutting, burning, abrasions/ blisters</li> </ul> <p><b>Body</b></p> <ul style="list-style-type: none"> <li>▪ Overalls: Can protect against dust, vapours, splashes</li> </ul> <p><b>Foot Protection</b></p> <ul style="list-style-type: none"> <li>▪ If electrical hazard present, ensure boots offer protection</li> <li>▪ Safety Toe/Steel Toe Boots: Always worn when potential for falling hazards exists</li> <li>▪ Water/Chemical Resistant Boots: Use in a spill situation</li> </ul>
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- Non-slip boots for working on wet/slippy floors.

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

### G) Risk of Accidents

The water pipelines will have to be laid across existing roads that are used by motorists and cyclists in addition to pedestrians. The trenches created for the pipe crossing can lead to accidents if proper signage is not put in place. Construction traffic accidents would be a significant social impact and likely to affect public members like children, women, disabled, elderly people and livestock, etc. The duration of the risk will be short-term occurring only during the construction phase. Although some effects of the accidents (e.g. minor injuries) may be reversible, some, for example, loss of human life are irreversible.

*Impact significance:* The receptor sensitivity is **medium** given the number of pedestrians and commercial activities along the roads 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**.

		Sensitivity of receptor			
		Very low 1	Low 2	Medium 3	High 4
Intensity of impact	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 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

*Mitigation strategies:*

- 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

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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.
- Identifying optimum routes from pipe storage areas to the ROW to avoid sensitive receptors such as schools and hospitals, wherever possible and putting in place journey management plans.
- 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.

#### **H) Landscape, Land Use Impacts and Loss of Structures**

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The aspects of the project that will impact on the landscape of the area are the temporary use of land for construction (right of way (ROW), roads, construction camps and pipe yards) and the permanent adoption of land for the pump station, block valves and access roads, etc. During construction, the ROW and the temporary facilities will be visible from the time of vegetation or topsoil removal until reinstatement is complete and vegetation has re-established fully. This will inevitably have visual impact in the area that is surrounded mainly by subsistence farming activities.

Based on the RAP, the Bitsya Water Supply and Sanitation Project will require a permanent land take of 4.9234 acres (for water treatment plant, booster station, reservoir sites, access roads, and sanitation facility sites) and an permanent land restriction (easement for transmission and distribution pipes) of 31.5823 acres. The construction contractor may require land for construction of lay down areas, and camps during the construction phase. In addition, unintended damage to crops and structures may occur.

Furthermore, a corollary livelihood impact resulting from the loss of household land is the loss of crops and fruit trees planted on that land thus changes in land use. There are also impacts related to loss of timber trees and woodland areas. The Project will impact 7,205 banana clumps at various stages of maturity. The Project land take will result in the loss of 236 fruit trees, 23.73% of which are avocado, followed by passion fruits of 21.61%, mangoes of 17.37% and jackfruit of 14.41%. The Project will impact 3,844 timber-productive trees, most of which (68.00%) are eucalyptus followed by Kiko (Gilikiti) of 10.30%.

The Project will not impact any residential structure except for 2 auxiliary structures, 4 agricultural structures, 3 commercial structures, and 152 other structures and fixtures. The asset survey indicates that these structures are within the 3 metres of the easement corridor. However, the PAPs have sufficient land remaining outside the easement corridor to enable them to replace their affected structure on their existing plot but outside the easement corridor. The schools and places of worship will only have land, crops and fences affected. Note that no classrooms or buildings related to

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education will be impacted. The Project Permanent Land Restrictions (Easement for Transmission and Distribution Pipes) and Permanent Land Acquisition will affect Bitsya Health Centre II and Karungu Health Centre III properties. Only small portions of land will be affected and the permanent land acquisition will be for the construction of the sanitation facilities

*Impact significance:* Duration of the impact will be long-term and the extent of the impact will be local. The **intensity** of the impact is **low** given that the kind of the proposed sewage treatment system, that is, waste stabilisation ponds, blends well with the environment. **Sensitivity** of the receptor is rated **high** given that no such system has ever been established in the area and its neighbourhood. Therefore, significance of the impact is **moderate**.

		Sensitivity of receptor			
		Very low 1	Low 2	Medium 3	High 4
Intensity of impact	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 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

*Mitigation strategies:*

- The contractor will be required by MWE to develop and implement a Reinstatement Plan.
- MWE shall ensure that this land and any impacted assets are compensated for in accordance with the provisions of this RAP.
- Upon payment of cash compensations, PAHs will be given sufficient time to salvage building materials from any lost structures.
- Reinstatement of the water pipeline will be done in such a way as return the visual integrity of the landscape as closely as possible to its previous condition.
- In areas where grading of the working width impacts on the local topography, reinstatement will be undertaken in a manner which is generally sympathetic to the existing contours. However, at locations along the route where extensive grading will be required to provide a level working area, it may not be possible to return the topography to its pre-existing form as this may exacerbate erosion risks given the type of soils in these areas and would preclude access to the sewer line for inspection, maintenance or emergency response.
- Wherever possible the removal of existing mature trees will be avoided, provided that the integrity of the pipeline is not jeopardised.

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

**I) 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, with attendant risk for spread of HIV/AIDS. 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**.

		Sensitivity of receptor			
		Very low 1	Low 2	Medium 3	High 4
Intensity of impact	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 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

*Mitigation strategies:*

- 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 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.

#### J) Slope Failure due to Earthworks

In steep areas, earthworks and river flow diversion could lead to slope instability and accelerated erosion or gully resulting into scarring of landscapes and increased sediment transport to surface waters or wetlands or gardens. Slope failure would affect downhill property and land uses. Risk of this potential impact actually occurring will be more prevalent in sections along the roads to the construction sites characterised by hilly terrain.

*Impact significance:* The likelihood of the impact occurring is high in the steep area. Duration of the impact will be short-term and effects reversible hence **intensity** of the impact is **low** and **sensitivity** of the receptors **medium**. Impact significance is therefore **moderate**.

		Sensitivity of receptor			
		Very low 1	Low 2	Medium 3	High 4
Intensity of impact	Very low 1	1 Negligible	2 Minor	3 Minor	4 Minor
	Low 2	2 Minor	4 Minor	6 Moderate	8 Moderate

	<b>Medium 3</b>	3 Minor	6 Moderate	9 Moderate	12 Major
	<b>High 4</b>	4 Minor	8 Moderate	12 Major	16 Major

*Mitigation strategies:*

- Weak slopes should be protected using engineered structures.
- Areas susceptible to erosion and slope failure are protected using temporary or permanent drainage works.
- Phasing of the construction works such that the majority of works are undertaken during the dry season to reduce the risk of erosion.
- The Contractors will use best available methods of construction to minimize the risk of blockages and constrictions during construction. Some of the methods that can be employed for channel diversion.
- The eroded channels will be backfilled and restored to natural contours.

When mitigation recommendations are instituted, significance of residual impact will be minor.

### K) Impact on Ecological Environment

Overall, the wider project area is lies in a landscape that is heavily influenced by human activity; with human settlements, cultivated areas and farmlands and eucalyptus plantations as the major components of the landscape. The habitats in the area are represented by disclimax successional vegetation types which develop in areas of relatively high human influence. Such disclimax communities result when human modified systems supplant natural ecosystems and undergo continuous cycles of burning, clearing, cultivation, grazing followed by regrowth. They do not provide stable habitats for fauna. Although agricultural landscapes are generally much more simplified habitats than natural habitats, they continue to support considerable amounts of biodiversity as they provide food sources for birds for example.

All fauna encountered and recorded are listed as Least Concern (LC) on the IUCN Red List of Threatened species. The Grey crowned crane (*Balearica regulorum*) was reported by the locals to have disappeared from the project area overtime (not encountered during the transect walks) and is listed as Endangered (EN) on the IUCN Red List of Threatened Species. It is the only species in this category that was reported by locals to have existed within in the project area. Its generalist feeding strategy makes it highly adaptable and has allowed it to persist in human modified habitats. The most significant threat to its survival is the loss of critical nesting sites which occur in wetlands (most wetlands have been converted into farmlands).

*Impact significance:* The likelihood of the impact occurring is high and duration of the impact will be long term as long as the plant is constructed and remains operation. Given that the natural habitats have reduced in extent and the project could eat into some semi natural areas resulting in reduction in diversity and abundance of species found in the immediate vicinity by way of direct destruction or displacement, the **intensity** of the impact is **medium** and **sensitivity** of the receptors **low**. Impact significance is therefore **moderate**.

		<b>Sensitivity of receptor</b>			
		<b>Very low 1</b>	<b>Low 2</b>	<b>Medium 3</b>	<b>High 4</b>
<b>Intensity of impact</b>	<b>Very low 1</b>	1 Negligible	2 Minor	3 Minor	4 Minor
	<b>Low</b>	2	4	6	8

<b>2</b>	Minor	Minor	Moderate	Moderate
<b>Medium 3</b>	3 Minor	6 Moderate	9 Moderate	12 Major
<b>High 4</b>	4 Minor	8 Moderate	12 Major	16 Major

*Mitigation strategies:*

- Clearing of vegetation in the natural habitat (wetland areas) will be minimised or avoided. If this cannot be avoided, then restoration of areas not needed for permanent project activities will be done.
- Unnecessary human presence in the natural habitats and project site will be minimised;
- Invasive species if observed along the revegetation sites will be removed.
- Environmental awareness programs for the construction workers, with special focus on threatened species will be conducted.
- Hunting and poaching of wild life will be strictly prohibited.
- Prevention and minimization of pollution (e.g. noise, water) through strict implementation of planned pollution control measures will be exercised.

**L) Impacts of Project Construction on Climate Change**

Vehicle emissions containing greenhouse gasses will be generated during construction activities. Quantities generated will depend on type, age and number of equipment used during construction. These emissions would have a cumulative negative effect on local air quality and global climate change. Though emissions of carbon dioxide (CO<sub>2</sub>) and methane (CH<sub>4</sub>) are generally accepted as contributing to global warming the effect has not been quantified. Global Warming Potential (GWP) provides a means of equating the potential contribution to global warming arising from different process units/activities which can generate different emissions. GWP is measured in terms of equivalent emissions of CO<sub>2</sub>; hence the GWP factor of CO<sub>2</sub> is 1. CH<sub>4</sub> has a GWP factor of 21 – that is, an emission of 1 kg of methane (CH<sub>4</sub>) is defined as having 21 times the GWP of an emission of 1 kg of CO<sub>2</sub>. Construction vehicles/activities are unlikely to contribute significantly to greenhouse gas emissions due to their relatively small scale, intermittence and temporary nature, and as such are not considered further in this assessment.

*Impact significance:* The above impacts would mostly be local and would be small on a global scale though cumulative in nature. The manageability of the impact is high since typical impacts are well understood in conventional infrastructure construction industry and the ability to adapt to the impact is high because similar construction activities have ever taken place in the area. The **intensity** of impact is assessed as **low** and **sensitivity** of the receptors as **low**. The impact significance is therefore **minor**.

		Sensitivity of receptor			
		Very low 1	Low 2	Medium 3	High 4
Intensity of impact	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 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

*Mitigation strategies:* During construction, mitigation actions recommended for minimisation of project

impacts on climate are:

- Optimizing work zone traffic management: Proper traffic management practices will limit GHG emissions due to traffic congestion caused by road construction works.
- Managing overloading: Trucks hauling construction materials will be optimally loaded in order to lower GHG emissions than over-loaded ones.
- Use of existing material sources: Wherever feasible use will be made of existing borrow pits rather than opening new sites will reduce embodied carbon associated with opening up new areas.
- Use of equipment in good mechanical condition: The contractor will ensure that all motorised equipment is in good mechanical condition and regularly services to reduce emissions they generate.

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

### M) Impact of Climate Change on Project Construction

Climate change would impact on construction activities both during the dry spells for activities that are water demanding. These would be slowed down and alternative sources will have to be sought increasing the cost and related impacts of hauling water from a distance. During intense rainfall, some project areas may be inaccessible given the terrain and some of construction activities may be delayed.

*Impact significance:* The manageability of the impact is high since typical impacts are well understood in conventional infrastructure construction industry. Considering that a competent contractor will be hired by MWE, the **intensity** of impact is assessed as **low** and **sensitivity** of the receptors as **low**. The impact significance is therefore **minor**.

		Sensitivity of receptor			
		Very low 1	Low 2	Medium 3	High 4
Intensity of impact	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 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

*Mitigation strategies:* Construction activities will be rescheduled depending on the prevailing weather conditions in order to keep within the project construction period as much as possible.

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

## 8.3.2 Anticipated Negative Impacts during Operation Phase

### A) Stress of Water Resources

The provision of a potable water supply may increase the consumption of water. Provision of taps or household connections may increase water use significantly. This may consequently lead to a drop in the amount of water received by downstream users on Nyarwambu River and its water quality as a

result of establishment of a water intake and treatment plant. However, an assessment of water use and demand was done as part of the detailed design and dry spells effects were factored into the water requirements. Thus, the abstraction of water resource for the purpose of the project should not have a heavy impact on available water resource.

*Impact significance:* Duration of the impact will be long-term depending on the recharge from the catchment and the extent of the impact will be local. The **intensity** of the impact is **low** given that there are also plans to put in place catchment management measures that would contribute in recharging the affected water resources. **Sensitivity** of the receptor is rated **low** resulting in a **minor** impact significance.

		Sensitivity of receptor			
		Very low 1	Low 2	Medium 3	High 4
Intensity of impact	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 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

*Mitigation strategies:*

- MWE will acquire water abstraction permits with conditions to guide the amount of surface water to be abstracted.
- A water source protection plan is being prepared to protect the catchment areas for the water source.

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

## B) Land Pollution, Waste and Drainage Problems

Improved water supply comes with an increase in the amount of wastewater and sullage generated from the water treatment plant (domestic waste and backwash water, etc.), households and industrial or commercial facilities. Poor disposal or management of the wastewater generated will lead to land and/ or water pollution and related drainage problems. In cases where household are connected to piped water and not to sewerage system, they may use septic tanks whose cesspool or soak pit overflow may lead to contamination of soil and/or groundwater.

*Impact significance:* This is a direct negative impact, short-term and local in extent since there are plans to establish wastewater treatment and disposal systems in the project area. The likelihood of the impact occurring is high if water users are not educated on techniques for safely disposing of wastewater or sullage from their households especially in informal settlements. The **intensity** of the impact is **medium** and **sensitivity** of the receptor is rated **medium** given that the water treatment plant is located close to the Kitagata swamp resulting in a **moderate** impact significance.

		Sensitivity of receptor			
		Very low 1	Low 2	Medium 3	High 4
Intensity of impact	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 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

*Mitigation strategies:*

- DWD will acquire a wastewater or effluent discharge permit from DWRM with conditions to control discharge of untreated or partially treated effluent to the environment.
- A good drainage system should be built around the water supply site, public stand pipe and water treatment plant. The drainage and/ or soak pit as often as needed should be cleaned by the respective households or user-communities. Households or user-communities will be sensitised about proper drainage systems and their use.
- Households and commercial facilities will be encouraged to render sanitation waste like food waste free of pathogenic organisms through composting technique and so make it useful as agricultural fertilizer.

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

### C) Negative Impacts on Water Vendors

In many developing countries due to the great distance to traditional water source waters, fetching water is done by water vendors. The same conditions exist in Buhweju District where some community members rely on water vendors for water supply with a 20-litre jerry can costing between Ug. Shs 200 and 500. By introduction of piped potable water supply project, those people previously engaged in fetching water for others as a paid occupation, are thrown out of their job.

*Impact significance:* The **intensity** of the impact is **very low** given that there will still be households not connected to the piped water and with increasing population of Buhweju, there will be more alternative jobs. **Sensitivity** of the receptor is rated **low** resulting in a **minor** impact significance.

		Sensitivity of receptor			
		Very low 1	Low 2	Medium 3	High 4
Intensity of impact	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 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

*Mitigation strategy:* Identify such people and encourage them to work as casual labourers at the proposed project facilities.

### D) Occupational Health and Safety Risks

During maintenance of the water transmission network and water treatment plant, occupational health and safety problems may arise. These may include: lifting of heavy and sharp objects and transportation of materials for maintenance, storage as well as handling and use of dangerous substances.

- Inadequate lighting and ventilation in workplaces when the intervention has to be done late in the day;
- Lack of adequate training (or neglect of safety precautions/ guidelines) in use of equipment and tools;
- Misuse of equipment and materials for functions they are not designed;
- Lack of safety signage in specific areas;
- Electrical hazard; and
- Eye hazards such as splashes.

*Impact significance:* Duration of the impact would be long-term lasting entire life of the affected person or short-term depending of the hazard exposed to. The **intensity** of the impact is **low**. However, **sensitivity** because it may involve loss of life or permanent damage of a person’s limb on the receptors will be **high**, thereby giving a **moderate** impact significance.

		Sensitivity of receptor			
		Very low 1	Low 2	Medium 3	High 4
Intensity of impact	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 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

*Mitigation strategies:*

- The primary measure to mitigate OHS impacts is prevention which entails identification of risks and instituting pro-active measures to avoid them. In part this can be achieved by following GIIP or national guidelines. For unavoidable risks, personal protective equipment (PPE) will be provided to workers.
- All staff will be oriented on safe work practices and guidelines and ensure that they adhere to them.
- Staff will be trained 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.
- Regular safety drills will constantly follow on various possible incidences.
- Signage will be used to warn staff and/ or visitors that are not involved in facility work of dangerous places.
- Evacuation procedures will be developed to handle emergency situations.

- Adequate OHS protective gear will be provided for all laboratory staff.
- The treatment plant will be provided with a first aid kits shall be provided.
- In addition to tree planting around the site, the facility will be fenced off with a razor wire to stop unauthorised people from accessing the site and to keep out animals and for avoidance of vandalism at the site.

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

### E) Risk of Accidents

The development is expected to increase the traffic along the access roads due to maintenance vehicles carrying workers as well as tools and equipment for construction and maintenance of the pipeline. These impacts would mostly be linear and spatial in extent limited to road routes. They would therefore affect roadside communities, communities neighbouring the proposed site and road users.

*Impact significance:* The **intensity** of impact is assessed as **low** and **sensitivity** of the receptors as **low** given that there will be a few vehicles at the beginning of the project and the community will get used as the number increases in addition to the fact that the road network is being improved on. Therefore, significance of the impact is **minor**.

		Sensitivity of receptor			
		Very low 1	Low 2	Medium 3	High 4
Intensity of impact	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 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

*Mitigation strategies:*

- Travel speeds of vehicles along the road especially at trading/ business centres will be controlled using humps and setting travel speeds not exceeding 40 km/h;
- All construction equipment and trucks will be kept in good operating condition by regular servicing to reduce noise and exhaust emissions;
- Adequate and appropriate signs including speed limits will be installed along the roadway in proximity to the access roads.

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

### f) Impacts of Project Operation on Climate

The water treatment plant requires energy and in the event that the grid power is not available, diesel generators will be used to supply energy. The generators will contribute to gases like CO<sub>2</sub>, CO and CH<sub>4</sub>.

*Impact significance:* The above impacts would mostly be local extent and intermittent in nature

only happening when the generators are running. Therefore, the **intensity** of impact is assessed as **very low** and **sensitivity** of the receptors as **low**. The impact significance is therefore **minor**.

		Sensitivity of receptor			
		Very low 1	Low 2	Medium 3	High 4
Intensity of impact	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 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

*Mitigation strategies:* MWE will ensure that the generators are well serviced and maintained to minimise GHG emissions.

### g) Impact of Climate Change on Project Operation

A changing climate would impact water supply through changes precipitation patterns and storm-related damages. Dry spells will lead to an overall decrease in the availability of water and communities may revert to unsafe water sources. Changes in climate may also result in more intense rainfall events resulting into heavy storms. Stormwater-related effects include surge damage, wind damage and flooding which could pose a direct threat to the water infrastructure.

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*Impact significance:* The water shortage may force communities to use unsafe sources leading to impacts some of which are irreversible, for example, death resulting from water borne diseases and poor sanitary conditions. The **intensity** of impact is assessed as **low** and **sensitivity** of the receptors as **high**. The impact significance is therefore **moderate**.

		Sensitivity of receptor			
		Very low 1	Low 2	Medium 3	High 4
Intensity of impact	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 Major
	High 4	4 Minor	8 Moderate	12 Major	16 Major

*Mitigation strategies:*

- Catchment management and source protection plans are being developed to ensure that in cases of extreme weather conditions, the water resources are not greatly affected.
- The communities will be encouraged to use the toll-free calling line to report any damages during extreme weather conditions.

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

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### 8.3.3 CUMMULATIVE IMPACTS

The Ministry of Water and Environment in Uganda developed an Integrated Water Management and Development Project (IWMDP) to integrate water resource management, planning, development and access to water and sanitation services in priority urban areas. Western Uganda is one of the regions to benefit from the IWMDP and as such Buhweju District will be one of the beneficiaries. In line with Uganda's Vision 2040, Cap 4.1.9 section 153, of improving access to safe water by 100% this project will ultimately bridge the gap in order to achieve this vision and extending a more reliable source of drinking water closer to the people.

A reliable drinking water supply would generate long-term economic benefits, including benefits to the local economy and spur up development in the area. Construction activities would generate short-term economic benefits and residents of Buhweju District in the project area will benefit from this and once the earnings received are well utilised, the benefactors' livelihood would have been transformed for the better.

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# 9 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

## 9.1 INTRODUCTION

This environmental and social management plan (ESMP) for proposed construction works and operation of the water supply and sanitation facilities under this project, identifies the potential environmental and social aspects that should be monitored. It identifies parties responsible for monitoring actions, associated costs, indicators and training or capacity building needs and reporting. Various aspects of the ESMP are detailed in sections below.

## 9.2 ESMP IMPLEMENTATION AND MONITORING ARRANGEMENTS

### 9.2.1 Roles and Responsibilities of parties in ESMP implementation and Monitoring

The following parties will be involved with the ESMP implementation, that is, the client (MWE - and a project manager will lead the client team) with ultimate responsibility for E&S performance on the project; the Supervising Engineer (with an Environment and Social Specialist on their team) responsible for monitoring and supervising the implementation of the ESMP and contract requirements; and the Contractor (with an Environment and Social Officer) who has responsibility for implementing the ESMP.

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Therefore, the institutional responsibility of ensuring that this ESMP is implemented will rest with MWE having a key role of reviewing consultants' reports for compliance with the ESMP, among others. The Project Manager shall have the ultimate responsibility for implementation of ESMP and will therefore ensure that resources are duly provided. Other roles will be:

- Monitoring implementation of mitigation actions by contractors
- Coordinating training and capacity building where planned

MWE should ensure that all its personnel to be involved in implementation of this ESMP are adequately qualified and were appointed based on their qualification and suitability for respective roles. There is thus no training provided for them under this ESMP.

Monitoring of the implementation of this ESMP is the responsibility of the Contractor under the guidance, supervision and monitoring by the Supervising Engineer. The Environmentalist and Social Specialist for the Supervising Engineer will supervise the contractor's monitoring activities.

The Contractor's Environment and Social Officer will ensure that the provisions in this ESMP are implemented within the sites under their supervision and to collect and transmit relevant information to the Supervising Engineer.

Subcontractors will be required by a condition of their subcontract with the main contractor to actively manage environmental and social issues associated with their subcontract works and comply fully with all the applicable statutory regulations and the main contractor's environmental and social management plans. For significant aspects of work such as earthworks, the contractor may require subcontractors to provide their own Environmental and Social Management Plans and/or Method

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Statements for review by the Contractor's Environmental consultant/Officer. These ESMP's shall be approved by the Resident Engineer in consultation with MWE for adequacy before being implemented.

The Buhweju District Environmental Officers (DEOs) are responsible for overseeing environmental protection on behalf of NEMA. The DEO will have implementation and monitoring roles during execution of this ESMP. Usually, these officials lack adequate facilitation so the project will need to provide auxiliary financial assistance for them to have effective participation in this project.

## 9.2.2 Monitoring and Reporting Arrangements

Monitoring will verify if predicted impacts have actually occurred and check that mitigation actions recommended in the ESIA are implemented and their effectiveness. Monitoring will also identify any unforeseen impacts that might arise from project implementation.

Monitoring will be undertaken by MWE and Environmental Officers who represent NEMA at local administrative level. Monitoring by NEMA in this case can be considered "third party monitoring" but this is its regulatory mandate according to National Environment Act (2019).

Another government agency that may undertake "third party monitoring" is the Occupational Health & Safety Department in Ministry of Gender, Labour & Social Development (MGLSD). This unit has authority to inspect any facility for compliance with national requirements on safety in workplaces. The project shall make no funding to MGLSD since this is provided for in its annual budget.

Monitoring will be done through site inspection, review of site records (Accident Log, issuance of PPE, waste records, trainings and inductions, permits and approvals, etc.) review of grievances logged by stakeholders and *ad hoc* discussions with potentially affected persons (construction workers, residents near the project facilities). At each monitoring, a discussion with a chairperson of environment committee of the area's local council (LC) could provide insight into views and grievances community has about the project.

Monitoring will be undertaken continuously on a daily basis over the construction period.

Environmental Compliance Audits will be necessary both during construction and project operation. While construction audits will aim to verify compliance to impact mitigation requirements, post-construction audits are a regulatory requirement within 12 months and not more than 36 months after completion of construction, according to ESIA Regulations (2020).

Since construction duration is estimated to be 1½ years, this ESMP has included a budget for 1½ year's construction audit and a separate provision so that from year 2 to year 5 full environmental audits are done as per Uganda requirements.

Both construction and post-construction audits can be conducted internally (by MWE) or by a consultant hired by MWE. If undertaken by a hired consultant, a budget has been proposed for both in this ESMP.

Concise monthly monitoring reports should be compiled by the Contractor. The report will highlight the different activities undertaken to manage environmental and social aspects of the project in line with contract specifications, laws, standards, policies, and plans of Uganda and World Bank Safeguard policies. The report will be discussed during the monthly progress meetings. The Environmentalist and Social Specialist for the Supervising Engineer will approve the Contractor's monthly environmental and social monitoring report that will then be transmitted to MWE for final approval. MWE's Environmental Management and Social Specialist will also independently monitor the implementation of the ESMP and/or verify the accuracy and content of the Contractor's monitoring report and then report to MWE.

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The report will also be shared with The World Bank and other relevant stakeholders. Approval of the environmental monitoring report will be the basis for the Supervising Engineer to approve payment of the respective environmental and social BoQ items.

Construction- and post-construction phase auditing should culminate in reports that MWE shall share with IDA, NEMA or other interested stakeholders. Note that while MWE is under no obligation to disclose construction phase audits, annual post-construction audits must be submitted to NEMA as a regulatory requirement as per ESIA Regulations (2020).

## 9.3 GRIEVANCE REDRESS MECHANISM

This section describes avenues for affected persons to lodge a complaint or express a grievance against the project, its staff or contractors during project implementation. It also describes the procedures, roles and responsibilities for addressing grievances and resolving disputes. Every aggrieved person shall be able to trigger this mechanism to quickly resolve their complaints. The objectives of the grievance process are:

- 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.

The grievance mechanism will collect information and complaints from three main sources:

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- Community residents and the respective local leaders ( community GRM).
- Supervising engineer, clerk of works or contractor ( Workers GRM).
- Monitoring team who will forward issues/concerns identified in the field.

It is the responsibility of the Contractor(s) to ensure that Workers GRMs are constituted and have functional, accessible redress and appeal processes and the appeal structures shared with MWE/RWSSD before the commencement of the Construction Phase.

Steps of the grievance process for the PAPs and the community in general are described below.

### *a) Step 1: Receipt of complaint*

A verbal or written complaint from a complainant will be received by the Clerk of Works or Supervising Engineer and recorded in a complaints log s(he) keeps on site. The log will indicate grievances, date lodged, action taken to address complaint or reasons the grievance was not acted on; information provided to complainant and date the grievance was closed. Grievances should be lodged at any time, either directly to the Clerk of Works/ Project Office or through the Local Council Chairperson. The process for lodging a complaint is outlined below:

- Supervising Engineer receives complaint(s) from complainant and records it in log (in English).
- Supervising Engineer reads the recorded complaint translating it into local language for the complainant to confirm correct detail of complaint has been documented.
- Complainant signs the log to confirm grievance was accurately recorded.

Written complaints will be received and person delivering the complaint fills in log with his or her details (name, contact, etc.); date of delivery and then the person receiving the complaint also signs against the record.

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**b) Step 2: Determination of corrective action**

If in his/her view, a grievance can be solved at this stage, the Clerk of Works/ Project Office will determine a corrective action in consultation with the aggrieved person. Remedial action(s) and timeframe within which they must be accomplished has been described and the party responsible for implementing them will be recorded in the complaint log.

Grievances will be resolved and status reported back to complainants within 5 days. If more time is required, this will be communicated clearly and in advance to the aggrieved person. For cases that are not resolved within the stipulated time, detailed investigations will be undertaken and results discussed not more than 1 month from lodging a grievance.

**c) Step 3: Meeting with the complainant**

The proposed corrective action and the timeframe in which it is to be implemented will be discussed with the complainant within 5 days of receipt of the grievance. Consent to proceed with the corrective action will be sought from the complainant and witnessed by a local council chairperson (LC Chairman).

**d) Step 4: Implementation of corrective action**

Agreed corrective action will be undertaken by the project or its contractor within the agreed timeframe. The date of the completed action will be recorded in the log against the complainant's grievance.

**e) Step 5: Verification of corrective action**

To verify satisfaction, the aggrieved person will be asked to return if not satisfied with the corrective action.

**f) Step 6: Action by MWE and project contractors**

If the Clerk of Works cannot solve the grievance, he will refer it to MWE (and contractor) through the Supervising Engineer. If MWE (and Contractor) or cannot solve the grievance, then it can be referred to the local government structures ranging from LC I to LC V or the Courts of Law.

In accordance with the Employment Act (2006), the MWE/RWSSD shall ensure that the Contractor has provided contracts to all workers and has established a GRM and grievance redress committee with workers representation.

Table 56: Environmental Management and Monitoring Activities and Criteria

Ref. No	Anticipated Impacts	Mitigation Measures	Responsibility	Monitoring Period	Monitoring Indicators	Cost (UGX)	Frequency
<b>Construction Phase</b>							
CP1	Construction activities	<ul style="list-style-type: none"> <li>✓ Orienting all construction workers on safe work practices and ensure that they are adhered to</li> </ul>	Contractor & Supervision Consultant	Ongoing	Routine inspection and maintenance records	Included in Contractor's cost	Daily
CP2	Traffic Disruptions	<ul style="list-style-type: none"> <li>✓ Preparing a Traffic Management Plan to minimize the risk of traffic disruption, especially in areas where the major roads will require re-construction of culvert crossings. Using Appropriate safety signs during construction (e.g. 'Heavy Trucks Turning', 'Road</li> </ul>	Contractor, Supervision consultant & Police	Throughout the Construction period	Presence of the Traffic Management Plan with the contractor and on site	Included in Contractor's cost	Daily
CP3	Vegetation Removal	<ul style="list-style-type: none"> <li>✓ Minimize vegetation clearance and protect water &amp; soils from pollution</li> <li>✓ Landscaping and re-vegetation after construction</li> </ul>	Contractor	Throughout the Construction period	Visual inspection	12,000,000	Daily
CP4	Soil erosion and degradation	<ul style="list-style-type: none"> <li>✓ Clearance of vegetation will be limited to areas that will be required for construction purposes. This will serve to minimize land disturbance as much as possible.</li> <li>✓ Excavation of trenches will be done in a phased manner such that soil is not exposed for a long time before the channel is lined.</li> <li>✓ Excavated material will be collected routinely such that heaps of exposed soils are not left in the Project area for long.</li> </ul>	Contractor, Supervision Consultant & MWE	Throughout the Construction period	Evidence of sedimentation of eroded soil downstream of construction site. Number of complaints from neighboring communities regarding deposition of eroded soil.	Included under Ref. No. CP3 above.	Daily
CP5	Flow Diversions during construction	<ul style="list-style-type: none"> <li>✓ Phasing of the construction works such that the majority of works are undertaken during the dry season to reduce the risk of erosion.</li> <li>✓ The Contractors will use best available methods of construction to minimize the risk of blockages and constrictions during construction. Some of the methods that can be employed for channel diversion.</li> </ul>	Contractor & Supervision Consultant	Throughout the Construction period	Occurrence of flooding in Project area during construction period	Included in Contractor's cost	Daily

Ref. No	Anticipated Impacts	Mitigation Measures	Responsibility	Monitoring Period	Monitoring Indicators	Cost (UGX)	Frequency
CP6	Generation of Wastes	<ul style="list-style-type: none"> <li>✓ The principles of an integrated solid waste management system will be implemented i.e. reduction at source, reuse and recycle.</li> <li>✓ A waste management plan should be developed by the Construction Contractors, and approved by MWE to ensure that measures for handling all Project-generated waste are in place.</li> <li>✓ Waste transportation vehicles will be covered to avoid spillage or waste getting blown off during haulage.</li> <li>✓ Construction waste shall not be left in stockpiles along roads, but removed and reused or disposed of on a regular basis.</li> <li>✓ Human waste will be properly managed through provision of onsite portable toilets, with consideration for the number of workers on site during construction. Separate toilets will be provided for female workers.</li> <li>✓ Any hazardous wastes generated by construction activities (e.g. emptying pit latrine contents) will be collected and transported off site to the appropriate licensed waste storage facility</li> </ul>	Contractor, Supervision Consultant & MWE	Throughout the Construction period	Submitted waste management plan with adequate acceptable measures. Records from licensed waste contractor with logs on source of waste, weight, final destination of waste, handling of waste at final disposal point.	Included in Contractor's cost	Daily

Ref. No	Anticipated Impacts	Mitigation Measures	Responsibility	Monitoring Period	Monitoring Indicators	Cost (UGX)	Frequency
CP7	Accidents and Construction hazards	<ul style="list-style-type: none"> <li>✓ Preparation and approval of a Health and Safety Plan that sets out the measures to be taken to ensure the safety of the workers and the local community during the works.</li> <li>✓ Orient all construction workers on safe work practices and ensure that they are adhered to.</li> <li>✓ Safety training will be conducted routinely on how to prevent and manage incidences on site, and measures to protect the general public from construction site hazards</li> <li>✓ Use of PPE for different work environments.</li> <li>✓ Procedure for reporting and/or responding to incidents.</li> <li>✓ Emergency evacuation procedure</li> <li>✓ All tasks will be performed by qualified and authorized personnel.</li> </ul>	Contractor, Supervision Consultant	Throughout the Construction period	Records of incidents and accidents on site. Observance of site safety rules by workers. Use of requisite PPE by workers. Response to emergency incidents on site. Availability of first aid kits on the various sites.	30,000,000	Daily

Ref. No	Anticipated Impacts	Mitigation Measures	Responsibility	Monitoring Period	Monitoring Indicators	Cost (UGX)	Frequency
CP8	Air quality and pollution	<ul style="list-style-type: none"> <li>✓ Sensitization of local residents will be undertaken prior to the start of the construction works.</li> <li>✓ Delivery vehicles will be switched off when not in use so as to minimize the release of fugitive emissions;</li> <li>✓ Contractor's vehicles and machinery will be regularly serviced and maintained to optimum working conditions to minimize potential emissions.</li> <li>✓ Trucks delivering materials will be covered with tarpaulin to reduce the risk of fugitive dust emissions, especially in busy residential and commercial areas;</li> <li>✓ Waste from site to be transported by licensed companies for waste transportation</li> <li>✓ Regularly monitor air quality and noise nuisance and inform timely interventions</li> </ul>	Contractor, Supervision Consultant & MWE	Throughout the Construction period	Number of complaints of excessive fumes or dust registered. Levels of dust and fugitive emissions released to the atmosphere as a result of construction activities	20,000,000	Daily

Ref. No	Anticipated Impacts	Mitigation Measures	Responsibility	Monitoring Period	Monitoring Indicators	Cost (UGX)	Frequency
CP9	Noise Pollution and Vibrations	<ul style="list-style-type: none"> <li>✓ Sensitisation of local residents prior to the start of the construction works. It will be particularly important to:</li> <li>✓ The Contractors on site made aware of, and adhere to, the regulatory noise limits for a construction site</li> <li>✓ Construction workers provided with appropriate PPE such as ear plugs and ear muffs for protection against excessive noise.</li> <li>✓ Construction activities limited to daytime, especially in residential areas to minimize disturbance of residents.</li> <li>✓ Construction works near public institutions such as schools should be harmonized with school programmes to consider works during holidays and weekends.</li> <li>✓ Project machines and vehicles will be turned off when not in use.</li> </ul>	Contractor, Supervision Consultant & MWE.	Throughout the Construction period	Number of complaints of excessive noise and vibration. Routine inspection and maintenance records	Provided under CP8	Daily

Ref. No	Anticipated Impacts	Mitigation Measures	Responsibility	Monitoring Period	Monitoring Indicators	Cost (UGX)	Frequency
CP10	Water Pollution	<ul style="list-style-type: none"> <li>✓ Planning and management of stockpiles to minimize potential for "wash-out" and generation of sediment-laden runoff during rainy seasons.</li> <li>✓ Fuel handling and oil spill measures will be implemented to prevent, control and address spill or leaks.</li> <li>✓ All equipment and vehicle repairs will be carried out under shelter to minimize potential soil and oil pollution during rainy seasons.</li> <li>✓ Regular maintenance of operating machinery to keep it in good working condition, and hence minimize oil and lubricant spills</li> <li>✓ Implement a water source protection plan (WSPP)</li> </ul>	Contractor, Supervision Consultant & MWE.	Throughout the Construction period	Occurrences of impediment to water flow, especially in wetland areas	100,000,000	Monthly

Ref. No	Anticipated Impacts	Mitigation Measures	Responsibility	Monitoring Period	Monitoring Indicators	Cost (UGX)	Frequency
	Public Health Issues	<ul style="list-style-type: none"> <li>✓ All Contractors shall be required to develop guidelines for behavioral conduct, including penalties. This should be reflected either as independent document or component to the Contractor's Human Resource Manual</li> <li>✓ Workers must be sensitized on proper social behaviour and conduct with regard to community norms prior to starting work;</li> <li>✓ workers should be sensitized to avoid engaging in sexual relations with underage girls and married women;</li> <li>✓ In case of misunderstandings between workers and the local community, use of local leadership should always be sought as a first priority in solving these issues;</li> <li>✓ Similarly, in liaison with local leaders, contractors should prepare local communities – psychologically and otherwise – for the newcomers; efforts be focused on instilling attitudes of tolerance, support and understanding towards the newcomers in the local communities</li> <li>✓ Contractors will be required to have an HIV/AIDS policy and a framework (responsible staff, action plan, etc.) to implement during Project execution. This will include a reporting procedure in the event that the community members have any issues to report as a result of the Project workers' behaviour and/or negligence.</li> <li>✓ All construction workers will be orientated and sensitized about responsible sexual behaviour with Project area communities and inherent health risks associated with HIV/AIDS and other sexually transmitted diseases.</li> <li>✓ As part of their Corporate Social Responsibility, the Contractor in coordination with MWE will conduct HIV/AIDS awareness campaigns in the Project areas, particularly in slum areas, to avoid reckless lifestyle and spread of the disease in the area.</li> <li>✓ HIV/AIDS policies should be developed at workplace</li> </ul>	Contractor, Supervision Consultant & MWE.	Throughout the construction phase	Guidelines for behavioral conduct, and No. of penalties awarded to workers for misbehavior	13,000,000	Monthly

Ref. No	Anticipated Impacts	Mitigation Measures	Responsibility	Monitoring Period	Monitoring Indicators	Cost (UGX)	Frequency
CP11	Disruption of Socio-economic Activities and utility services	<ul style="list-style-type: none"> <li>✓ Project implementation will be done in close consultation with the respective utility service companies such as MWE, UMEME and telecommunication companies.</li> <li>✓ All identifiable utility service lines in the right of way will be relocated in the pre-construction phase prior to the commencement of works to avoid interruptions from damage during the construction phase.</li> <li>✓ During construction, the Contractor will have to prepare a work schedule, which will be closely monitored and supervised by MWE.</li> <li>✓ The communities to be affected by any interference in service provision (water, electricity, or telecommunication signals); will be given ample warning and alternatives provided by service provider.</li> <li>✓ Formation, tooling and training of GRM as part of a stakeholder engagement plan.</li> </ul>	Contractor(s) /MWE and service providers	Before construction phase kicks off	All the utility service lines in the right of way are relocated and communities are informed in advance, Recorded number of service infrastructure damaged as a result of Project implementation. Number of complaints recorded from community members regarding interference with service infrastructure due to Project activities. Record on formation, tooling and training of GRM	5,000,000 (mobilization of communities and meetings)  30,000,000 (for formation, tooling and training of GRM)	lumpsum
<b>OPERATIONAL PHASE</b>							
OP1	Occupational Health and Safety Risks	<ul style="list-style-type: none"> <li>✓ The channel crossings will be clearly demarcated to indicate the ones that are meant for only pedestrian traffic, those that can be used by bicycles and motorcycles and general traffic. The crossings for only pedestrians should have bollards with reflective strips installed at the ends to strict access to other traffic.</li> <li>✓ Side rails will be installed along the channel crossings to enhance community safety and minimize the risk of falling into the channels.</li> <li>✓ Community sensitization to allow proper usage of the crossing points and avoid accidents when crossing after a heavy downpour.</li> <li>✓ Community sensitization to instill a sense of ownership of the project and project infrastructure so as to encourage community vigilance and hence reduce vandalism or theft of metal work fabrication, such as safety railings.</li> </ul>	Operator	Throughout the O&M phase	Number of complaints registered from community about potential hazards as a result of Project activities. Records of incidents amongst community residents as a result of Project activities.	Included in the operators annual operational budget	Monthly

Ref. No	Anticipated Impacts	Mitigation Measures	Responsibility	Monitoring Period	Monitoring Indicators	Cost (UGX)	Frequency
OP2	Loss of income from Project-related activities	<ul style="list-style-type: none"> <li>✓ All people taken on to work on this Project will be informed about its duration and phasing beforehand, so that they can plan accordingly.</li> <li>✓ The MWE Supervising Engineers will take note of Consultants, Contractors and sub-contractors that produce quality work, in line with their contracts and industry best practice during the construction phase, and prioritize them for available maintenance work during the life of the Project.</li> <li>✓ Unskilled labourers taken on from the local communities surrounding the project area will be kept on for maintenance works of the channel, where possible.</li> <li>✓ Where feasible, upon discussion with the local area leaders, committees will be selected along the densely populated sections along the channel with the aim of promoting vigilance against garbage.</li> </ul>	Operator	Throughout the O&M phase	Number of O&M workers from the local communities	Included in the MWE annual operational budget	Annually
OP3	Risk of accidents	<ul style="list-style-type: none"> <li>✓ Side rails will be installed along the river crossings to enhance community safety and minimize the risk of falling into the river.</li> <li>✓ Community sensitization to allow proper usage of the crossing points and avoid accidents when crossing after a heavy downpour.</li> <li>✓ Community sensitization to instil a sense of ownership of the project and project infrastructure so as to encourage community vigilance and hence reduce vandalism or theft of metal work fabrication, such as safety railings</li> </ul>	Operator	Throughout the O&M phase	Number of complaints registered from community about potential hazards as a result of Project activities. Records of incidents amongst community residents as a result of Project activities	Included in the MWE annual operational budget	Monthly

Ref. No	Anticipated Impacts	Mitigation Measures	Responsibility	Monitoring Period	Monitoring Indicators	Cost (UGX)	Frequency
OP4	Air pollution	<ul style="list-style-type: none"> <li>✓ The vehicles will be switched off when not in use so as to minimize the release of fugitive emissions.</li> <li>✓ The vehicles and machinery will be regularly serviced and maintained to optimum working conditions to minimize potential emissions.</li> </ul>	Operator	Throughout the O&M phase	Number of complaints of excessive fumes registered. Levels of emissions released to the atmosphere as a result of faulty equipment.	Included in the MWE annual operational budget	Weekly
OP5	Disturbance due to noise pollution and vibrations	<ul style="list-style-type: none"> <li>✓ The Contractors and workers for operation and maintenance should be especially mindful when carrying out construction near sensitive receptors such as business centres.</li> <li>✓ Maintenance activities will be limited to daytime, especially in residential areas to minimize disturbance of residents.</li> <li>✓ Regular care and maintenance of vehicles and equipment must be undertaken to ensure they run smoothly so as to minimize emissions of noise.</li> <li>✓ Project machines and vehicles will be turned off when not in use</li> </ul>	Operator	Throughout the O&M phase	Number of complaints of excessive noise registered. Noise level measurements	Included in the MWE annual operational budget	Weekly
OP6	Improper waste management	<ul style="list-style-type: none"> <li>✓ A waste management plan will be developed by the Maintenance Contractors, and approved by MWE to ensure that measures for handling all operation and maintenance waste (dredged material and waste debris) are in place.</li> <li>✓ The principles of an integrated solid waste management system will be implemented i.e. reduction at source, reduce, reuse and recycle</li> <li>✓ Waste transportation vehicles will be covered to avoid spillage or waste getting blown off during haulage.</li> </ul>	Operator	Throughout the O&M phase	Number of complaints of dumping Project waste in unlicensed areas registered Sediment and waste debris deposition in the wetlands and receiving water bodies	Included in the MWE annual operational budget	Weekly

Ref. No	Anticipated Impacts	Mitigation Measures	Responsibility	Monitoring Period	Monitoring Indicators	Cost (UGX)	Frequency
OP7	Impact on water resources and the receiving habitats	<ul style="list-style-type: none"> <li>✓ The quantity and quality of storm water reaching the river must be reduced within the catchment. Implementation of an integrated catchment management plan (ICMP) would be an effective undertaking.</li> <li>✓ The designed channel corridors need to be protected from encroachment.</li> <li>✓ The channels must be regularly and adequately maintained – including replacement of damaged lining, vegetation clearing, de-silting, garbage/debris removal and dredging.</li> <li>✓ MWE will closely engage NEMA and WMD in programmes aimed towards protection of natural wetland systems, since the storm water from the drainage channel will have an impact on the downstream receiving bodies.</li> </ul>	Operator	Throughout the O&M phase	Monitoring locations water quality trends (water quality tests). Waste collected from the channel as wet earth materials shall be temporarily stockpiled at a gazetted location around project site to drain before they are transported to the final disposal site	15,000,000	Monthly
PO8	Traffic Disruptions	<ul style="list-style-type: none"> <li>✓ Preparing a Traffic Management Plan to minimize the risk of traffic disruption, especially in areas where the major roads will require re-construction of culvert crossings. Using Appropriate safety signs during construction (e.g. 'Heavy Trucks Turning', 'Road Diverted', 'Half Road Closed', etc.)</li> </ul>	Operator	Throughout the O&M phase	Traffic incidences	-	Monthly

**Note:** External Monitor can be a lead Agency and or Authorities like NEMA, District Environment Officers 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.

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# CONCLUSION AND RECOMMENDATIONS

BWSSS is being proposed by the Ministry of Water and Environment/DWD for Bitsya and Karungu Sub Counties both in Buhweju district. This is envisaged to bring an end to water stress and overreliance on a few low yielding boreholes within the project area of Bitsya and Karungu Sub-Counties and neighbouring community. It is also envisaged that, the area experiences scarcity of safe clean water and high growing population. Further still, the project will also address the focal area of access to clean water 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.
- Reliable water supply to the 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 scale irrigation farming especially in vegetables and flowers since most household heads are involved in subsistence agriculture.
- An increase in revenue for the sub counties 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 Sub Counties and parishes in terms of providing good services to its people hence more funding from potential funders.

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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:

- Soil erosion during construction phase.
- Destruction of vegetation and crops during construction phase.
- Increased noise nuisance during construction phase by workers and equipment.
- Increased sediment loads into the downstream beyond water sources especially during construction phase.
- Improper disposal of cut out spoil and other construction wastes.
- Other concerns include occupational safety hazards, and HIV/AIDS risk associated with construction labour.

A RAP was undertaken to address all compensation issues that are anticipated and an ESMP has also been presented in the preceding Chapter to ensure positive impacts are enhanced while negative impacts are mitigated. Resettlement issues are not anticipated. The current designs did not consider the need for a wastewater treatment plant. The water source being surface water based, a substantial amount of wastewater and sludge will be generated in sedimentation tanks thus there is need to put in place a wastewater treatment plant to enable wastewater to be treated before final disposal especially if water treatment chemicals are to be used.

During this ESIA study, comprehensive stakeholder consultations were conducted with relevant stakeholders and MWE/DWD will liaise with them to ensure effective implementation of the proposed mitigation measures for the anticipated negative impacts as indicated in the ESMP. MWE/DWD 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 DWD should immediately address them in consultation with NEMA. If any other structures/ expansion not described

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in this report takes place, it will be considered separate and an ESIA Report/Project brief will be prepared by DWD 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 ESMP 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 Buhweju district should be used and 95% (subject to availability and skills levels) local contractors should be used.
- The Developer (DWD) 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 intake on River Nyarwambu.
- Prepare a water source protection plan for the catchment area of the water sources.

Therefore, the proposed BWSSS 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



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## Annexe 1. Approved Terms of Reference for ESIA by NEMA



## NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY (NEMA)

NEMA House  
Plot 17,19 & 21, Jinja Road.  
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### NEMA/4.5

3<sup>rd</sup> May, 2022

The Director  
Directorate of Water Development  
Ministry of Water and Environment  
P. O. BOX 20026  
**KAMPALA.**

Tel: +256-4144505941  
E-mail: nmalizah@yahoo.com

**RE: REVIEW OF THE SCOPING REPORT AND TERMS OF REFERENCE FOR THE ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT FOR THE PROPOSED CONSTRUCTION OF BITSYA WATER SUPPLY AND SANITATION SYSTEM IN BITSYA AND KURUNGU SUB-COUNTIES, BUHWEJU DISTRICT – EIATOR 8458**

This is in reference to the Scoping Report and Terms of Reference (TOR) for carrying out an environmental and social impact assessment (ESIA) for the above-mentioned Project, which was submitted to this Authority for review and consideration for approval. This Authority has finalised the review of the said Scoping Report and ToR.

**Please, note that approval of the Scoping Report and TOR, DOES NOT CONSTITUTE PERMISSION to start implementing any of the proposed project activities, before a decision is made by this Authority.**

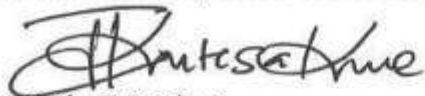
In addition to the scope of work provided in the ToR, ensure that the key aspects highlighted below are taken into consideration during the conduct of the Environment and Social Impact Assessment and preparation of the ESIA report.

- (a) A separate environmental assessment shall be undertaken for the proposed Faecal Sludge Treatment Plant and sanitation component of the project, and the report submitted to this Authority for consideration. Note however, the cumulative impacts of both projects should be evaluated and mitigation measures provided in the respective reports.



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This is, therefore, to recommend that you proceed with carrying out the ESIA for the proposed Bitsya Water Supply and Sanitation System in Bitsya and Kurungu Sub-Counties, Buhweju District. We look forward to your cooperation and receipt of a comprehensive copy of the ESIA report, for our further action.



Jennifer Kutesakwe

**FOR: EXECUTIVE DIRECTOR**



## Annexe 2. Records of Stakeholder Engagement

No	Description	Action by
Min 1	<b>Opening Prayer</b> This was said by Jonathan Kavuma	BTS
Min 2	<b>Self-Introduction</b> Members did self-introduction. Attendance list is attached	All
Min 3	<p><b>Communication from Ministry of Water and Environment (MWE)</b></p> <p>The Team Leader (Edrida Musinguzi) welcome all members and pointed out the following to the meeting:</p> <ul style="list-style-type: none"> <li>• In 2019, The World Bank and Ministry of Finance Planning and Economic Development Agreed to support MWE in increasing Access to Water and Sanitation under the Integrated Water Management and Development Project (IWMDP).</li> <li>• With regard to Buhweju, the district is under the Gravity Flow Water Supply Systems (WSS) proposed in Bitsya. In addition, MWE had introduced the Project to the District and engaged Bright Technical Services (BTS) to carry out the Environment and Social Impact Assessment (ESIA) and the Resettlement Action Plan (RAP).</li> <li>• The ESIA and RAP were carried out and the reports approved by National Environment Management Authority (NEMA) and the Chief Government Valuer (CGV) in the Ministry of Lands Housing and Urban Development.</li> <li>• MWE had commenced the implementation of the approved RAP through engagements and preparing PAPs for disclosure with some PAPs opening Bank Accounts and their Details entered into the IFMS.</li> <li>• However, design reviews undertaken in 2020-2021 revealed that the yields at Rujuga and Rwakina are not sufficient for the targeted demand. Consequently, River Nyarwambu has been identified as the new source.</li> <li>• The above changes in the sources results into a change in the routing of the transmission pipes. This together with the fact that a lot of time has passed with many changes occurring including change in PAPs, some could have sold, more subdivisions, and probable building construction, there is need to prepare a new ESIA and RAP Reports in accordance with the new Project design and footprint</li> </ul>	MWE

No	Description	Action by
	<ul style="list-style-type: none"> <li>Consequently, MWE and Bright Technical Services (BTS) signed on the 27<sup>th</sup> January 2022 for preparation of the ESIA, RAP, and SPP for the Project. The Inception Report is expected on 15<sup>th</sup> February 2022 and by March or beginning of April; the Draft ESIA and RAP Report will be out to.</li> <li>Another Consultant for Stakeholder Engagement, Environment and Social Risk Management, and RAP Implementation will be procured to address issues to do with HIV, Gender Based Violence among others prior and during construction phase.</li> </ul>	
Min 4	<p><b>Communication from the Consultant</b></p> <p>The Consultant led by Mr Pius Kahangirwe informed the meeting that the Rujuga and Rwanika Springs had in yields of approximately 12.5m<sup>3</sup>/day in 2019 and its 2.5m<sup>3</sup>/day currently. This was a basis for the design review and finding a new water source was inevitable. Therefore, this consultancy will involve ESIA, RAP, and Water source under the Source Protection Plan (SPP). The SPP activities are intended to guarantee sustainability</p>	BTS
Min 5	<p><b>Communication from the Chairperson L.C.V</b></p> <p>The Chairperson L.C.V (Deo Atuhaire) welcomed everyone to the meeting.</p> <p>He acknowledged in the meeting that Buhweju District is one of the Most Water Stressed Districts in Uganda and welcomed MWE and the Project objectives in the district.</p> <p>The Chairman was mainly concerned about poor communication flow between the District and the MWE to the extent these changes locations of water sources had not been communicated to the district and other stakeholders well in time. He therefore requested that going forward, it is important the MWE and all consultants keep the district and other stakeholders updated.</p> <p>He requested the MWE provides the district with a summary Project Brief/Brochure for their records and reference</p>	<p style="text-align: right;">165</p> <p>MWE</p> <p>MWE</p>
Min 6	<p><b>Discussion and Resolution</b></p> <p>MWE Team leader introduced the Project Manager (Cate Namyalo) to the stakeholders and informed the meeting she will be responsible for the Project and ensure all documents and information is shared</p> <p>The Chairman requested the MWE to urgently plan Engagement Meetings with previous PAPs who will now no longer be affected due to design changes. The meetings should have the focused participation of the district leaders to avoid any hostility or resistance from the formerly affected persons who have been anticipating compensation</p> <p>MWE Team leader said there is a new mode of operation introduced by the ministry to let district authorities manage the water to fill the gaps in proper water management.</p>	<p>MWE</p> <p>MWE</p> <p>District</p>

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No	Description	Action by
Min 7	<p><b>Closing Remarks</b></p> <p>The Project Manager (Cate Namyalo) presented the expectations on the Project and called upon the consultant and all stakeholders to commence the activities immediately.</p> <p>The Chief Administrative Officer (Henry Ddamba) closed the meeting with appreciation to members who managed to attend.</p>	C.A.O
	<p>Edrida Musingunzi Meeting Chairperson</p> <p>Jonathan Kavuma Minute Secretary</p>	

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## MINUTES FOR THE MEETING HELD AT BITSYA SUB COUNTY IN BUHWEJU DISTRICT ON 13<sup>TH</sup>04, 2022

### AGENDA

1. PRAYER
2. SELF INTRODUCTION
3. REMARKS FROM LC3 CHAIRPERSON
4. PRESENTATION FROM THE CONSULTANTS
5. REACTIONS
6. APPOINTMENT OF THE WATER SOURCE PROTECTION COMMITTEE (WSPC)

#### 1. Prayer

Prayer was led by a volunteer

#### 2. Self-introduction

Meeting members introduced themselves;

#### 3. Remarks from LC3 Chairperson

He welcomed visitors from MWE (consultants) and all the technical and political staff at the sub county. He thanked God for their sub county was chosen among all other water stressed areas and were considered. Everything to be needs water and water is life. This water project will bring development in our area. There are cells where the water project will not e.g. Kazirwa A & B, Kabutega and Kakuto and he requested that if possible, water should reach there.

#### 4. Presentation from the consultant

#### 5. Reactions

Water is life and so the project is welcome

Requested that water should be for free

There is a water project in this area which is tapped from Kyenjogyera, so they requested the two water projects to integrate and run together

Jobs especially casual works should be given to the local people

We request that all the villages in this sub county get water. A group of ministry water said there will be public toilets in public institutions. We request its implemented

Activity alternatives which may be considered and financed are; Zero grazing, fish farming, bee keeping and also juice packing machines to replace brewing.

SN.	Comment	Response
1.	The water is dirty and bad, what are you going to do about it?	We doing a water source protection plan and we are identifying activities which leads to water quality deterioration so as alternatives can be suggested. We shall also treat water before supplying it.

2.	Is the contractor going to get workers from outside our place?	As the law states, 75% of the workers are supposed to be got from the project area unless they are not available
3.	At times people come here we do agreements and later they change them and do forgery. Are you genuine?	If NEMA finds out there is any forgery in work, it will suspend that project. But there is no any forgery in this work
4.	They requested for opening of roads where the public tap stands will be placed	Most of these tap stands will be located in accessible places like town centres
5.	Most times water is not constant. Will your water be regular?	Yeah, we expect our water to be regular
6.	If during construction our coffee or bananas are cut, is there any compensation?	Compensation will be according to the property destroyed. District compensation rates will be used
7.	According to your training we should not expect any money, how shall the committee monitor the project without any pay?	The selected committee is you people from these villages in the project area, we don't expect much movements out of these areas
8.	Is the project government aided or private?	It's a government project
9.	Kiringoma B village was not considered, what's your plan for this village?	According to the area coverage, its considered
10.	Will there be security for project property, how sure are the pipes and other property will not be vandalized?	There will be a guard on pump station and for case of pipes we are appointing a water user committee for monitoring and sensitizing people about the project.

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## 7. Selection of the Water Source Protection committee (WSPC)

The following people were selected;

SN.	NAMES	POSITION
1.	CHAIRPERSON	TUSIIME ADEODATI
2.	VICE CHAIRPERSON	KAYESU JACKLINE
3.	GENERAL SECRETARY	PETER TEHWA
4.	TREASURER	KANYESIGYE JALLIA
5.	MOBILIZATION/PUBLICITY	ISSA KARYEISA
6.	WOMEN REPRESENTATIVE	TUSIMIIRE SCOVIA

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7.	YOUTH REPRESENTATIVE	KEKIMURI VENTRINA
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**MINUTES FOR THE MEETING HELD AT KARUNGU SUB COUNTY, BUHWEJU DISTRICT ON 13TH 04, 2022**

**AGENDA**

1. PRAYER
2. SELF INTRODUCTION
3. REMARKS FROM LC3 CHAIRPERSON
4. PRESENTATION FROM CONSULTANTS
5. REACTIONS
6. SELECTION/ APPOINTMENT OF THE WATER SOURCE PROTECTION COMMITTEE (WSPC)

**1. Prayer**

Prayer was led by a volunteer

**2. Self-introduction**

Meeting members introduced themselves as follows;

**3. Remarks from the LC3 Chairperson**

Welcomed everyone to the meeting. So far three meetings have already been chaired regarding Karungu water. He tasked councilors to educate people this water because they are immediate to the local people because they have been hesitant and not minding about attending water related meetings, they can only attend on hearing there is money. People are not willing to allow pipes pass their land but with education and training about the project, they can be changed gradually.

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**4. Presentation from the consultant**

**5. Reactions**

Community expects safe and clean water

The community expects jobs both skilled and unskilled

They expect water which is near their homes/houses and reduce on distances moved and save time for productive work.

The community expects water which is frequent/regular

They expect compensation of property destroyed like plantations and coffee

The contractor should employ workers with discipline

There should be replacement of activities/alternative of livelihoods in case there some activities are leading to compromise quality and quantity of water are stopped

There should be places gazetted for watering of animals

Juice packing machines should be brought in case brewing of alcohol is stopped alongside the rivers

Taps of water should be extended to others areas to facilitate brick laying outside the rivers

The project area should be supplied with bee hives as an alternative activity

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Every home or two families should be given a tap to reduce congestion of people in water collecting points since its covid-19 period.

Find farming should be financed as an activity alternative

Zero grazing practices should be encouraged in the project area (financed and extending water to the farming).

Sn.	Quiz	Ans.
1.	What is the difference between NWSC and the water you are bringing?	There is no much difference, if the ministry and district leaders decide NWSC to be on ground, it will take over, if they decide Maizimarungi as operators, well and good.
2.	There are cells/villages which were not considered and they don't have water, what plan do you have for them?	Government is working hand in hand with the district to include these villages.
3.	When should this water be expected?	By end of May, 2022 these studies will be done and the contractor will be onsite.
4.	What is the cost if I want water to reach my home?	The distance/meters or kilometers from the main pipe to your home will be considered in determining the cost. (District and sub county leaders will decide). There are promotional connections which are relatively cheaper.
5.	My home is not considered in the project area. But I have another piece of land where pipes are passing. How do I benefit?	There are compensation rates, the surveyor considers these district rates and the property destroyed will be compensated.

**Summary of Stakeholder Views and Concerns at Sub county Level with RAP Team Responses**

Target Stakeholders:	CAO, LCV, District water Engineer, DSS, all Sub-County Leaders including Councilors, CSO, Previously affected PAPs, Chairpersons Local Council I of all previously affected villages.
Consultant	Bright Technical Services
Minutes by:	Joseph Balikuddembe
Reviewed by:	Wamani Bryan
Date of Meeting:	23 <sup>rd</sup> / 03 / 2022
Meeting Venue:	<b>Karungu Sub-county</b>
Meeting Start Time:	<b>12:00pm</b>
ATTENDEES (See attendance register attached)	
<b>AGENDA</b>	
<ol style="list-style-type: none"> <li>1) Prayer</li> <li>2) Self-Introductions</li> <li>3) Remarks from the Chairman of the meeting</li> <li>4) Communication from the MWE team leader about the project status</li> <li>5) Communication from Bright Technical Services about the project way forward for the project</li> <li>6) Reactions from people present</li> <li>7) Question and Answer</li> <li>8) Closure</li> </ol>	

**Communication from the MWE to the stakeholders.**

MWE team leader stated the purpose, nature and scale of the project and gave a background about the project, clearly stated the reasons for the amendments in the project including but not limited to why there is a change in the water source, and why there is need for a fresh ESIA study, RAP study and to conduct SPP as well. She went further to introduce the consultant to the stakeholders present that Bright Technical Services is the consulting firm contracted by MWE to the undertake the necessary studies in a fast and efficient way possible and called upon the leaders to not only mobilize people but as well ensure they offer BTS all the necessary support to execute this assignment on time.

**Communication from Bright Technical Services to the stakeholders included the following issues among others.**

- a) The duration of proposed project activities including; asset surveys, socio-economic surveys and the compensation procedures.
- b) Potential risks and impacts of the project on local communities, and the proposals for mitigation, highlighting potential risks and impacts that might disproportionately affect vulnerable and disadvantaged groups and describing the differentiated measures taken to avoid and minimize these;
- c) The proposed stakeholder engagement process highlighting the ways in which stakeholders can participate; and
- d) The process and means by which grievances can be raised and will be addressed.

NAME	ISSUE	QUESTION /COMMENT	RESPONSE
CAO Buhweju	Information sharing	<ul style="list-style-type: none"> <li>• I request that you share information about this project as much as possible to enable the responsible departments track progress and supervise as well.</li> <li>• All leaders present, I urge you to engage the community members to provide utmost support and coordination needed by the Project wholly and not let individual interests put a standstill or delay the implementation.</li> </ul>	This is noted. Good enough both concerned parties the consultant and MWE are here.
V/LCV Buhweju District	Coverage	<ul style="list-style-type: none"> <li>• We request that more villages be covered during the first phase of this project</li> </ul>	This will again be discussed at another level but for now let's ensure we offer our utmost support to this phase.
LC III Karungu sub county		<ul style="list-style-type: none"> <li>• Water scarcity is a serious problem in this community, women and children bear the full responsibility of ensuring that there is water at home.</li> <li>• It sometimes takes people 2-3hours fetching water thus the project is timely and long overdue</li> </ul>	We appreciate that we are responding to a genuine cause that impacts the life of people

CDO Karungu Sub county	Public outcry	<ul style="list-style-type: none"> <li>We request the consultant to ensure that people from the project area are considered first to be employed at the time of construction</li> </ul>	This is noted and at the construction phase opportunities will be available base
OC Police Station Karungu Police Post	Security concern	<ul style="list-style-type: none"> <li>There is need for your team to coordinate with the security personnel to avoid vandalism of your equipment as it has happened to the team working on the electricity project</li> </ul>	<ul style="list-style-type: none"> <li>The issue is noted and will be embedded in our report to inform the rest of the consultants and contractors the need to engage security operatives for the safety of equipment and staff</li> </ul>
		<ul style="list-style-type: none"> <li></li> </ul>	<ul style="list-style-type: none"> <li></li> </ul>
<b>Target Stakeholders:</b>		<b>CAO, LCV, District water Engineer, DSS, all Sub-County Leaders including Councilors, CSO, Previously affected PAPs, Chairpersons Local Council I of all previously affected villages.</b>	
Consultant	Bright Technical Services		
Minutes by:	Joseph Balikuddembe		
Reviewed by:	Wamani Bryan		
Date of Meeting:	24 <sup>th</sup> / 03 / 2022		
Meeting Venue:	<b>Bitsya Sub-county</b>		
Meeting Start Time:	<b>12:00pm</b>		
ATTENDEES (See attendance register attached)			
<b>AGENDA</b>			
<ol style="list-style-type: none"> <li>1) Prayer</li> <li>2) Self-Introductions</li> <li>3) Remarks from the Chairman of the meeting</li> <li>4) Communication from the MWE team leader about the project status</li> <li>5) Communication from Bright Technical Services about the project way forward for the project</li> <li>6) Reactions from people present</li> <li>7) Question and Answer</li> <li>8) Closure</li> </ol>			
<p><b>Communication from the MWE to the stakeholders.</b></p> <p>MWE team leader stated the purpose, nature and scale of the project and gave a background about the project, clearly stated the reasons for the amendments in the project including but not limited to why there is a change in the water source, and why there is need for a fresh ESIA study, RAP study and to conduct SPP as well. She went further to introduce the consultant to the stakeholders present that Bright Technical Services is the consulting firm contracted by MWE to the undertake the necessary studies in a fast and efficient way possible and called upon the leaders to not only mobilize people but as well ensure they offer BTS all the necessary support to execute this assignment on time.</p> <p><b>Communication from Bright Technical Services to the stakeholders included the following issues among others.</b></p> <ol style="list-style-type: none"> <li>a) The duration of proposed project activities including; asset surveys, socio-economic surveys and the compensation procedures.</li> </ol>			

b) Potential risks and impacts of the project on local communities, and the proposals for mitigation, highlighting potential risks and impacts that might disproportionately affect vulnerable and disadvantaged groups and describing the differentiated measures taken to avoid and minimize these; c) The proposed stakeholder engagement process highlighting the ways in which stakeholders can participate; and d) The process and means by which grievances can be raised and will be addressed.			
NAME	ISSUE	QUESTION /COMMENT	RESPONSE
Ayebare Arthur Subcounty Chief	Compensation	<ul style="list-style-type: none"> <li>We welcome the project but kindly consider to pay some money to those who had already opened up bank accounts</li> </ul>	Unfortunately, there is no budget to meet that cost but not all hope is lost as the consultant will resurvey again and identify those that are still affected will be paid.
OLD PAP	Compensation	<ul style="list-style-type: none"> <li>Will you pay for the crops that you are likely to cut down?</li> </ul>	Our design tries as much as possible to route
Asiimwe Grace Chairman LC III	Concern for Local community	<ul style="list-style-type: none"> <li>We request for Jobs for the local communities during construction phase of the project</li> </ul>	The people from the local community will be considered for these job openings when the construction phase commence. As you can see even our project coordinator is your very own.
Bakaija NRM District Chairperson	Compensation	<ul style="list-style-type: none"> <li>We request that some funds be paid to our people who had already opened up accounts for the projects purpose.</li> </ul>	This has been addressed already! There is no budget for the same but people will still benefit from the service that is being extended to the community

### *Summary of Stakeholder Views and Concerns with RAP Team Responses*

Views/Comments/Questions	RAP Team's Responses
<ul style="list-style-type: none"> <li>Will my house be compensated for in case the pipe line is passing through it?</li> </ul>	<ul style="list-style-type: none"> <li>Compensation will be paid by the Government of Uganda through Ministry of Water and Environment based on the Valuation Report upon being approved by the Chief Government Valuer</li> </ul>
<ul style="list-style-type: none"> <li>Will water be free of charge or there will be some charges incurred</li> </ul>	<ul style="list-style-type: none"> <li>No, however the utility tariff charged will be affordable and somewhat similar to that charged in other areas. The charges usually ensure the sustainability of the project</li> </ul>
<ul style="list-style-type: none"> <li>We request for Jobs for the local communities during construction phase of the project</li> </ul>	<ul style="list-style-type: none"> <li>The request is noted. And as already witnessed, our project coordinator is from the project area.</li> </ul>
<ul style="list-style-type: none"> <li>Given that this is a development project, why do we</li> </ul>	<ul style="list-style-type: none"> <li>We pay for utilities to enable operation and maintenance activities for continuity and sustainability of the</li> </ul>

Views/Comments/Questions	RAP Team's Responses
<p>have to pay utility charge for water usage</p> <ul style="list-style-type: none"> <li>• Can Bright Technical Services give us the opportunity to work as a security guard for the reservoir after it is erected since we have our brothers and sisters who qualify fully in that field?</li> </ul>	<p>project.</p> <ul style="list-style-type: none"> <li>• These opportunities will be based on the required skill set, available work and age.</li> </ul>
<ul style="list-style-type: none"> <li>• In case our school land is affected, what specific documents are required as you have tasked individuals to present their National IDs?</li> <li>• Will public stand taps be established in addition to service line extensions to private individuals</li> </ul>	<ul style="list-style-type: none"> <li>• The representative will equally present the National ID but in the long run, the implementing team will give further guidance on the way forward after discussions with the institution governing body or council.</li> <li>• Ministry of Water and environment will most likely hand over the project once the infrastructure is set up, NWSC will be in charge of the infrastructure. The technical team will assess the need and offer the service accordingly.</li> </ul>
<ul style="list-style-type: none"> <li>• Will service line connections to private individuals be free of charge or there will be some charges incurred</li> </ul>	<ul style="list-style-type: none"> <li>• No, however the charge will be affordable and somewhat similar to that charged in other areas. This is for the benefit of both the project implementors and the end users to ensure sustainability</li> </ul>
<ul style="list-style-type: none"> <li>• Will the charge be much fair for those who are sacrificing their land for the project?</li> </ul>	<ul style="list-style-type: none"> <li>• A uniform unit charge will be applied. However, connection fees may vary since for you the pipe will be much closer to your home</li> </ul>

***Schedule of engagements conducted during the RAP study***

Phase	Stakeholder	Key Officials Present	Date of engagement	Location	Numbers	
					Male	Female

Reconnaissance	District Consultations					
	Buhweju		09-10 Feb 2022	Buhweju Town Council		
	Sub-County Consultations					
Inception Meetings	Karungu Sub-county	CAO, LCV, District water Engineer, DSS, all Sub-County Leaders including Councillors, Previously affected PAPs, Chairpersons Local Council I of all previously affected villages.		Karungu Sub-county	28	10
	Bitsya Sub-county	V/C LCV, District water Engineer, Sub-County Leaders including Councillors, CSO, Previously affected PAPs, Chairpersons Local Council I of all previously affected villages.		Bitsya Sub-county	32	19
Detailed Disclosure and Assessment Phase	Community Level Consultations					
	Nyakakongi, Kanyakakongi, Kamukaki, Ryakabunu	Community members, LC Leaders, Parish and Sub-county Leaders	25.03.2022	Ekisiizi Trading Centre	39	09
	Kamakanda, Nyakasa, Nyakitooma	Community members, LC Leaders, Parish and Sub-county Leaders	27.03.2022	Katara Trading Centre	41	07
	Ahambuga, Karungu I & li, Kasharara I & li	Community members, LC Leaders, Parish and Sub-county Leaders	26.03.2022	Ahambuga Trading centre	26	08
	Bishenyi, Rwankondo	Community members, LC Leaders, Parish and Sub-county Leaders	27.03.2022	Rwankondo Trading Centre	19	13
	Ntoboora B, Nyabugando A	Community members, LC Leaders, Parish and Sub-county Leaders	25.03.2022	Akatete Trading centre	23	12
	Nyabugando A, Nyabugando B	Community members, LC Leaders, Parish and Sub-county Leaders	26.03.2022	Karungu Subcounty	56	38
	Kankara, Mirama	Community members, LC Leaders, Parish and Sub-county Leaders	28.03.2022	Kankara Trading Center	26	05
	Mpiiija I, Mpiiija li	Community members, LC Leaders, Parish and Sub-county Leaders	28.03.2022	Mpiiija Trading centre	21	03
	Kasiira Rwanyimoma	Community members, LC Leaders, Parish and Sub-county Leaders	28.03.2022	Mushasha Health centre	06	10
	Bitsya, Kanoni, Kasaana, Rujuga, Muziguru	Community members, LC Leaders, Parish and Sub-county Leaders	29.03.2022	Bitsya Subcounty	27	12
	Karingoma A, Kayanzi	Community members, LC Leaders, Parish and Sub-county Leaders	30.03.2022	Karigoma Trading centre	21	08

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	Kitega I Kitega li	Community members, LC Leaders, Parish and Sub-county Leaders	30.03.2022	Kitega Trading Centre	08	11
	Kyanyabitta	Community members, LC Leaders, Parish and Sub-county Leaders	27.03.2022	Kyanyabita Trading centre	07	04

# Annexe 3. Stakeholders Consultation Forms



REPUBLIC OF UGANDA  
MINISTRY OF WATER AND ENVIRONMENT

Consultancy services for preparation of environmental and social impact assessment (ESIA), environmental and social project brief (EPB), resettlement action plan (RAP) and source protection plans (SPP) for (I) large solar powered piped water supply systems and sanitation facilities in Bugwara and Kabamba in Kagaon district, Kikoora and Mwatizungu in Kakumiro district, Kasese and Lwentulege in Rakai District and (II) Bitsya and Nyamugasani water supply systems in Buhwaju and Kasese districts respectively

STAKEHOLDER CONSULTATIONS - ATTENDANCE LIST

PLACE Bugwara

Date 2 February 2022

SEE	NAME	DESIGNATION	TELEPHONE NO / E-MAIL	SIGNATURE
01	BASTON OKOKA NICHOLAS	DCDO	0787314934 bnicholas@upho.gov.ug	
02	NAMARA BRENDA	ENVY OFFICER	0799218394 nagar@upho.gov.ug	
03	KUKURITA MATHEW	RWSRC E TUMUKU	0745445747 kukurita@upho.gov.ug	
04	ABITEGEKA ARNOLD	E.H.O	0784873824 arnold@upho.gov.ug	
05	ALYASITA JOHN	DHE	0753213500 alyasita@upho.gov.ug	
06	WAWUWAKIBI ROSEMARY	SEHO	0782419302	
07	JONATHAN KAYUMA	SOCIOLOGIST/BTS	0753603235	



**BRIGHT TECHNICAL SERVICES LTD**  
Civil Engineers and Project Managers



REPUBLIC OF UGANDA  
MINISTRY OF WATER AND ENVIRONMENT

Consultancy services for preparation of environmental and social impact assessment (ESIA), environmental and social project brief (EPB), resettlement action plan (RAP) and source protection plans (SPP) for (i) large solar powered piped water supply systems and sanitation facilities in Bugwara and Kabamba in Kagadi district, Kikoora and Mwitazinge in Kakumiro district, Kasese and Laventulege In Rakal District and (ii) Bitsya and Nyamugasani water supply systems in Buhweju and Kasese districts respectively

STAKEHOLDER CONSULTATIONS - ATTENDANCE LIST PLACE Buhweju Date 2<sup>nd</sup> February 2022

REF	NAME	DESIGNATION	TELEPHONE NO / E-MAIL	SIGNATURE
1	NDIATTEGWA EZRA	Buhweju DLG	0772541582	
2	Atuhave Naama	MWSE Senior Coordinator	0702544753	
3	Ddamba Henry	cmo Buhweju	0782860004 ddamba@up.gov.ug	
4	AKUTHIRE DEE	LC2 CH	akuthiredee@gmail.com	
5	FRAS KATHARINE	BIS/TESSA WSP	0774603688	FRAS
6	Cato Mamyalo	JEHO/PIWCD	0775191509	
7	Eskola Mwanuzi	Princ. Sec. MWSE	0201675528	
8	DAVID SIMPICA	UPRUSA/BTS	0702460773	DS



**BRIGHT TECHNICAL SERVICES LTD**  
Civil Engineers and Project Managers

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### STAKEHOLDER CONSULTATION AND ENGAGEMENT

NAME OF THE PROJECT: CONSULTANCY SERVICES FOR ENVIRONMENT AND SOCIAL IMPACT ASSESSMENT (ESIA) AND WATER SOURCE PROTECTION PLAN FOR BITSYA PIPED WATER SUPPLY SYSTEM IN KARUNGU AND BITYSA SUB COUNTIES; BUHWEJU DISTRICT.

Date: 13<sup>th</sup> Feb 2022 Bitsya S/c

NO.	NAMES	DESIGNATION	CONTACT	SIGNATURE
1	ASHIMWE GRACE	LC III CHIEF	0784995330	
2	KEZIRE DEZIDERIUS	Parish chief	0784160871	
3	KANYESIGYE JALWA	Bugwarama	0784660609	K.J
4	TUSHIMIRE SCOVIA	DI COUNCILLER	0787470202	
5	KAYESU JACKLWE	Parish COUNCILLOR	0716876475	Kayesu
6	Katusiime J	LC I		
7	Budamanya S	Bisya-LCI	0779961640	Budamanya
8	Bainomugisha J	BISYA CL	0776241634	Bainomugisha
9	Tellwa Peter	Chairman LCI	0772065762	
10	Tushimire Ronald	Bisya Cell		

## STAKEHOLDER CONSULTATION AND ENGAGEMENT

NAME OF THE PROJECT: CONSULTANCY SERVICES FOR ENVIRONMENT AND SOCIAL IMPACT ASSESSMENT (ESIA) AND WATER SOURCE PROTECTION PLAN FOR BITSYA PIPED WATER SUPPLY SYSTEM IN KARUNGU AND BITSYA SUB COUNTIES; BUHWEJU DISTRICT.

Date: 13/04/2022 Bitsya S/C

NO.	NAMES	DESIGNATION	CONTACT	SIGNATURE
1.	ARINATWE GERARD	Bitsya	0785489821	Arinatwe ✓
2.	TUMUSHIME ADEODATO	Chairman PITA Boya	0785502927	Tumushime ✓
3.	RUGUMANA DEODATINS	Chairman LCI MPIDAI	0774990930	Rugumana ✓
4.	Kanyajira ISA	Chairman LCI Yacwa	0773976316	Kanyajira ✓
5.	ASHIMWE GRACE	Chairman LCI III	0784995236	Ashimwe ✓
6.	Karamura VESTRIMAH	DC SECRETARY	0786536669	Karamura ✓
7.	BYUKATONKA PASTOR	V/MAN LCI III	0776640325	Byukatonga ✓
8.	KASWIGE FAUSTINE	Police Officer Buhweju	0788287068	Kaswige ✓
9.	-			
10.				

## STAKEHOLDER CONSULTATION AND ENGAGEMENT

NAME OF THE PROJECT: CONSULTANCY SERVICES FOR ENVIRONMENT AND SOCIAL IMPACT ASSESSMENT (ESIA) AND WATER SOURCE PROTECTION PLAN FOR BITSYA PIPED WATER SUPPLY SYSTEM IN KARUNGU AND BITSYA SUB COUNTIES; BUHWEJU DISTRICT.

Date: 13/04/2022 Karamura S/C

NO.	NAMES	DESIGNATION	CONTACT	SIGNATURE
1.	Nawasira Pamela	Peasant	0783908794	Nawasira ✓
2.	Kansume Rowald	Police	0789903432	Kansume ✓
3.	Kyamuhendo SPERIDOR	Secretary for Women	0776558101	Kyamuhendo ✓
4.	Nuwasisira VICARI	Area Councillor	0774944190	Nuwasisira ✓
5.	Mugisha Denis	Peasant	0789552569	Mugisha ✓
6.	Musemige Adwano	Peasant	0778934537	Musemige ✓
7.	Kamuyuni GRACEMARY	Ward Councillor	0778625066	Kamuyuni ✓
8.	Tukahirwa Annet	Sec. social services	0774857466	Tukahirwa ✓
9.	MUGOYA KENCACETA	DC Karungu PLS	0774806246	Mugoya ✓
10.	Tupuhimbise Aloysius	LCI Program	0785977510	Tupuhimbise ✓

## STAKEHOLDER CONSULTATION AND ENGAGEMENT

NAME OF THE PROJECT: CONSULTANCY SERVICES FOR ENVIRONMENT AND SOCIAL IMPACT ASSESSMENT (ESIA) AND WATER SOURCE PROTECTION PLAN FOR BITSYA PIPED WATER SUPPLY SYSTEM IN KARUNGU AND BITSYA SUB COUNTIES; BUHWEJU DISTRICT.

Date: 13/04/2022 KARUNGU S/C

NO.	NAMES	DESIGNATION	CONTACT	SIGNATURE
1.	BAGARUKAWA TALABISA	Chairman L.C	0783890517	<i>[Signature]</i>
2.	BAGUMA LEONIDAS	s/c speaker	0778732516	<i>[Signature]</i>
3.	MWESIGYE GERARD	V.C/MAN LC II	0789578483	<i>[Signature]</i>
4.	KANSIIME ANNET	L.Councillor Karungu Central	0780526496	Annet
5.	TURAHABWE AGNES	L.Councillor Buturo Parish	0775681840	Agnes
6.	NIWASHIMA JUDITH	Secretary SUPPLY POINT	0781583082	Judith
7.	TUMWINE JAVIRA	KAMUKAKI (B)	0751774085	Javira ✓
8.	TUMUHISE JULIUS	NYAKAKONDE LG	0784314022	<i>[Signature]</i> ✓
9.	TUMUHIRE, COSTANTINO	NYAKAKONDE	0780118370	<i>[Signature]</i> ✓
10.	TUGOMEWASE HAVEN	Karungu Parish	0779607128	<i>[Signature]</i> ✓

## STAKEHOLDER CONSULTATION AND ENGAGEMENT

NAME OF THE PROJECT: CONSULTANCY SERVICES FOR ENVIRONMENT AND SOCIAL IMPACT ASSESSMENT (ESIA) AND WATER SOURCE PROTECTION PLAN FOR BITSYA PIPED WATER SUPPLY SYSTEM IN KARUNGU AND BITSYA SUB COUNTIES; BUHWEJU DISTRICT.

Date: 13<sup>th</sup> 04 2022 KARUNGU S/C

NO.	NAMES	DESIGNATION	CONTACT	SIGNATURE
1.	BOOHABANA SENTURWA	s/man	0773580411	<i>[Signature]</i> ✓
2.	Keingiso Harriet	Councillor	0777384194	<i>[Signature]</i>
3.				
4.				
5.				
6.				
7.				
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REPUBLIC OF UGANDA  
MINISTRY OF WATER AND ENVIRONMENT

Consultancy services for preparation of environmental and social impact assessment (ESIA), environmental and social project brief (ESP), resettlement action plan (RAP) and source protection plan (SPP) for (i) large solar powered piped water supply systems and sanitation facilities in Bugwera and Kabamba in Kagadi district, Kikinda and Muliiziga in Karamoja district, Kasesa and Lawitolega in Makar District and (ii) Bwaga and Nyemogoozi water supply systems in Bulwaga and Kasesa districts respectively

STAKEHOLDER CONSULTATIONS - ATTENDANCE LIST

PLACE: KARUNGU Sub-County Date: 29/3/2022

REF	NAME	IDENTIFICATION	TELEPHONE NO./E-MAIL	SIGNATURE
1	MUNYONYA VERAWEYO	CEO/ PROJECT COORDINATOR	072090304	
2	MULIMBERE VITALIS	COMMUNITY HEALTH ASSISTANT	0787440192	
3	Joseph Kabwaddemba	Senior Inspector	07757116	
4	TWESHIME ADDAMS	SubCounty Chief	0783534480	
5	BAGAYUSA MAMUKE	Senior Assistant Accountant	0776667761	
6	Bagayusaka TADAYISA	CLINICAL OFFICER	0783990977	
7	KUNYAKAZA MATHET	FWSE RURAL COMMUNITY ASSISTANT	0705425924	
8	ABITEGEVA ANNALE	EMO - FWSE RURAL	0754595524	



**BRIGHT TECHNICAL SERVICES LTD**  
Civil Engineers and Project Managers



CONSULTANCY SERVICES FOR ESIA AND RAP FOR BITSYA PIPED WATER SUPPLY SYSTEM IN BUHWEJU DISTRICT AND NYAMUGASANI GRAVITY FLOW SCHEME IN KASESE DISTRICT



RECORD OF ATTENDANCE

MEETING REFERENCE: STAKEHOLDER ENGAGEMENT

VENUE: KARUNGU SUB-COUNTY

DATE: 22/03/2022

#	NAME	SEX (M/F)	VILLAGE	DESIGNATION	EMAIL	CONTACT	SIGNATURE
1	Esther Musungu	F	MUSI	PSOC	esthermusungu@gmail.com	075282214	
2	Mugeige Kato	M		Senior Sec	075282214		
3	MUGOTA KENIAH	M	Karungu	DC Karungu	0756098075	0756098075	
4	Bemuhanyi Gerardo	M	Katara		0785767819	0785767819	
5	AHIMBULIBWE G	M	NYAKASA	LCI/CM	0777282311		
6	Kinyesiga Penant	F	Karungu	CDO	kinyesiga@gmail.com	072421602	
7	Natekunda Clarence	F	Bwamba	Finance Officer	0788909160		
8	Kandungu Dorcas	F	Bwamba	Public Officer	kandungudorcas@gmail.com	075760143	
9	Nasosira Pamela	F	Karungu	Secretary	078595794	078595794	
10	KANSIME ANNET	F	Muboma B	Councillor	0750526498	0750526498	
11	Bamwema Simon	M	Kasese	C/Officer		078218809	
12	Mugisa Veerappa	M	Bisitani	Chm LCTI	0777017392		



CONSULTANCY SERVICES FOR ESIA AND RAP FOR BITSYA PIPED WATER SUPPLY SYSTEM IN BUHWEJU DISTRICT AND NYAMUGASANI GRAVITY FLOW SCHEME IN KASESE DISTRICT



RECORD OF ATTENDANCE

MEETING REFERENCE: STAKEHOLDER ENGAGEMENT

VENUE: KARUNGU SUB-COUNTY

DATE: 23/03/2022

#	NAME	SEX (M/F)	VILLAGE	DESIGNATION	EMAIL	CONTACT	SIGNATURE
1	Munyonyonyi Matis	F	Munyonyonyi	Councillor		0796772441	
2	Kabiragume Vitan	M	Karungu	CLM LCI		0774292349	
3	Tamwani Zube	M	Rugonyi	Parish Chief		0703007936	
4	Munyonyonyi Vito	M	Munyonyonyi	Councillor		0774944100	
5	Karungu sala	M	Nyamugasa	CLM LCI		0770387446	
6	Rumusiime Gerwa	M	Rugonyi Central	CLM LCI		0753791182	
7	Mwabazamba Ewas	M	Mwabazamba	CLM LCI		077072811	
8	Turyamuraho Kanutha	M	Karungu	Councillor		0785736634	
9	Turyamuraho Sipiira	M	Nyamugasa	CLM LCI		0774746244	
10	Athiindukira Esosa	M	Rugonyi B	CLM LCI		0786913719	
11	Turyamuraho Agnes	F	Buhweju	Councillor		0758220781	
12	Muyinda John	M	Water Office	ADDITIONAL	John.Muyinda@wema.gov.ug	075729400	



CONSULTANCY SERVICES FOR ESIA AND RAP FOR BITSYA PIPED WATER SUPPLY SYSTEM IN BUHWEJU DISTRICT AND NYAMUGASANI GRAVITY FLOW SCHEME IN KASESE DISTRICT



RECORD OF ATTENDANCE

MEETING REFERENCE: STAKEHOLDER ENGAGEMENT

VENUE: KARUNGU SUB-COUNTY

DATE: 27/03/2022

#	NAME	SEX (M/F)	VILLAGE	DESIGNATION	EMAIL	CONTACT	SIGNATURE
1	TWESIME ABDAMS	M	Karungu LC	Sub County Chief	adtwesime@gmail.com	0783534480	
2	BAGUMA LEONIDAS	M	Karungu LC	SLC Speaker		0978752816	
3	BAGAZUKUNA TADWA	M	Karungu LC	C/MCA LC		0783890911	
4	MUKAYEZI ERIC	M	Buhweju	Ndulo - B.T.U	mukayezieric@gmail.com	0722338392	
5	AMUTAZI CHRIS	M	Buhweju	ADULO - ACH	amutazichris@gmail.com	0784666444	
6	KANKUNDO EPHREM	M	Buhweju	PROV. VP	kankundoephrem@gmail.com	0772395175	
7	AGABA MILDRED	F	Buhweju	FRS CPO	agabamildred@gmail.com		
8							
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CONSULTANCY SERVICES FOR ESIA AND RAP FOR BITSYA PIPED WATER SUPPLY SYSTEM IN BUHWEJU DISTRICT AND NYAMUGASANI GRAVITY FLOW SCHEME IN KASESE DISTRICT



RECORD OF ATTENDANCE

MEETING REFERENCE: STAKEHOLDER ENGAGEMENTS 10

VENUE: KARUNGU SUB-COUNTY

DATE: 23/03/2022

#	NAME	SEX (M/F)	VILLAGE	DESIGNATION	EMAIL	CONTACT	SIGNATURE
1	BEYUNGA RUSI	M	KARUNGI	C/MCA LC		0704118250	
2	Rwandukana Karim	M	Karungu	C/MCA LC		077504622	
3	Musigye Gerald	M	Karungu	Vic/MCA LC		0784578483	
4	BATAINKAYA WILLIAM	M	Karungu	C/MCA LC		0757157358	
5	RUTAFUYIKA JEREMIAH	M	Ntibiru A	C/MCA LC		07856624	
6	MUTTA NAJJIGO	F	MWE	Com. Council		078602287	
7	Joseph Bwambwame	M	B.T.S	Senior Scientist		0787766	
8							
9							
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CONSULTANCY SERVICES FOR ESIA AND RAP FOR BITSYA PIPED WATER SUPPLY SYSTEM IN BUHWEJU DISTRICT AND NYAMUGASANI GRAVITY FLOW SCHEME IN KASESE DISTRICT



RECORD OF ATTENDANCE

MEETING REFERENCE: STAKEHOLDER ENGAGEMENT

VENUE: BITSYA PRIMARY SCHOOL

DATE: 24/07/2022

#	NAME	SEX (M/F)	VILLAGE	DESIGNATION	EMAIL	CONTACT	SIGNATURE
1	Bigirimankwasa C	M	Karabura	omutaga		0774338890	Bigimankwasa
2	Mwambiwa Kivuvu	M	KAWON	SIST/medu		0792823176	Mwambiwa
3	Quwawura Ernest	M	Kawon	W-councilor		0785281193	Quwawura
4	BAKATISA EXMIUS	M	KAWON	HRM WST. off		079292374	Bakatisa
5	Byambwanga	M	MUSIGWA	OMUTAGA			Byambwanga
6	Munyuni Pawan	M	MUSIGWA	Chairman		0787571301	Munyuni
7	Tundabaze - C	M	MUSIGWA	Chairman			Tundabaze
8	Kyamwira ALICE	F	BITSYA	CDO		077765209	Kyamwira
9	AYEBAZI ANTON	M	BITSYA	Steching		078955113	Ayebazi
10	ASTIMWIZI GRACE	M	BITSYA	Chairman		0784995336	Astimwizi
11	Namugamba Ruth	F	Naka	FOR CDO		078385069	Namugamba
12	Edwila Musinguzi	F	MUTE	Proc Soc		071475526	Edwila

0781443872 LC1 Kaseke



CONSULTANCY SERVICES FOR ESIA AND RAP FOR BITSYA PIPED WATER SUPPLY SYSTEM IN BUHWEJU DISTRICT AND NYAMUGASANI GRAVITY FLOW SCHEME IN KASESE DISTRICT



RECORD OF ATTENDANCE

MEETING REFERENCE: STAKEHOLDER ENGAGEMENT (BITSYA SUB-COUNTY)

VENUE: BITSYA PRIMARY SCHOOL

DATE: 24/01/2022

#	NAME	SEX (M/F)	VILLAGE	DESIGNATION	EMAIL	CONTACT	SIGNATURE
1	KEHWA PETER	M	KANONI	LCE		0772065742 0741382404	
2	KAHIMA SOHA	M	NYAMAMEN	LCE		0777 279506	
3	TUMUSIME CHASE	M	KARUJO	LCE		0787781669	
4	NUWANYESIGA PLOW	M	NYAMASUNO	LCE		0788075570	
5	IRUKATONDA PASURI	M	KITEGA I	LCE		0770666326	
6	NSAMUKWE SOGOMI	M	RUMUSUBOYA	LCE		0779092378	
7	BESUYEMUKA ZEB	M	KITEGA II	LCE		0782364460	
8	KALONJE NATHAN	M	KALINGOMAS	LCE		0704900365	
9	KEREZE WILBERD	M	KIRIOWA	LCE		0785154798	
10	KATIKIQU SOHA	M	KATEHE	LCE			
11	AMUKWASE G	M	BITSYA	LCE		0774773711	
12	IRUKATONDA	M	BITSYA	LCE		0781443872	

X

rlm



CONSULTANCY SERVICES FOR ESIA AND RAP FOR BITSYA PIPED WATER SUPPLY SYSTEM IN BUHWEJU DISTRICT AND NYAMUGASANI GRAVITY FLOW SCHEME IN KASESE DISTRICT



RECORD OF ATTENDANCE

MEETING REFERENCE: STAKEHOLDER ENGAGEMENT  
 VENUE: BITSYA PRIMARY SCHOOL DATE: 24/03/2022

#	NAME	SEX (M/F)	VILLAGE	DESIGNATION	EMAIL	CONTACT	SIGNATURE
1	BRIAN DAVID KASIRYE	M	KLA	Senior Analyst	demucm@b.gov.ug	0774921056	K.B.S.
2	Jean Bahadur	M		Senior Analyst		070627666	J.B.
3	KAMUKHANGI EVEREST	M	RUJUGA	CLIMATE		0786835591	Edna
4	Begum L.	M	MUZIGWA	Defence		0785043700	
5	Biyana gabo Babat	M	Rujuga	Secretary		0785002990	
6	Muzigwa Juma	M	Rujuga	Community		07744736	
7	OBE JOHN	M	Rujuga	Community	John.obey@gmail.com	0772541161	
8	KALUSUME KARIME	F	KWAGWAGW	Police		077079260	
9	KIO MUKHENDU-JAY	F	BITSYA	Pitch of Bitsya		0787135343	
10	ANEMUKAMA MAREEN	F	KWAGWAGW	Pitch of		0773145265	
11	KEZIRE DESIDERIUS	M	KITOGA	PARISH CHIEF		0784160871	
12	TUMUHITWE FERRETT	F	MUZIGWA			075218054	



CONSULTANCY SERVICES FOR ESIA AND RAP FOR BITSYA PIPED WATER SUPPLY SYSTEM IN BUHWEJU DISTRICT AND NYAMUGASANI GRAVITY FLOW SCHEME IN KASESE DISTRICT



RECORD OF ATTENDANCE

MEETING REFERENCE: STAKEHOLDER ENGAGEMENT (BITSYA SUB-COUNTY)  
 VENUE: BITSYA PRIMARY SCHOOL DATE: 24/03/2022

#	NAME	SEX (M/F)	VILLAGE	DESIGNATION	EMAIL	CONTACT	SIGNATURE
1	ABERIMWE ALBERT	M	KWAGWAGW	Lc clm		0782330439	
2	Muyinda John	M	DURRA	Police	johnmuyinda@gmail.com	071572990	
3	VIOLA AYERAA	F	MBARARA	Social Worker	violaayeraa@gmail.com	0784316341	
4	Kwagwagw Harriet	F	MBARARA	Community	kwagwagw.harriet@gmail.com	0705402524	
5	Mwita Naigwa	F	MWE	Area Comm	mwita.naigwa@gmail.com	074422580	
7							
8							
9							
10							
11							
12							

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## Annexe 4. Water Quality Analysis Results

Telephone  
+256 (0) 414 250 464 (Gen)  
+256 (0) 414 250 474  
Email: dgals@mia.go.ug  
Website: www.mia.go.ug

In any Correspondence on  
this subject **GE097/2022**  
quote No

April 14, 2022



THE REPUBLIC OF UGANDA

MINISTRY OF INTERNAL AFFAIRS  
DIRECTORATE OF GOVERNMENT  
ANALYTICAL LABORATORY  
Plot No. 1 Lourdel Road  
Wandegeya,  
P.O. BOX 2174  
Kampala - Uganda

### REPORT OF ANALYSIS

#### Description of Sample

One water sample labeled 'B' from River Nyarwambu, Buhweju District was received on April 7, 2022 for conformity to US EAS 12:2014 Specification of Natural Potable Water

#### Methods of Analysis

Metal ions were quantified from an acidified sample, at respective wavelengths, using Atomic Absorption Spectrometry technique, Shimadzu 6300. A five-point calibration curve was used to get the concentration of each metal ion. Nitrates, phosphates, sulphates, chlorides and ammonia were determined by UV-VIS Spectrometry technique, Shimadzu, 1601 at respective absorption wavelengths. Coliforms and *E. coli* were determined by Membrane Filtration Technique at 37°C and 44°C respectively. All determinations were done in duplicate.

#### Results of Analysis

The mean analysis values are as below;

Parameter	Result	Limits/Authority
pH	6.8	5.5 - 9.5
Conductivity(µS/cm)	247	2500 Max
Total Dissolved Solids (mg/L)	<b>1678</b>	1500 Max
Total Suspended Solids (mg/L)	<b>24</b>	Not Detectable
Total Hardness, CaCO <sub>3</sub> (mg/L)	94	600 Max
Turbidity (NTU)	<b>28</b>	25 Max
Arsenic (mg/L)	0.01	0.01 Max
Cadmium (mg/L)	≤0.01	0.003 Max
Calcium (mg/kg)	32.8	150 Max
Chromium (mg/L)	≤0.01*	0.05 Max
Copper (mg/L)	0.8	1.0 Max
Iron, Total (mg/L)	<b>6.4</b>	0.3 Max
Lead (mg/L)	≤0.001*	0.01 Max
Magnesium (mg/L)	34.2	100 Max
Manganese (mg/L)	<b>1.2</b>	0.1 Max
Mercury (mg/L)	≤0.001*	0.001 Max
Sodium (mg/L)	38.8	200 Max
Ammonia (mg/L)	<b>1.2</b>	0.5 Max
Chlorides (mg/L)	132	250 Max
Fluorides (mg/L)	1.2	1.5 Max
Nitrates (mg/L)	8.4	45 Max
Phosphates (mg/L)	<b>3.4</b>	2.2 Max
Sulphates (mg/L)	135	400 Max
Total Coliforms cfu/100ml)	<b>22</b>	Absent
<i>E. coli</i> (cfu/100ml)	<b>8</b>	Absent

#### Remarks

- \* Detection Limit, AAS technique, Shimadzu 6300
- Parameters in bold are in excess of the Standard
- Results relate to sample and are reported on as received basis

Justus Mike Ochem  
Senior Government Analyst

"Go Scientific for a Safe and Just Society"



## NATIONAL WATER & SEWERAGE CORPORATION

Tel: 0485 - 20723 WATER WORKS 20255 MBARARA AREA

Fax:

Our Ref: \_\_\_\_\_

Your Ref: \_\_\_\_\_

P.O. Box 1371  
PLOT NO. 3 GALT ROAD  
MBARARA

TO: The Project manager  
Kagga & Partner Consulting Engineering  
P.O.Box 6568  
Kampala, Uganda

Date: 21/08/2021

### **RE: WATER QUALITY ANALYSIS RESULTS.**

Source: River (Kalungu Bridge), Buhweju District

Date of sampling & Analysis: 19/08/2021

Lab No. **546**

Parameters	Units	Results	Drinking Standards (WHO)
Appearance	-	Not clear	Clear
Odour		Odorless	Odorless
Temperature	<sup>o</sup> C	23.5	20 – 30
PH	-	6.46	6.50 – 8.50
Electrical Conductivity	µs/cm	54	Less 1500
colour	Ptco	213	Less 15
Total Dissolved Solids	Mg/l	27	Less 700
Total Suspended Solids	Mg/l	20	Zero
Iron,	Mg/l	0.289	Less 0.3
Total Hardness as CaCO <sub>3</sub>	Mg/l	100	Less 500
Total Alkalinity	Mg/l	25	Less 500
Calcium	Mg/l	39.75	Less 150
Magnesium	Mg/l	26.0	Less 100
Phosphates	Mg/l	0.87	Less 10
Nitrate	Mg/l	0.36	Less 10
Chloride	Mg/l	1.56	Less 250
Fluoride	Mg/l	0.02	Less 1
Feecal coliforms,	Cfu/ 100ml	270	Zero
Ecoli	Cfu/100ml	0	Zero
Sulphates	Mg/l	12.0	Less 300
Turbidity	NTU	23.3	Less 5

**Remarks:** High levels of Colour, Turbidity and Feecal coliforms have been identified.

Analyzed by,

*MWEBAZE NABOTH*  
MWEBAZE NABOTH  
Quality Control Analyst.



NATIONAL WATER AND SEWERAGE CORPORATION

MBARARA AREA

JAR TEST REPORT

MONTH: August

YEAR: 2021

DATE: 23/05/2021

RAW WATER: pH: 6.46 Colour: 213 PtCo Turb: 23.3 NTU TSS: 20 mg/L

1% Alum concentration ✓

PRE-CHLORINATION

Run	1	2	3	4	5	6
1% HTH used						
Residual pH						
Residual Colour (PtCo)						
Residual Turbidity (NTU)						
1% Alum added: mls						
Alum dose: mg/L						
Floc formation order (1-First to 6-last)						
Floc size						
Appearance of supernatant						
Parameter	Supernatant quality					
pH						
Colour (PtCo)						
Turbidity (NTU)						
Parameter	Filtered Water					
pH						
Colour (PtCo)						
Turbidity (NTU)						
T. Iron (mg/L)						
Residual Aluminium						

Remarks: An optimum Alum dose of 20.00-30.00 mg/L has been revealed for effective coagulation.

Hence, 25.00 mg/L gives better performance with all parameters complying but pH of 5.60 needs collection slight dose of  $\text{H}_2\text{CO}_3$  10 (2 mg/L) after filtration.

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## Annexe 5. RAP Report (Executive Summary)

The Government of Uganda received credit from the World Bank towards implementation of the Integrated Water Management and Development Project (IWMDP). The Project Development Objective (PDO) is to improve access to water supply and sanitation services, capacity for integrated water resources management and the operational performance of service providers in project areas. The project will also contribute to the achievement of National Development Plan III objectives, Vision 2040 and Sustainable Development Goals. Under the IWMDP, funds have been provided for Environmental and Social Impact Assessment (ESIA), Resettlement Action Plan (RAP) and Source Protection Plans (SPP).

The support to Small Towns and Rural Growth Centres sub-component covers activities designed to improve the sustainable provision of water supply and sanitation services in small towns and RGCs in Uganda. The sub-component targets the districts of Rakai in Central Uganda; and Buhweju, Kagadi, Kakumiro and Kasese in Western Uganda. In order to address the water supply and sanitation gap in the above districts, six solar powered piped water supply systems (in the districts of Rakai, Kagadi, and Kakumiro) and two piped water supply systems of Bitsya and Nyamugasani GFS in Buhweju and Kasese have been proposed. These water supply and sanitation infrastructure will be implemented as part of the strategy to improve access to clean water, improved sanitation and hygiene in the selected Rural Growth Centres.

A sustainable piped water supply and sanitation system have beneficial impacts on the social economic status of communities especially in terms of improving outcomes in the areas of health, poverty reduction and education.

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The MWE therefore contracted, M/S Bright Technical Services LTD (BTS) to carry out the Environmental and Social Impact Assessment (ESIA), Resettlement Action Plan (RAP) and Preparation of Source Protection Plans for the six large solar powered piped water supply systems, Bitsya water supply system and Nyamugasani Gravity Flow Scheme.

This document presents the Resettlement Action Plan (RAP) for Bitsya Water Supply and Sanitation Project. According to best practice, a project that will require land acquisition must prepare a RAP to guide these activities. This RAP shall be a living document throughout its implementation.

The water supply area of the proposed Bitsya water supply system is located in Bitsya and Kurungu Sub Counties (with an LC III administrative status) in Buhweju district. The Project location map is shown in **Error! Reference source not found.** below

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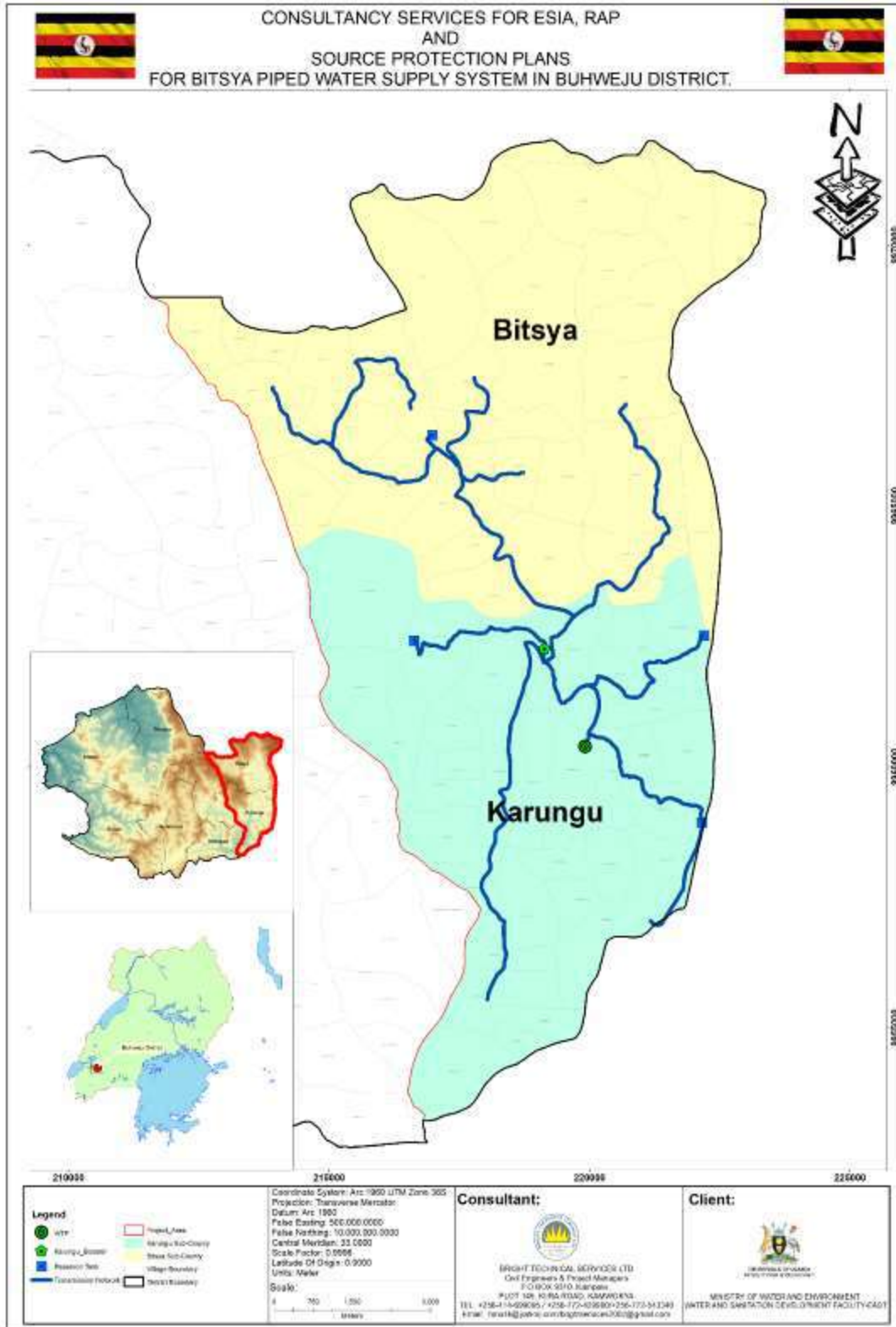


Figure 0.1: Location of Bitsya WSS Project in Buhweju

The Bitsya Water Supply and Sanitation System will comprise of the following components shown in **Error! Reference source not found.** below.

Table 0-1: Bitsya WSS Project Components

Project Component	Technical Description
Water Intake Site	<p>River Nyarwambu is chosen water source for the project. It can yield about 55,000 m<sup>3</sup>/day which is much higher than the projected water demand of 3,200 m<sup>3</sup>/day. When compared with the water demand for the 20yr design period, it is possible that it can meet the project demand with other instream and environmental flow requirements met.</p> <p>The components of the intake works include the following:            Intake weir - A reinforced concrete broad crest weir            Intake channel - Channel to be lined with reinforced concrete            Intake sump - Sump to be constructed in reinforced concrete            Raw water pump - i.e.            Q = 160 m<sup>3</sup>/hr            H = 30m            Pump house – Pump house of floor area 7.2 x 10m to house both the raw water pumps and the treated water pumps.            Raw water mains - DN 250mm DI, 150m length pipeline</p>
Water Treatment Plant	<p>The following components of the water treatment works have been designed for the output capacity of 3,200m<sup>3</sup>/day with 20 hours of operation a day:</p> <ul style="list-style-type: none"> <li>Aerator</li> <li>Flocculation/ Coagulation Unit</li> <li>Clarifiers</li> <li>Rapid sand filters</li> <li>Disinfection / Chlorination</li> <li>125m<sup>3</sup> hot pressed steel section panel water storage tank elevated 6m above ground level to double as backwash tank and service water for the water treatment works</li> <li>Treated water tank</li> <li>Treated water pumping station</li> <li>Air blowers for the backwash system</li> <li>Surge protection unit</li> <li>Electrical installations</li> <li>Mechanical Installations including chemical mixing equipment</li> <li>Unit interconnection pipework including control valves</li> <li>Chemical dosing equipment</li> <li>Sludge drying bed</li> </ul>
Rugarama Main Reservoir	<p>Design Capacity = 600 m<sup>3</sup>            Height = 4 Plates            Length = 10 Plates            Width = 10 Plates</p>
Karungu Booster	<p>Design Capacity = 250 m<sup>3</sup>            Height = 3 Plates            Length = 8 Plates</p>

Project Component	Technical Description																																		
	Width = 7 Plates																																		
Kasharara Hill Reservoir	Design Capacity = 250 m3 Height = 3 Plates Length = 8 Plates Width = 7 Plates																																		
Kabingo Hill Reservoir	Design Capacity = 250 m3 Height = 3 Plates Length = 8 Plates Width = 7 Plates																																		
Bitsya Hill Reservoir	Design Capacity = 180 m3 Height = 3 Plates Length = 7 Plates Width = 6 Plates																																		
Transmission Pipes	Gravity mains from Main Tank at Rugarama: Rugarama - Karungu Junction DN 250mm PN25 Ductile Iron 4,575m Karungu Junction – Karungu Town DN 200mm PN2 Ductile Iron 1,525m Karungu Town - Kankara Junction DN 150mm PN2 Ductile Iron 2,125m Kankara Junction - Bitsya Tank DN 150mm PN2 Ductile Iron 1,591m DN 100mm PN25 Ductile Iron 2,732m Branch main to Kabingo Tank DN 200mm PN25 Ductile Iron 3,500m Branch pumping pipeline to Kasharara Tank DN 150mm PN25 Ductile Iron 3,600m Gravity main Tank - Rugongo DN 200mm PN10 uPVC 2,100m  Booster Mains: Booster pumping main to Kasharara Tank DN 150mm PN25 Ductile Iron 3,600m																																		
Distribution Pipes	<table border="1"> <thead> <tr> <th>Tank</th> <th>Diameter</th> <th>Pipe material</th> <th>Length</th> </tr> </thead> <tbody> <tr> <td rowspan="4">Bitsya Tank supply area network</td> <td>OD 160mm</td> <td>uPVC</td> <td>230m</td> </tr> <tr> <td>OD 110mm</td> <td>HDPE</td> <td>2,938m</td> </tr> <tr> <td>OD 90mm</td> <td>HDPE</td> <td>200m</td> </tr> <tr> <td>OD 63mm</td> <td>HDPE</td> <td>9,649m</td> </tr> <tr> <td rowspan="4">Kabingo Tank supply area</td> <td>OD 225mm</td> <td>uPVC</td> <td>8,550m</td> </tr> <tr> <td>OD 160mm</td> <td>uPVC</td> <td>5,650m</td> </tr> <tr> <td>OD 110mm</td> <td>HDPE</td> <td>3,250m</td> </tr> <tr> <td>OD 63mm</td> <td>HDPE</td> <td>2,725m</td> </tr> <tr> <td>Kasharara Tank supply area</td> <td>OD 160mm</td> <td>HDPE</td> <td>3,600m</td> </tr> </tbody> </table>	Tank	Diameter	Pipe material	Length	Bitsya Tank supply area network	OD 160mm	uPVC	230m	OD 110mm	HDPE	2,938m	OD 90mm	HDPE	200m	OD 63mm	HDPE	9,649m	Kabingo Tank supply area	OD 225mm	uPVC	8,550m	OD 160mm	uPVC	5,650m	OD 110mm	HDPE	3,250m	OD 63mm	HDPE	2,725m	Kasharara Tank supply area	OD 160mm	HDPE	3,600m
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In addition to the above, the Project will also construct 7 public toilets at locations in the **Error! Reference source not found.** below that have been identified by Buhweju District Local Government Leadership together with the Design Consultant and MWE.

Table 0-2: Location of Public Toilet Facilities

#	Toilet Site Name	Institution	Location (Village, Parish, Sub County)	Remark
	Bitsya Health Centre II	Bitsya Health Centre II	Kasana, Bitsya, Bitsya	For Rehabilitation (10 X 10 metres)
	Karungu Health Centre III	Karungu Health Centre III	Nyabugando A, Karungu Central, Karungu	For Rehabilitation (10 X 10 metres)
	Bitsya Primary School Toilet Site	Bitsya Primary School	Kanoni, Bitsya, Bitsya	For Rehabilitation (10 X 10 metres)
	Rugongo Primary School	Rugongo Primary School	Rugarama A, Rugongo, Karungu	New Toilet Facility (10 X 10 metres)
	Kasharara Primary School	Kasharara Primary School	Kabare, Kasharara, Karungu	New Toilet Facility (10 X 10 metres)
	Ibogora Community Primary School	Ibogora Community Primary School	Kyeshero, Kasharara, Karungu	New Toilet Facility (10 X 10 metres)
	Kihabure Town School	Kihabure Town School	Kyeshero, Kasharara, Karungu	New Toilet Facility (10 X 10 metres)

#### Institutional, Legal, and Policy Framework

The Project is guided by both the applicable Ugandan laws and regulations related to land acquisition and involuntary resettlement as well as the applicable international standards.

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Key Ugandan legislation and policies that will govern the Project include:

The Constitution of the Republic of Uganda

Land Acquisition Act (1965)

The Land Act, Cap 227

The Land Regulations, 2004

Water Act Cap, 152

The Roads Act, 2019

The Access Roads Act, CAP 350

Local Government Act (1997)

The key International RAP Implementation Standards and Guidelines (Applicable Standards) that guide this RAP and its implementation are:

The World Bank's safeguard policy on involuntary resettlement, OP 4.12

United Nations (UN) Basic Principles and Guidelines on Development-based Evictions and Displacement

Voluntary Guidelines on Responsible Governance of Tenure of Land, Forests, and Fisheries (VGGT)

Where national legislation falls short of meeting the conditions prescribed by the Applicable Standards the later will apply. The gap-filling measures proposed by the Project are also detailed.

#### Stakeholder Engagement

The overall goal of stakeholder engagement is to establish an ongoing, accessible, and constructive dialogue with PAPs and other interested individuals and organisations, so that – in accordance with International Best Practice – their views and concerns can be considered in project decisions.

Stakeholder engagement is an inclusive process that should be conducted throughout the project life cycle, where properly planned and guided information is relayed to specific stakeholders to help in smooth implementation of a given project. This helps to communicate the purpose and objective of a given project. If executed well, it helps to support the development of strong, constructive and responsive

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relationships that are important for successful management of a project's environmental and social risks. Stakeholder engagement is most effective when initiated at an early stage of the project development process, and is an integral part of early project decisions and the assessment, management and monitoring of the project's environmental and social risks and impacts.

The Project has conducted a series of community sensitisation meetings, Focus Group discussions (FGs) Key Informant Interviews (KIIs) with PAPs to ensure strong participation and a comprehensive understanding of the entitlement framework. Comprehensive participation of displaced PAPs will be achieved using a variety of methods including smaller meetings to enhance participation levels.

Consultations were carried out with PAPs during preparation of this RAP between 9 – 10 February, and 28 March – 9 April 2022

#### Identified Stakeholders

Primary stakeholders for consultation and disclosure are directly affected stakeholders with the most to lose or gain from the Project. Secondary stakeholders are government agencies at the National, district, sub-county and local level. Tertiary stakeholders include non-government organisations.

#### Information Disclosure

Disclosure entails making information accessible to interested and affected parties. Communicating information in an understandable manner to the relevant and interested stakeholders is an important factor in the stakeholder engagement process. Specific measures will be undertaken to ensure that Project commitments -- and specifically, the compensation entitlement framework and grievance mechanism information -- is accessible to all relevant parties, including those with disabilities preventing them from reading the documentation. The steps taken (or to be) to ensure accessibility include:

Oral communication in relevant local languages via community meetings and household-level meetings

Development of a non-technical summary RAP version in both English and relevant local languages by the MWE during RAP Implementation phase

Supporting vulnerable or illiterate PAPs that require additional assistance to ensure comprehension of agreements and the sign-off process.

Information that has been or will be disclosed to stakeholders includes the following:

The affected assets and interest in the affected assets were disclosed and signed off on by PAPs during the cadastral and asset surveys

Entitlement Cut-off Dates were disclosed to PAPs during one-on-one discussions as well as at community meetings

The Entitlement Matrix will be disclosed through community meetings

Expected Project impacts -- including loss of livelihood, economic displacement, migrant worker (construction worker) influx during the construction phase -- will be disclosed to stakeholders through community meetings as well as through district and Subcounty workshops targeting technical officials and elected leaders

The RAP will be disclosed on MWE's website and will be disclosed to stakeholders through district and Subcounty workshops and village-level community meetings

The compensation and resettlement packages -- including cash compensation, and resettlement assistance -- will be disclosed to individual PAPs and their spouses where relevant and their consent will be indicated via consent form sign-off

Project strip maps will be disclosed to individual PAPs through community meetings

The Livelihood Restoration Plan, including summarized matrices, will be disclosed to PAPs and local government administrative units through district and Subcounty community meetings and workshops

Vacate dates will be disclosed to individual PAPs at the household level through the issuance of notices to vacate the permanently acquired land.

Key stakeholder concerns were: whether the communities on the opposite side of the distribution pipes will also be connected to service lines; the payments for service lines connection and options for household

connections; hiring local labour during project construction phase; involvement of local leaders including PAPs, women and other vulnerable groups; continuing use of land; fear of not receiving any compensation and; delayed and unfair compensation.

#### Consultation and Disclosure Phases

Stakeholder engagement is an ongoing process. It involves two major phases:

Phase I covered the RAP preparation. It focused on the following:

Creating Project and RAP process awareness

Stakeholder mobilization to participate in RAP activities including cadastral survey, asset survey, socio-economic surveys, and vulnerability assessments

Management of grievances and concerns

Phase I included three major stages:

Stage 1: Engagement with district and sub-county leaders during reconnaissance surveys and awareness creation

Stage 2: Meetings with affected communities and PAPs for cadastral survey, asset survey, and socio-economic surveys

Stage 3: Focus Group (FG) discussions and Key Informant Interviews (KII) for livelihood surveys and vulnerability assessments

Management of grievances and concerns was an integral part of all stages.

A consultative approach was used in the stakeholder engagement process. Consultation was a two-way process involving information sharing between the RAP Team and stakeholders. The local leaders -- especially the LC1s -- helped mobilise PAHs. Consultations commenced at 10 AM or 2 PM Ugandan Time to enable participation of all interested groups including women and children.

Phase II shall cover the RAP implementation. It will focus on land and property compensation packages, grievance management, livelihood restoration program implementation, and clearing the acquired infrastructure sites after the expiry of the 6 months' notice to vacate period.

In order to mitigate gender-based violence, specific, deliberate approaches have been embedded in the Disclosure to PAPs and Compensation Agreement Sign-offs specifically requiring spousal consents and joint sign-offs and a grievance mechanism thoroughly addressing gender-related grievances.

Engagements in Phase II will be a continuation of the engagements conducted in Phase I. The activities will be tailored to specific stakeholders including PAPs, and local leaders

#### Planned Stakeholder Engagements During RAP Implementation

Stakeholder engagements will be continuous throughout RAP implementation phase. More than one topic, described in Table 0-3, are to be addressed within the planned engagements.

The RAP Implementation Consultant will be responsible for the overall execution of stakeholder engagement activities, and MWE is responsible for ensuring these engagements are carried out.

The teams shall work with local government Technical Officials and elected leaders to ensure seamless implementation of planned stakeholder engagement activities.

Table 0-3: Schedule of Planned Stakeholder Engagements

#	Topic	Stakeholder Group	Format	Lead	Date/Frequency	Project Stage
1	Project Coordination Meetings	MWE, WB	Project Meetings	MWE	Bi Monthly	RAP Preparation and Implementation
2	RAP Disclosure	District Local Governments, Affected Communities	Debrief Workshop, Community Meetings	RAP Implementation Consultant & MWE	Monthly and Quarterly	RAP Implementation
3	Follow-up	Affected	Field Surveys	RAP	Monthly and	RAP

#	Topic	Stakeholder Group	Format	Lead	Date/Frequency	Project Stage
	Surveys	Communities		Implementation Consultant & MWE	Quarterly, or as needed	Implementation
4	Household Sign-off/ Valuation Disclosure	PAPs	Group Disclosures at Community Meetings  Individual Disclosures	RAP Implementation Consultant & MWE	Regularly, after CGV approves Valuation Report	RAP Implementation
5	Compensation Payment	District Local Governments, PAPs	Small Group PAP Consultations	RAP Implementation Consultant & MWE	Regularly, after CGV approves Valuation Report	RAP Implementation
6	Livelihood and Vulnerables Programs	PAPs	Community Meetings	RAP Implementation Consultant & MWE	Regularly, after completion of compensation payment	RAP Implementation

#### Baseline Data Collection and Analysis

Socioeconomic surveys were conducted to define impacts and to provide a monitoring baseline following an initial desktop data review. Effective resettlement planning entails conducting a displaced persons' census and an inventory of affected land and assets at the household, enterprise, and community levels.

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The data was collected via a mixed-method approach incorporating both quantitative and qualitative assessments, as well as an assessment of available secondary resources. Quantitative surveys were conducted for all PAHs.

A total of 255 households were surveyed. The vast majority 87.84% of the survey respondents were the head of their household. Perspectives of both genders were captured and represented, with 75.69% male and 24.31% female respondents in addition to gender-specific Focus Groups (FGs) and Key Informant Interviews (KIIs).

Qualitative data was gathered to provide supporting details for the quantitative data collection surveys. Qualitative data collection was based on KIIs, FGs, and participatory methodologies including village transect walks.

Household socio-economic surveys was undertaken alongside the cadastral and asset surveys. The land and asset component measured and described fixed assets for each household including land holdings, land type, buildings, crops, and trees. This information was collected to inform compensation agreements and to assist in resettlement impact assessments.

A summary of the surveys completed is provided in the table below.

Table 0-4: Completed Baseline Surveys

Survey	Number of Surveys Completed	Timing
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Survey	Number of Surveys Completed	Timing
Cadastral Survey	9946	28 March – 6 April 2022
Assets Survey	9947	28 March – 6 April 2022
Socio-Economic Household Survey	255	28 March – 9 April 2022
Focus Group (FG) Discussions: Held with male leaders, male elders, female leaders, young males, and young females	2	6 April – 9 April 2022
Key Informant Interviews (KIIs)	2	6 April – 9 April 2022

### Survey & Household Demographics

A total of 255 households were surveyed with the vast majority (87.84% of the survey respondents) being head of their households. The majority of the respondents were male at 75.69% and with female at 24.31%.

In Uganda, even though there are more female than male in terms of population, most of the land and property assets are owned by male. This could explain why there are more male respondents than female respondents. Whereas the male own land, women will mostly farm on the land. Women who owned land in the project area either had purchased it with their own money or were widows.

### Water Sources

According to the RAP household surveys, protected springs are the only main water source for 66%, followed by the ponds/dams (26%), river (5%) and tap (2%)

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### Cooking Fuel

97% Households in the project area use firewood as a source of energy for cooking. This is supplemented with charcoal (at 3%). The use of firewood is mainly due to its cost effectiveness and availability.

### Forms of Sanitation

The overwhelming majority of survey participants (99%) have access to a pit latrine only, 1% has a flushing toilet.

The percentage of survey respondents with access to a flush toilet is aligned with the national rural averages according to the 2016 UDHS. Only 19% of Ugandan households use improved sanitation. Urban households are more likely than rural households to use improved sanitation (27% versus 16%). Eight in ten households use unimproved sanitation: 20% use a shared facility, 55% use an unimproved facility, and 7% have no facility.

Households without any form of sanitation and using communal pit latrines was mainly due to the heavy rains in the area destroying their form of sanitation such that they have to share or share with other members in the community.

Therefore, the Project will supplement sanitation efforts by constructing 7 public toilet facilities

### Project Perceptions

The majority of households surveyed are very supportive of the Project at 95% whereas the remaining 5% of the households are somewhat in support of the Project.

6 Number of PAPs/Transactions as per the Cadastral and Asset Survey contained in the Valuation Report. PAPs include affected households or institutions that might be having multiple entries in the valuation report because of holding multiple properties/land parcels

7 Ditto

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The very high support of the project implies that water is very much needed in the project and surrounding areas and that there will be minimal disturbances during the construction phase of the water pipelines. However, more sensitization is needed to bring the 5% to support the project so that there is full support for the project

#### Project Impacts Identification

#### Project Impact Minimisation Efforts

This RAP has been prepared based on the MWE approved Feasibility and Detailed Engineering Design Report of October 2021. During the RAP surveys, efforts have made to avoid physical displacements as much as possible by avoiding impacting residential houses, public and institutional infrastructure buildings as much as possible.

In addition, the Project water pipes (transmission and distribution pipes) are routed along the existing roads reserves. The easement corridors for pipes have been proposed at 3 metres wide (1.5 metre on either side of the centreline). Furthermore, the sites for permanent land acquisition -- Water Treatment Plant, Booster Station, Reservoir Sites, Access Roads, and Sanitation Facility Sites -- are of minimal land take or located on land parcels with minimal impacts on economic and livelihood activities of affected persons. For example, the Water Treatment Plant, Reservoir Sites, Booster Pumping Stations and Sanitation Facilities sites measure approximately 2.5452, 0.2965, 0.2965 and 0.0247 acres respectively.

#### Identifying Project Impacts

For the purposes of defining impacts, a distinction is drawn between households that are both physically and economically displaced and those that are only economically displaced, as follows:

**Physical Displacement:** Loss of shelter and assets resulting from land acquisition associated with a project that requires PAP to relocate.

**Economic Displacement:** Loss of income streams or livelihood means resulting from land acquisition or obstructed access to resources (land, water, or forest) resulting from the construction or operation of a project or its associated facilities. For example, economic displacement can result from loss of access to farmland and can occur without physical displacement occurring.

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 water intake, water treatment plant, borehole sites, and reservoirs.

**Permanent land restriction** involves limitations imposed on the land under easement corridors for water pipes which prohibits building any structures or cultivating perennial crops and trees within the corridor. However, any existing PAH retains land use/ownership rights and cultivation of seasonal crops within the easement corridor, or any other landuses. Land use restrictions decrease land use potential which decreases the land value. It is this diminution (reduction in value) that is compensated

Lastly, impacts have been disaggregated by land tenure status in accordance with Article 237 of the Constitution of the Republic of Uganda (1995) and land tenure systems found in the Project Area including:

**Customary:** Applicable to a specific area of land and characterized by local customary regulation which applies local customary regulation and management to individual and household ownership, use and occupation of, and transactions in, land. Providing for communal ownership and use of land in which land parcels may be recognized as subdivisions belonging to a person, a family, or a traditional institution. Land is considered as owned in perpetuity.

**Licensees:** Licensees are persons granted authority to use land for agricultural production. Traditionally, such production would be limited to seasonal crops. Licensees have no legal security of tenure or any propriety right to the land. For this Project, these include cases where a relative has been given rights to carry out agricultural production as well as to build a temporary structure but without necessarily having

legal rights to the land. Licensees are not entitled to land compensation but they are entitled to compensation for crops, trees, and structures on land they would lose to the project and other resettlement assistance.

The PAHs by land tenure type is presented in the table below.

Table 0-5: PAH by Land Tenure Type

Land Tenure	No. of PAPs	Total % age
Customary	987	99.30%
Licensee	7	0.70%
Total	994	100.00%

Table 0-6: Project Impacts Based on Socio-economic and Asset Surveys

Impacts	Total
Total Land Affected (Permanent Acquisition & Restriction)	36.5057Acres
Permanent Land Affected (Water Treatment Plant, Booster Station, Reservoir Sites, Access Roads, and Sanitation Facility Sites)	4.9234Acres
Permanent Land Restriction (Easement for Transmission and Distribution Pipes)	31.5823Acres
Total Number of Customary Landowners Affected	987
Permanent Land Affected (Water Treatment Plant, Booster Pumping Station, Reservoir Sites, Access Roads, and Sanitation Facility Sites) of Customary Landowners Affected	4.9234Acres
Permanent Land Restriction (Easement for Transmission and Distribution Pipes) of Customary Landowners Affected	31.5823Acres
Total Number of Licensees (households) Affected	7
Physically Displaced Households (PAHs)	0
Physically Displaced Persons (PAPs)	0
Number of Affected Residential House Structures	0
Number of Affected Auxiliary Structures (i.e., Kitchen and bath enclosure)	2
Number of Affected Agricultural Structures (i.e. Kraal, Pig sty and nursery bed)	4
Number of other Affected Fixtures (i.e. Plate rack, benches, retaining walls, compound yard, walkways, permanent staircase, fences ,permanent perimeter walls and gates)	152
Number of Affected Graves	0
Economically Displaced Households (PAHs)	957
Economically Displaced Persons (PAPs)	4,785
Number of Affected Crops and Trees	12,654
Number of Affected Commercial Structures	3
Number of Affected Public Institutional Properties	37

Source: Valuation Report

Compensation Framework

Under the applicable standards, the Project Proponent is required to compensate and/or assist physically or economically displaced PAPs.

Affected persons includes:

Those who have formal legal land or asset rights.

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Those who do not have formal legal land or asset rights, but have a claim to land or assets that is recognized or recognizable under national law.

Those who have no recognizable legal right or claim to the land or assets they occupy or use.

Compensation for assets should be at full replacement value which includes:

**Agricultural Land:** The market value of land of equal productive use or potential -- which must be located in the vicinity of the affected land -- plus the cost of preparation to levels similar to or better than those of the affected land plus the cost of any registration and transfer taxes.

**Residential and Urban Land:** The market value of land of equal size and use, with similar or improved public infrastructure facilities and services -- preferably located in the vicinity of the affected land -- plus the cost of any registration and transfer taxes.

**Perennial Crops and Trees:** Equivalent to current market prices given the type, age, and productive value of the plants and/or trees, including lost future productivity.

**Household and Public Structures:** The cost of purchasing or building a new structure with an area and quality similar to or better than those of the affected structure, or the cost of repairing a partially affected structure, including labour and contractor fees and any registration and transfer taxes.

In determining replacement costs, neither asset depreciation nor the value of salvage materials are taken

### Compensation Eligibility

PAHs are eligible for compensation and other assistance if they have a "legitimate interest" in Project Area "immoveable assets" that are in place (i.e. established, in the case of crops; or constructed, in the case of buildings and other structures) at the time of the Entitlement Cut-off Date.

"Legitimate interest" in household-level immoveable assets is usually held by a single member: The Hohm. Through traditional and family practice, the Hohm is typically the most senior male household member. In some instances, the legitimate interest may be held jointly, i.e. by the household head and his/her spouse, or with other extended family members. In accordance with the applicable standards, the compensation framework includes gender-specific components to ensure that documentation of ownership or occupancy and compensation payments will be issued in the names of both spouses and single heads of households as relevant.

Note that "legitimate interest" is not synonymous with ownership. Even those Project-affected persons/households/communities with no recognisable legal right or claim to assets they are occupying should be considered eligible for resettlement assistance, in accordance with the applicable.

Immoveable assets comprise:

Land

Perennial crops and trees fully or partly established at the Entitlement Cut-off Date.

Buildings and Other Structures including residential houses, stores, kitchen blocks, latrines, wells, commercial structures and other structures such as animal pens and graves. These must have been fully or partly constructed.

Immoveable Assets that are planted (in the case of crops and trees) or constructed (in the case of buildings) after the Entitlement Cut-off Date are not included in compensation calculations. Therefore, eligibility derives from association with the land, based on the results of the asset and socio-economic surveys. Categories of eligible persons will include --but not limited to -- the following:

Households whose temporary and semi-permanent structures are affected by the Project Permanent Land Restrictions (Easement for Distribution Pipes)

Households that will be economically displaced, as they have assets or crops/trees to be affected by the Project, so will lose access to their means of production (including rights to unrestricted use of agricultural land or other natural resources);

Public institutions such as educational institutions, health institutions and administrative centres affected by the Project Permanent Land acquisition (especially sanitation facility sites) and Permanent Land

Restrictions (Easement for Transmission and Distribution Pipes) that will lose auxiliary structures (such as gate house), fixtures (such as fences, perimeter walls and gates) and crops

Households experiencing loss of, or restrictions of access to some or all of their common resources (for example fuel wood)

#### Entitlement Cut-off Date

The date of cadastral and asset surveys is the entitlement cut-off date. PAPs were informed of entitlement cut-off dates during the stakeholder consultations as well as during the PAH surveys. Each PAH was provided with a copy of the Asset Survey Form that was dated and signed off by the Valuer, PAP, and the Local Council Chairperson. Cadastral and asset surveys were carried out from 28 March – 5 April 2022.

#### Entitlement Matrix and Payment Options

All entitlements associated with the defined eligibility are presented in the Entitlement Matrix below.

Table 0-7: Detailed Entitlement Matrix

Affected Asset or Right	Eligibility Considerations	Entitlements		
		Compensation	Allowances	Livelihood Restoration + Vulnerable Assistance
Loss of Fruit Trees and Perennial Crops	Crops in place at Entitlement Cut-off Date and identified during asset surveys.	Cash compensation at district rates based on size and maturity (height and maturity)	15% disturbance allowance based on cash compensation value.  Salvaging permitted	Access to financial management training
Loss of Non-economic Trees and Bushes	Non-economic trees and bushes in place at Entitlement Cut-off Date declaration.	Cash compensation at district rates based on size and maturity (height and maturity).	15% disturbance allowance based on cash compensation value.  Salvaging permitted	Access to financial management training
Loss of Seasonal or Annual Crops	Crops in place at Entitlement Cut-off Date declaration	Not eligible for cash compensation.	Harvesting permitted	Timing of Project aligned with harvesting seasons to ensure no loss of annual crops. However, if Project schedule impinges on PAPs ability to harvest, cash compensation at district rates based on size (height and maturity) + 15% disturbance allowance based on cash compensation value. The seasonal assets

Affected Asset or Right	Eligibility Considerations	Entitlements		
		Compensation	Allowances	Livelihood Restoration + Vulnerable Assistance
				will be assessed and a valuation report prepared and approved accordingly
Permanent Loss of Land (Water Treatment Plant, Reservoir Sites, Booster Station, and Sanitation Facility Sites)	Customary Landowners at Entitlement Cut-off Date	<p>Non-vulnerable households: Cash compensation at 100% of full replacement value.</p> <p>Vulnerable households: In kind compensation with a standard plot size. Land Title Certificate or Certificate of Customary Ownership to HoH and spouse(s)</p>	15% disturbance allowance based on cash compensation value.	<p>Access to financial management training</p> <p>Vulnerable Persons Assistance Programs</p>
Permanent Land Use Restrictions (Easement)	Customary Landowners at Entitlement Cut-off Date	<p>Non-vulnerable households: Cash compensation at 100% land interest and 80 -100% diminution of full replacement value</p> <p>Vulnerable households: In kind compensation with a standard plot size. Land Title Certificate or Certificate of Customary Ownership to HoH and spouse(s)</p>	15% disturbance allowance based on cash compensation value.	<p>Access to financial management training</p> <p>Vulnerable Persons Assistance Programs</p>
	Primary residential structure owners (i.e. residential and sleeping structures) occupied by Physically Displaced	Cash compensation at full Replacement Cost (based on size, construction materials, higher-	15% disturbance allowance on cash compensation.  Salvaging	<p>PAPs capacity building program of construction training</p> <p>Access to livelihood</p>

Affected Asset or Right	Eligibility Considerations	Entitlements		
		Compensation	Allowances	Livelihood Restoration + Vulnerable Assistance
Loss of Dwellings Loss of Dwellings	Households present at Entitlement Cut-off Date declaration, and as quantitatively defined by the asset survey.	end finishes with no depreciation considered).	permitted.	restoration programs including access to financial management training
	Wives in polygamous households residing in separate structures at Entitlement Cut-off Date declaration and are considered distinct households with entitlement to compensation for loss of dwelling.			
	Primary residential structure tenants (i.e. residential and sleeping structures) occupied by Physically Displaced Households	Not eligible for cash or in-kind compensation.  Provided 6-month notice to secure alternative rental housing.	Accommodation allowance based on 50% rental income of the space they are renting for 6 months.  Salvaging permitted	
Loss of Commercial Buildings Loss of Commercial Buildings	Commercial structures owners present at Entitlement Cut-off Date declaration, and as quantitatively defined by the asset survey.	Cash compensation at full replacement cost (based on size, level of completeness, construction materials, higher-end finishes with no depreciation considered).	15% disturbance allowance on cash compensation.  Transitional assistance equal to 50% of the monthly income from the business for 6 months	Access to financial management training
	Commercial structures tenants	Not eligible for cash or in-kind compensation.  Provided 6-month notice to secure alternative rental	Transitional assistance equal to 50% of the monthly income from the business for 6 months.	Access to financial management training

Affected Asset or Right	Eligibility Considerations	Entitlements		
		Compensation	Allowances	Livelihood Restoration + Vulnerable Assistance
		housing		
Loss of Rental Income	Residential or commercial structure landlords identified at Entitlement Cut-off Date declaration, and as quantitatively defined by the asset survey.	Not eligible for cash or in-kind compensation.	Transitional assistance equal to 50% of the monthly income from affected property for 6 months	Access to financial management training
Loss of Other Structures	Other structures (perimeter walls, fences, etc.) or incomplete structures present at Entitlement Cut-off Date declaration.	Cash compensation at full replacement cost (based on size, level of completeness, construction materials, and finishes with no depreciation considered).	15% disturbance allowance on cash compensation.  Salvaging permitted	Access to financial management training
Loss of Public Institutions structures	Public institutions structures present at Entitlement Cut-off Date declaration.	Cash compensation at full replacement cost (based on size, level of completeness, construction materials, higher-end finishes with no depreciation considered)	15% disturbance allowance on cash compensation.  Salvaging permitted	<u>xxxi</u>
Loss of Graves	Graves identified before Entitlement Cut-off Date declaration.	Cash compensation for grave disturbance at district rates.  Exhuming and relocation by the Project by a qualified contractor in accordance with GoU legal requirements. All costs (UGX 1,565,000 per	15% Disturbance allowance on all cash compensation value.  Funds for spiritual appeasement and rituals (UGX 1,200,000 per grave).	

Affected Asset or Right	Eligibility Considerations	Entitlements		
		Compensation	Allowances	Livelihood Restoration + Vulnerable Assistance
		grave) covered by the Project.		
Other Allowances	All affected households and entities		Harvesting permitted Salvaging permitted Support opening bank accounts	Access to financial management training
Vulnerable Persons	Identified Existing & Potentially Vulnerable Households	Eligible for in kind compensation for loss of land or dwellings.	Prioritisation for compensation and moving assistance.	Support: All vulnerables will be eligible for vulnerable support program (legal, psychological, and mobility support)

#### Livelihood Restoration Plan

The Project LRP aims to restore and improve PAPs affected livelihoods. Livelihood restoration encapsulates specific measures necessary to mitigate any harmful or negative Project impacts on PAPs economic assets or activities.

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The LRP objectives are to:

- Improve the quality of life of affected families by building their capacity in managing, cash compensation
- Meet the compensation commitments – and support the effective management of compensation commitments – as negotiated with affected households, such that they receive compensation and other assistance in a manner enabling them to create new income sources
- Ensure that displaced households can equally access and benefit from other community, district, and regional development programs and initiatives such as government programs and community development activities.

The LRP program is a Financial Management Support Program (FMSP) package for all PAPs

#### Vulnerable Persons

Vulnerables refers to those who may be more likely to be adversely affected by the project impacts and/or more limited than others in their ability to take advantage of a project's benefits.

In preparing this RAP, vulnerable PAPs have been identified and consulted. Assistance measures have been developed to prevent disproportionate impacts among such groups.

The completed socio-economic survey and vulnerability assessments indicate that the categories of Project-affected vulnerable persons include:

Female-headed households with limited resources. These households may be impoverished as the labour required for certain farming activities normally performed by men may limit the household's productive capacity. However, sometimes female-headed households are less vulnerable because women often manage the household more effectively than men. Female-headed households may not necessarily be 'vulnerable', particularly if they have access to land and other resources and have been able to sustain adequate living standards over a period of time. However, given the WB's description of vulnerable people as those who "may be limited in ability to claim or take advantage of resettlement assistance", it is

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appropriate to focus special attention on female households to ensure they are not disadvantaged in the compensation process.

Widows. In Uganda, widows remain the most vulnerable members of society as they are often threatened by in-laws and without proper ownership documentation of the assets of their late husbands. The Project shall provide sufficient legal support to households headed by widows to ensure they are not disfranchised of their property and asset ownership rights.

Households with orphans. Such households are overstretched in terms of feeding and failure to provide an education and skills training to the orphans. The Project shall prioritize orphan household members through the provision of legal support and guardianship documents to process compensation payment

Elderly with limited support. Such households are overstretched in terms of feeding and healthcare. The Project shall prioritize these household members through disclosing to them from their households or providing transport means for them to come at disclosure centres

Physically Disabled. Such households need mobility support and assistance during the compensation. Best if the Project discloses compensation packages to them from their homesteads.

#### Vulnerability Support Programs

Identified vulnerable households and individuals will be monitored and provided with the following assistance:

Assistance with understanding of agreements and signing and additional time and independent support to ensure their agreement is properly informed

Assistance with collection of compensation and priority access to mitigation and development

Legal assistance (if required) for establishing powers of attorney and guardianship orders

Transport assistance to designated Project meeting venues

Increased number of monitoring visits

#### Cultural Heritage Protection

The Cadastral and Asset surveys indicate that the Project will not impact any graves, however, the activities of the Bitsya Water Supply and Sanitation Project have the potential to trigger OP 4.11 Physical Cultural Resources. During excavation works for Project infrastructure, there might be chance finds.

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#### Chance Finds

The Project has developed a Chance Finds Procedure for when previously unknown cultural heritage is encountered during Project activities. This procedure will be included in all construction-related contracts for this Project.

All MWE and contractor personnel involved in Project construction shall be responsible for following the Chance Finds Procedure.

#### Household Sign-offs and Moves

Where resettlement is confirmed and unavoidable, projects need to develop strategies for household sign-off and moves.

There are two key household sign-off phases:

1) Phase 1: Household Verification – This process involves households verifying that assets have been properly surveyed and the records fully reflect their interest in the asset.

2) Phase 2: Sign-off – Where households confirm the compensation as applied to their household are acceptable and they agree to allow the Project to proceed and take over ownership of the land for Project components that require permanent land acquisition.

#### Group Disclosure

Together with the RAP Implementation Consultant, MWE is responsible for overall RAP implementation. Once the RAP and the Valuation Report are approved, MWE shall undertake group disclosures with affected Project Area communities and their leaders. These shall take place in the districts and sub-

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counties and all PAPs shall be invited to attend. Information on key RAP findings and impact mitigation measures for minimizing displacement will be shared at the meetings. Importantly, the group disclosure meetings will be held at a time that takes into consideration local context, ensuring that women and youth are able to attend.

PAPs will be informed of compensation procedures, modes of compensation, eligibility criteria, livelihood programs, vulnerable support programs, and the process for signing compensation agreements.

The schedules for individual PAP verification and compensation package disclosure shall also be communicated to stakeholders.

#### PAH Verification

Each household asset survey included sign off by the relevant LC1, BTS, and the Project affected head of household. A copy of the captured assets was handed to head of household to support a smooth verification process. This provided the PAH an opportunity to verify that all their assets have been recorded properly and that they agree to use the recorded assets as the basis for their RAP entitlements. As part of the verification process, PAHs will be presented with:

Demographic information including name, ID number, recorded affected assets, contact information and photos.

Table for each main asset type (land, crops, structures) outlining survey date, survey code, and asset interest.

Record of grievances lodged by the PAH to help the Project assess any outstanding issues.

Photos of assets taken during the surveys.

Agreement with relevant signatures (LC1 chairperson, Area Land Committee Chairperson, MWE Officer, and the RAP Implementation Consultant, PAPs) that the household accepts the information on the form. The statement should include agreement to abide by any relevant land use restrictions (e.g. plant height restrictions under the wayleaves).

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Household verification will be undertaken by the head of household and spouse(s) to ensure they both agree to the survey findings and to protect the interests of the spouse(s). MWE (together with the RAP Implementation Consultant) to obtain PAP bank details or support PAHs in setting up accounts. A spousal consent and joint account shall be required where applicable

#### Sign-off Process

Upon completion of the verification exercise, the RAP Implementation Consultant and MWE, shall disclose the individual compensation packages in one-on-one meeting with PAHs timed to not impact livelihoods as well as cultural or religious functions or duties. For the sign off process, the process will be presented in the form of a household dossier.

PAPs who agree with the entitlements shall sign off on the compensation agreements. For couples, a spousal consent and joint account shall be required. The agreements shall be witnessed by an LC1 chairperson, Area Land Committee Chairperson, MWE Project Officer, and the RAP Implementation Consultant.

PAHs who disagree with the compensation package shall notify the RAP Implementation Disclosing Officer and register their concerns in the area designated for grievances on the disclosure document. PAHs are also free to provide additional information and register their grievance in accordance with the RAP's grievance mechanism.

#### Grievance Mechanism

The project is required to propose and implement a grievance mechanism to receive concerns and grievances and facilitate their resolution.

The grievance mechanism's goal is to deploy a reliable and effective method for project stakeholders to voice and address land acquisition and resettlement-related concerns.

Grievance Management Committees (GMCs)

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Prior to RAP implementation, GMCs shall be established and trained by the RAP Implementation Consultant in grievance handling with clear responsibilities including the following:

Facilitating access to information and attending to complaints that may be resolved by providing information

Providing a free and accessible method to PAPs to report their grievances and complaints as the established GMCs. In addition, any aggrieved stakeholder will be free to submit their grievance through their LC1 chairpersons.

Maintaining records of all grievances brought before the committee by PAPs

Establish a forum and a structure to report grievances with dignity

Providing a forum for resolving grievances and disputes at the lowest level

Providing access to a fair hearing and remedy

Verifying facts presented at grievance hearings using their community knowledge and experience and providing MWE with meeting minutes from each hearing

Providing access to negotiate and influence project decisions that may adversely affect them

Resolving disputes quickly before they escalate to unmanageable levels

Referring any unresolved grievances to higher levels for action and further follow up

Liaising with local leaders to ensure health, safety and security of the communities, workers and construction materials during the project implementation

The GMCs shall be established at three different levels as below:

Village Level

Subcounty Council GMC

District GMC

Grievance Mechanism Publicizing

The grievance mechanism shall be widely publicised within the Project Area through sensitization and community meetings.

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The grievance mechanism shall be publicised as part of consultation and disclosure activities. It will be communicated verbally at community and public meetings and will also be included in all communication materials such as sub-county noticeboards. Specific reference to the grievance mechanism shall be included in all compensation and sign-off agreements.

The grievance-handling steps are outlined below. Once received, all grievances will be responded to within a maximum of 30 days.

Table 0-8: 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

A grievance shall be submitted either verbally or in writing at the complaints and grievance desk which will be the secretariat for grievances management. The desk shall be at the Sub county, town council, and MWE. This desk will be assigned with the responsibility of receiving, registering, and screening, assessing and following up complaints and grievances to their conclusion. The desk will be hosted by the following officers who shall serve as Grievance Officer (GO) at different levels.

Table 0-9: Grievance Officers at Different Levels

No.	Grievance Committee Level	Responsibility/ Host office
1	Sub County/ Town Council	CDO Subcounty or Town Council
2	District	CDO District level
3	MWE	Principal Sociologist

Grievances may, in addition, be submitted through any of the following channels:



Letter to: The Permanent Secretary  
Ministry of Water and Environment  
Plot 3-7 Kabalega Crescent  
P.O. Box 20026, Kampala



Email: mwe@mwe.go.ug



Telephone: + 256 800 200 977



Walk in to: MWE Offices  
GMC Offices at Subcounty HQs or District HQs



Social Media: @min\_waterUg



Through stakeholder consultation and engagement meetings

Complainants identified as recognised vulnerable persons, per the Vulnerables Program, will be provided with adapted grievance procedures to ensure their interests are protected. These grievances will be handled with utmost importance and special considerations (document support and legal advice) will be upheld.

#### 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 GMC. 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 Adjumani District 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 company has been responding to the

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grievances it has received (i.e. time to respond, percentage of closed/resolved cases, number of complaints monthly).

## Monitoring, Evaluation, and Reporting Framework

### Monitoring Framework

Monitoring is an internal management function that measures RAP implementation progress and performance including key procedure progress such as compensation and resettlement. Specific consideration will be given to:

Monitoring the use of RAP inputs and outputs according to established cost and time schedules.

Any emerging social or economic difficulties encountered by PAPs during the compensation process

Compensation program compliance and completeness

Monitoring community consultation and grievance participation

### Performance Monitoring

Performance monitoring is also an internal management function allowing MWE and the RAP Implementation Consultant to measure the results of the delivered inputs.

RAP performance monitoring will be integrated into the overall project management to ensure RAP activities are synchronized with all project implementation activities. Performance Monitoring Reports shall be prepared every month throughout the RAP implementation schedule.

### Internal Monitoring Process

The Internal Monitoring Process includes establishing M&E systems and databases, ongoing monitoring, monthly reporting, and vulnerability assessments. Internal evaluation shall be based on the following criteria:

**Project Effectiveness:** Have the planned purpose, objectives, and results been achieved? Was the intervention logic correct? Were the resources applied appropriately in relation to the expected outcome? Were the means commensurate with the goal(s)?

**Project Efficiency:** Were resources (human, financial, material, time) used satisfactorily to achieve outcomes? What could be done differently to maximize impacts within acceptable and sustainable resource structures?

**Project Impacts:** To what extent has the program contributed toward its longer-term goals? Why or why not? What unanticipated positive and negative consequences did it have? To what extent has the Project achieved the central resettlement objective that affected communities and households have opportunities to improve their pre-Project livelihoods and living standard levels? Why or why not?

**Results Sustainability:** Are positive impacts resulting from the program continuing? Will they continue once the program has been completed? Why or why not?

The monthly internal monitoring process will entail the following:

To-date accomplishments

Objectives attained and not attained during specific periods

Problems and challenges encountered

Suggestions for corrective actions

MWE has the overall responsibility for conducting regular internal project implementation monitoring with tasks including the following:

Tracking RAP implementation progress

Indicator measurements at appropriate intervals

Implementation of a system to regularly respond to monitoring findings by adapting existing measures or modifying implementation processes.

This monitoring process will be used to analyse progress and change at regular intervals and shall be linked to the various RAP implementation activities.

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### Evaluation Framework

Evaluation considers resettlement program outcomes through an impact assessment of affected household income, living standards, and environmental issues. RAP implementation focus is on household baseline data compilation to enable comparison during evaluation missions.

Impact monitoring gauges RAP implementation and its effectiveness in meeting the affected population's needs. Impact monitoring for this project will be conducted by the MWE and RAP implementation consultant Team. It will provide MWE and the funders with an assessment of resettlement effects, verification of internal performance monitoring, and identification of any necessary RAP implementation adjustments. PAPs should be included in all impact monitoring phases.

Project-related land acquisition will be tracked against the population's pre-land acquisition baseline conditions. This baseline has already been established through cadastral surveys, assets surveys, land use assessments, and socio-economic surveys of the affected population and the Project-affected area.

This RAP has established objectively verifiable indicators for measuring resettlement impacts on the health and welfare of the affected population and the effectiveness of impact mitigation measures including livelihood restoration and community development initiatives.

### Implementation

This RAP has established objective, verifiable indicators for measuring resettlement impacts on the health and welfare of the affected population and the effectiveness of impact mitigation measures including livelihood restoration and community development initiatives.

### Organisational Framework

The specific roles and responsibilities of MWE and RAP Implementation consultant are shown in the table below.

Table 0-10: RAP Implementation Roles and Responsibilities of MWE and RAP Implementation Consultant

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Organization	Roles and Responsibilities
MWE	Lead RAP Implementation agency Reviewing and approving the RAP and all other reports Overall planning, co-ordination, and management of RAP implementation activities Liaising and coordinating with all RAP participants and contributors RAP activity budgeting Compensation Payment, including resettlement assistance Internal monitoring and evaluation
RAP Implementation Consultant	Stakeholder Engagement PAP Verification PAP disclosure and Compensation Agreement sign-offs Grievance Management including preparation of supplementary valuation reports Management of Livelihood Restoration Programs, Community Development Programs, and Vulnerability Assistance Programs including: Implementation of Financial Management Support programs Implementation of Construction Training Implementation of LC1 Capacity-building Training Provision of legal services to PAPs where necessary in the course of compensation payment Internal monitoring and evaluation Survey and Titling of acquired land for the water source and reservoir sites.

Other RAP Implementation Parties

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Other government departments and agencies play different but complementary roles in land acquisition, compensation, resettlement, and livelihood restoration. Each government department and agency bear institutional responsibilities and mandates as indicated below:

Valuation: Office of the Chief Government Valuer

Compensation Payment: MWE

Livelihood Restoration: MWE, District and Local Governments of Adjumani

Grievance Mechanism: LCs, Local Governments, and Courts of Law.

Land Titling: Department of Surveys and Mapping, Department of Land Registration, and District Land Boards

The overall RAP implementation organizational structure is shown in the figure below.

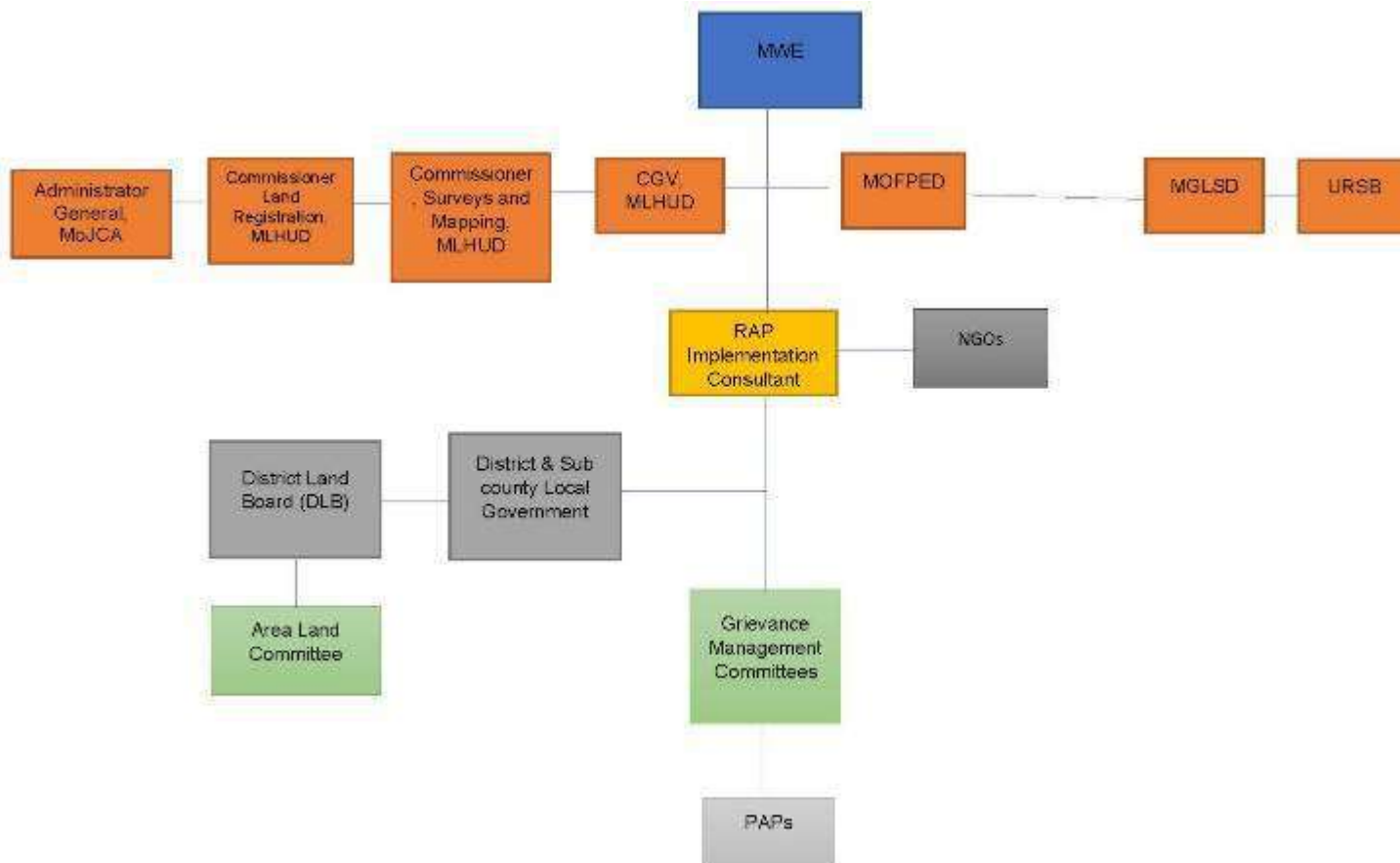


Figure 0.2: RAP Implementation Organizational Structure

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#### RAP Implementation Schedule, and Budget

MWE has committed that this RAP shall be implemented within a 12 months' period from July 2022 - June 2023. Project construction activities are expected to commence by the end of October 2022.

The overall RAP Budget is estimated at UGX 1,663,658,054.

#### Change Management

This RAP is a living document that will be periodically updated as the Project progresses. This RAP should be regarded as a key management tool and Project document to serve as the basis for any future sub project RAPs.

The construction contractor may require land for lay down areas, and camps. In addition, unintended damage to land, crops, and structures may occur. MWE shall ensure that this land and any impacted assets are compensated for in accordance with the provisions of this RAP.



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## Annexe 6. Chance Finds Procedure on Physical Cultural Resources Management

The Physical Cultural Resources Policy (PCRs) would be triggered because of the excavation/construction 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 project/ 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 MWE 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.



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## Annexe 7. Outline of the Spill Management Plan

The plan should be developed in order to specify the procedures of handling spills during the construction activities. The plan will ensure enhancement of the ability to handle spills, prevent the impacts of the spills and reduce loss resulting from spills, protect the safety of lives of personnel working in the project area and maintain social stability. The plan will include detailed spill management information for all areas of the Project i. Including Project site, storage areas, site offices and camps where required. The Spills Management plan should be a working document used in training and practice. The Contractor must submit the Spill Management Plan as part of their safety management plan to MWE/Supervising consultant for review and approval.

The Spill Management plan should be prepared to establish a Spill Management system based on an environmental risk assessment undertaken in accordance with the National Environment (Waste Management) regulation of 2020, part XII- Section 98(1), the National Environment (Environmental and Social Assessment) Regulations, 2020, the oil spill regulations made under the Act, the Occupational Safety and Health act of 2006 Part XII- Section 86 (a, b) which calls for adequate and readily accessible means of drenching with water for any employee who is splashed with corrosive liquids and sufficient means of flashing or irrigating the eyes. A lead agency shall, in consultation with the Authority, provide for Spill Management systems, contingency plans and other plans for minor incidents of acute pollution that may occur or cause damage within the jurisdiction of the lead agency in accordance with the National Environment Act NO.5 of 2019, Part VII Section 92 (1). The Plan must include, though limited to the following Objectives:

### Objectives

- To ensure sufficient measures of controlling and preventing any spill along the construction areas
- To train all the workers in safety drills and spills management for quick and efficient response to scenarios that can lead to pollution or damage to the environment

### Mitigation measures

- The contractor should draw prevention plans for all areas of work in the Spill Management Plan. Prevention plans must include training requirements, procedures and prevention equipment locations. Prevention equipment must meet the requirements of National Safety and Health Act and Regulations and be on site and readily available.
- Identify existing and potential dangers to spills at site and the measures that will be taken to reduce, eliminate or control those dangers, including procedures to be followed in case of spill.
- Identify internal and external resources that may be required to respond to the spill at site.
- Develop a Spill Management Plan for all physical areas of its performance of the work at site as well as its site office and storage areas.
- Test Spill Management Plans prior to commencing the work and at a minimum annually throughout the performance of the work.
- All contractor employees on the project must be trained and aware of their responsibilities in the prevention of spill and in the event of a spill.

### Roles and responsibilities

- The contractor must at all times take all precautions appropriate to maintain the health and safety of all the sites.

- 
- The contractor is responsible for the adequacy, stability and safety of all site operations and construction methods and must comply with workplace safety and health laws in accordance with the OSH Act 2006.
  - Before commencing the work, the contractor must identify their dedicated on site safety supervisor, who must attend a pre-job meeting at the MWE's office to review safety measures for the work and be approved by the Supervising consultant/ safety representative.
  - The safety supervisor of the consultant must have no other duties assigned. The dedicated on site safety supervisor will be responsible for, but not limited to, the identification and control of potential safety hazards including spills at the work sites.
  - All contractor employees on the project must be trained and aware of their responsibilities in preventing spills and in the event of a spill.

The Health, Safety and Environment Coordinator is responsible for the following roles;

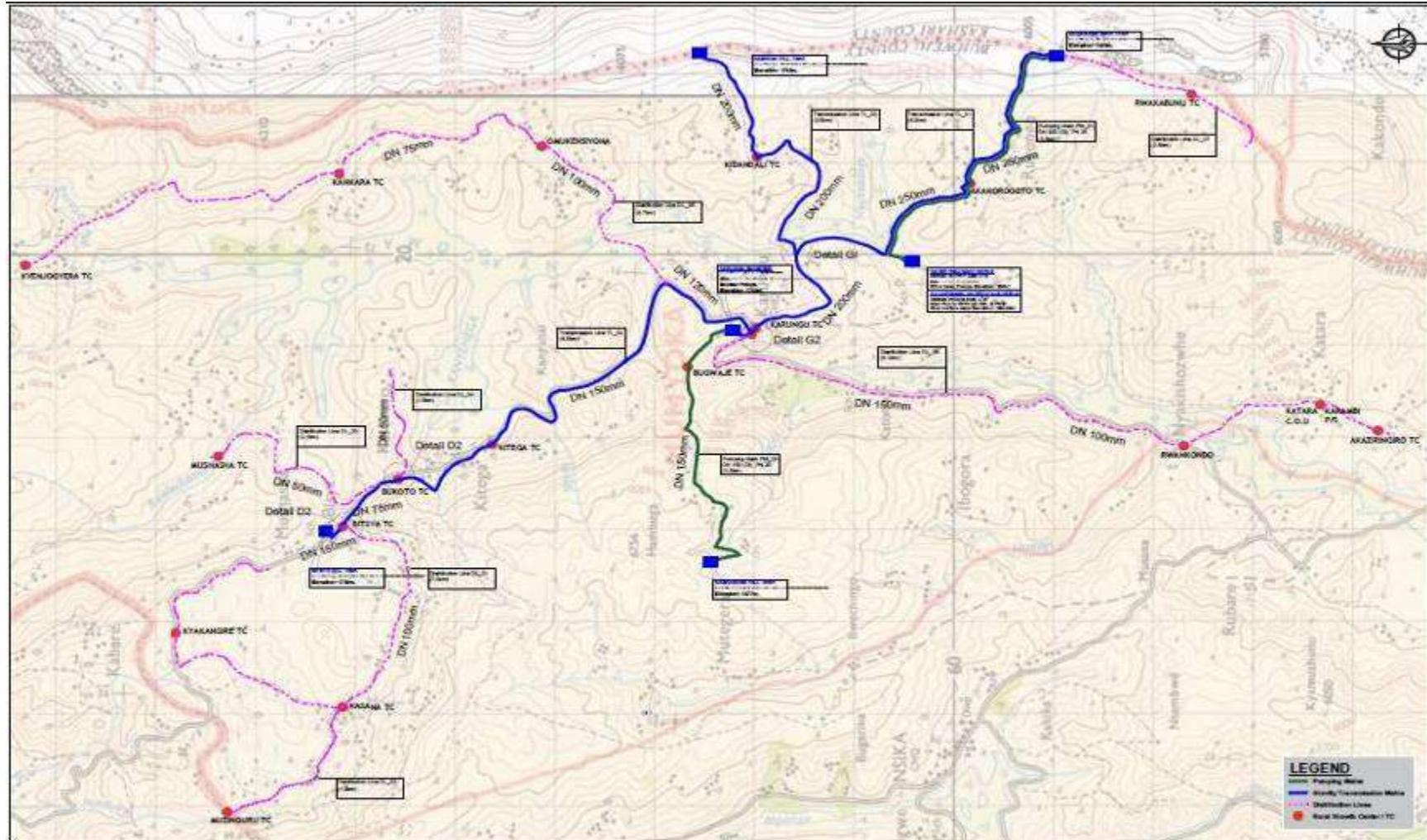
- Responsible for providing risk, health, safety and environmental information.
- Responsible for compliance with legislation and obtaining authority from the Supervising Consultant to inform and liaise with National Government and Regulatory authorities.
- Responsible for providing OHSE advice & support and information to the contractor and the Incident Response Team (IRT) at the spill site.
- Responsible for advising and maintaining the spill management responses in line with the Contractor emergency response procedures.

#### **Means of verification**

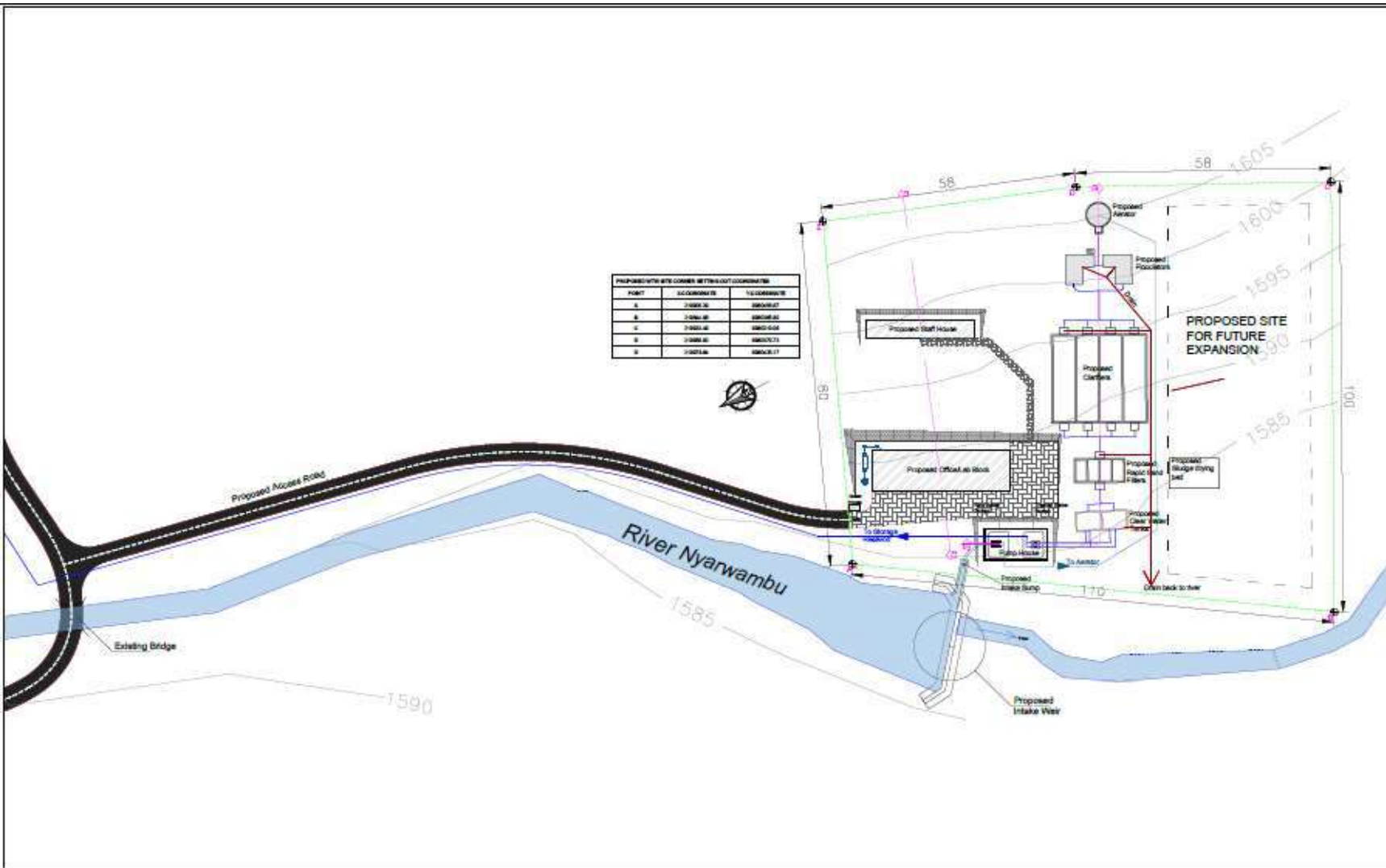
- Well-developed site spill management measures to protect the public from the hazards present on the project which contain hazards to the public, post the required signage to inform the public of the hazards present, maintain good housekeeping as required.
- Records of spill accidents in and around the project sites
- Presence of weekly health and safety performance report including safety information and statistics on spill management
- A write up of risks facing contractors' personnel and their responses.
- A list of dates for annual testing of Spill Management plans
- Records of safety drills and Spill Management trainings undertaken.

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## Annexe 8. General Layout and Layouts of the Transmission and Distribution System



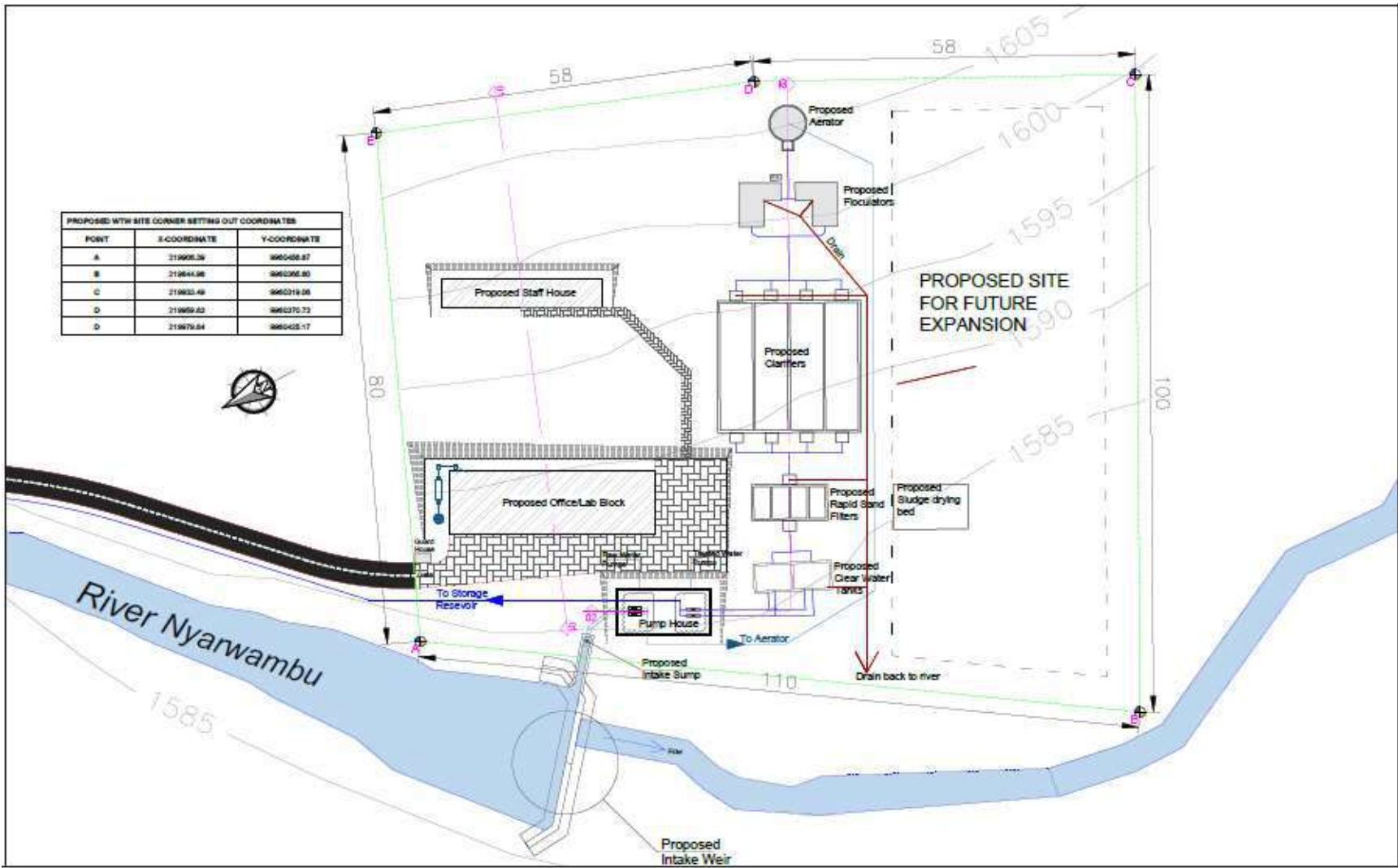
GOVERNMENT OF UGANDA MINISTRY OF WATER AND ENVIRONMENT	<b>KACCA &amp; PARTNERS</b> PLOT 2, BAKALU GUDA (OLD) ROAD KAMPALA, UGANDA TEL: 256 47 238278 FAX: 256 47 238298 P.O. BOX 6988 KAMPALA, UGANDA	PROJECT:	CONSULTANCY SERVICES FOR DESIGN REVIEW AND CONSTRUCTION SUPERVISION FOR BITSYA WATER SUPPLY AND SANITATION SYSTEM	REVISIONS	DATE		SCALE:	DATUM	DWG. No.	SHEET
		DWG. TITLE	PROPOSED SCHEME GENERAL LAYOUT					Vertical: New Khartoum Horizontal: UTM ZONE 30N ARC 00	81/BWS/CM/01	1



PROPOSED SITE CORNER SETTING OUT COORDINATES		
POINT	EASTING (E)	NORTHING (N)
A	71881.36	88208.07
B	71881.48	88208.00
C	71880.40	88208.00
D	71880.40	88207.71
E	71879.46	88208.07

GOVERNMENT OF UGANDA MINISTRY OF WATER AND ENVIRONMENT	<b>KAGGA &amp; PARTNERS</b> PLOT 3, BANDEKI CROSS ROAD BELL ROAD, TEL: 256 41 220376 FAX: 256 41 220298 P.O. BOX 6183, KAMPALA, UGANDA.	<b>PROJECT:</b> CONSULTANCY SERVICES FOR DESIGN REVIEW AND CONSTRUCTION SUPERVISION FOR SITSYA WATER SUPPLY AND SANITATION SYSTEM	<b>REVISIONS</b>	<b>DATE:</b>	<b>DRAWN BY:</b> AA	<b>SCALE:</b>	<b>DATUM</b> Vertical: New Khartoum Horizontal: UTM ZONE 39N ARC 60	<b>DWG. No.</b> 01/2017/001/001	<b>SHEET</b> 01
		<b>DWG. TITLE:</b> PROPOSED DESTRUCTION AND WATER TREATMENT WORKS GENERAL LAYOUT	<b>CHECKED BY:</b> CS	<b>APPROVED BY:</b> PJM					

PROPOSED WTW SITE CORNER SETTING OUT COORDINATES		
POINT	X-COORDINATE	Y-COORDINATE
A	219608.26	996408.87
B	219644.96	996326.80
C	219633.49	996219.06
D	219659.82	996275.23
E	219679.84	996402.17



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GOVERNMENT OF UGANDA  
MINISTRY OF WATER AND ENVIRONMENT

**KAGGA & PARTNERS**  
PLOT 7, BANDAHI CLOSE GOLD HORT  
BUL. ROAD,  
KAGGA  
TEL: 256 47 220278,  
FAX: 256 47 220208,  
P.O. BOX 6581,  
KAMPALA, UGANDA.

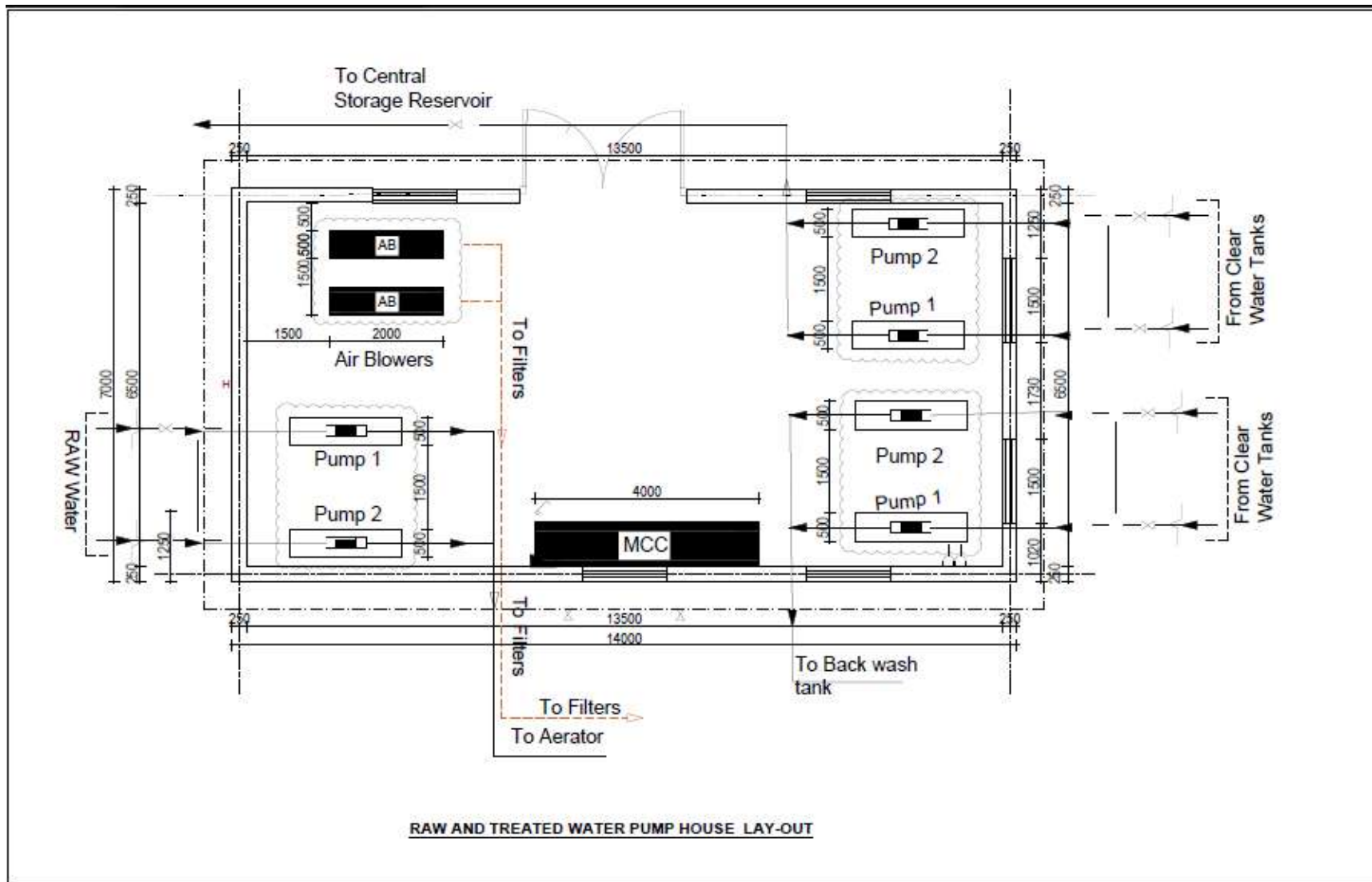
**PROJECT:** CONSULTANCY SERVICES FOR DESIGN REVIEW AND CONSTRUCTION SUPERVISION FOR BITSYA WATER SUPPLY AND SANITATION SYSTEM  
**DWG. TITLE:** PROPOSED DESTRUCTION AND WATER TREATMENT WORKS GENERAL LAYOUT

REVISIONS	DATE	DRAWN BY:	A.A
		CHECKED BY:	CS
		APPROVED BY:	PJM

**SCALE:** **DATUM:**  
Vertical: New Khartoum  
Horizontal: UTM ZONE 39N ARC 90

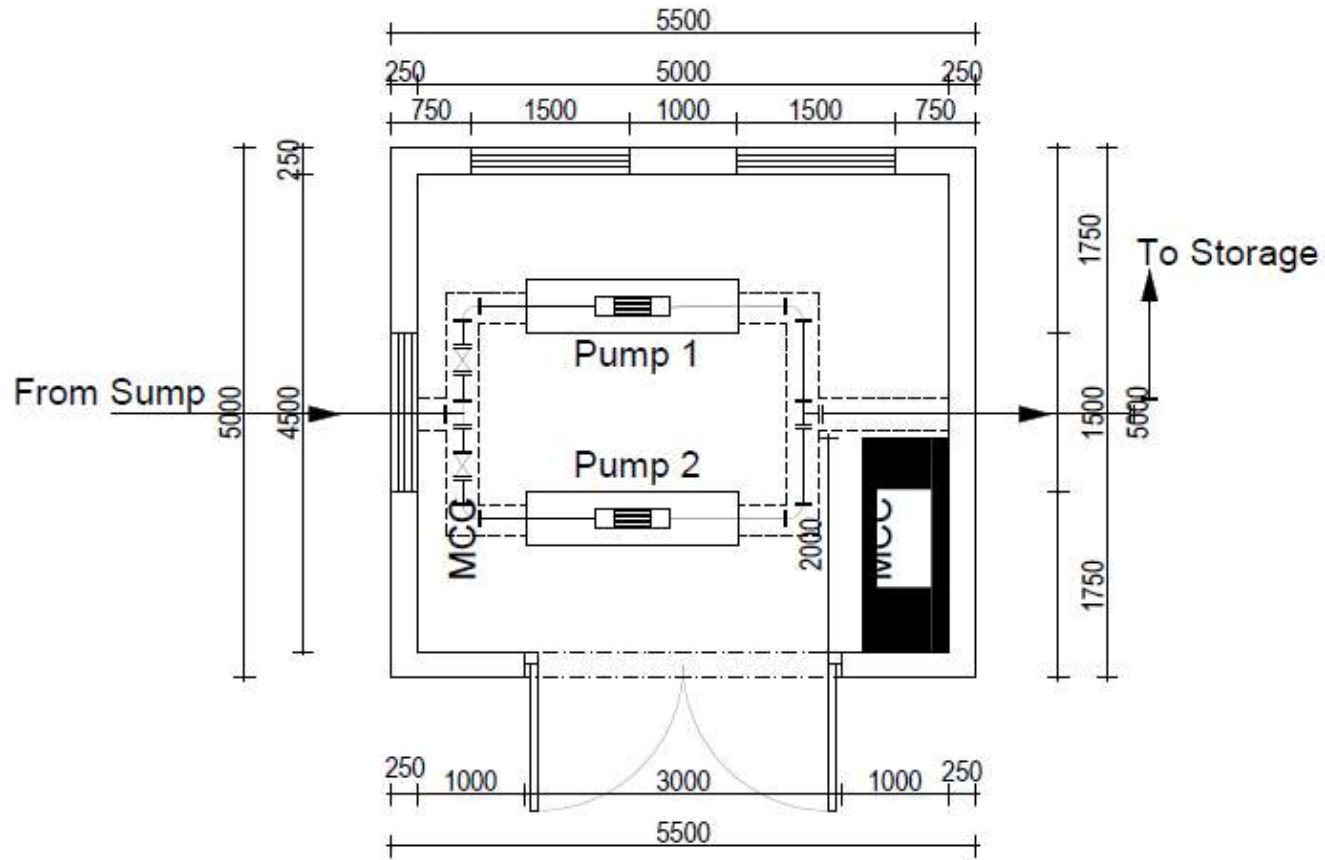
**DWG. No.**  
02/001/WTW/001/02

**SHEET**  
02



**RAW AND TREATED WATER PUMP HOUSE LAY-OUT**

GOVERNMENT OF UGANDA MINISTRY OF WATER AND ENVIRONMENT	<b>KAGGA &amp; PARTNERS</b> <small>           PLOT 2, BANGALU CROSS (OLD KOP) ELLI GOMA,            TEL: 256 41 202276            MO: 256 41 202288            P.O. BOX 5056,            KAMPALA, UGANDA.         </small>	<b>PROJECT:</b> CONSULTANCY SERVICES FOR DESIGN REVIEW AND CONSTRUCTION SUPERVISION FOR BITSYA WATER SUPPLY AND SANITATION SYSTEM	<b>REVISIONS</b> _____ _____ _____	<b>DATE</b> _____ _____ _____	<b>DRAWN BY:</b> A.A. <b>CHECKED BY:</b> CS <b>APPROVED BY:</b> PJM	<b>SCALE:</b> _____ _____ _____	<b>DATUM</b> Vertical: New Khartoum Horizontal: UTM ZONE 38N ARC 00	<b>DWC. No.</b> BR/DWS/WTR/PH-01	<b>SHEET</b> 
		<b>DWC. TITLE</b> MAIN RAW AND TREATED WATER PUMP HOUSE	_____ _____ _____	_____ _____ _____	_____ _____ _____	_____ _____ _____	_____ _____ _____	_____ _____ _____	_____ _____ _____



**KARUNGU BOOSTER PUMP HOUSE LAY-OUT PLAN**

GOVERNMENT OF UGANDA  
MINISTRY OF WATER AND ENVIRONMENT

**KACGA & PARTNERS**  
PLOT 2, BANNING CLIFF ROAD  
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KAMPALA, UGANDA

**PROJECT:** CONSULTANCY SERVICES FOR DESIGN REVIEW AND CONSTRUCTION SUPERVISION FOR BITSYA WATER SUPPLY AND SANITATION SYSTEM  
**DWG. TITLE:** KARUNGU BOOSTER PUMP HOUSE PLAN

REVISIONS	DATE	DRAWN BY:	SCALE:
		AA	
		CHECKED BY:	
		CS	
		APPROVED BY:	
		PJM	

**DATUM:** Vertical: New Khartoum  
Horizontal: UTM ZONE 36N ARC 00

**DWG. No.:** KP/BWS/WTM/PH-02

**SHEET**



## Annexe 9. Land Ownership Documents