



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

INTEGRATED WATER MANAGEMENT AND DEVELOPMENT PROJECT (IWMDP)

**ENVIRONMENT AND SOCIAL IMPACT ASSESSMENT (ESIA) FOR LARGE SOLAR-
POWERED PIPED WATER SUPPLY SYSTEMS AND SANITATION FACILITY IN IGWAYA
RURAL GROWTH CENTRE, KAGULU SUB COUNTY, BUYENDE DISTRICT**

Contract No: MWE/CONS/20-21/00095



ENVIRONMENTAL AND SOCIAL IMPACT STATEMENT

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LIST OF ACRONYMS

AES	Audio Encounter Surveys
CAO	Chief Administrative Officer
CBO	Community-Based Organization
CFRs	Central Forest Reserves
CHS	Community Health and Safety
CIA	Cumulative Impact Assessment
DCDO	District Community Development Officer
DDP	District Development Plan
DEA	Directorate of Environmental Affairs
DEO	District Environment Officer
DHO	District Health Officer
DHO	District Health Officer
DLG	District Local Government
DWD	Directorate of Water Development
DWO	District Water Officer
DWRM	Directorate of Water Resources Management
EHS	Environmental Health and Safety
EHSGs	Environment Health and Safety Guidelines
EIA/ESIA	Environmental Impact Assessment/Environmental and Social Impact Assessment
EOC	Equal Opportunities Commission
ESIS	Environment and Social Impact Statement
ESMMP	Environmental and Social Management and Monitoring Plan
ESMP	Environmental and Social Management Plan
EUWS	Eastern Umbrella of Water and Sanitation
FGDs	Focus Group Discussions
GBV	Gender-Based Violence
GPS	Geographical Positioning System
GRM	Grievance Redress Mechanism
H/C/HC	Health Centre
HHs	Households
HMIS	Health Management Information System

IFC	International Finance Corporation
IPC	Infection Prevention and Control
IUCN	International Union for Conservation of Nature
IWMDP	Integrated Water Management and Development Project
IWRM	Integrated Water Resources Management
KIIs	Key Informant Interviews
LC	Local Council
LCV	Chairperson Local Council V
LULC	Land use and land cover
MGLSD	Ministry of Gender, Labour and Social Development
MHU	Makerere University Herbarium
MOES	Ministry of Education and Sports
MoH	Ministry of Health
MoLHUD	Ministry of Lands, Housing and Urban Development
MWE	Ministry of Water and Environment
NDP	National Development Plan
NEMA	National Environment Management Authority
NFA	National Forestry Authority
NGOs	Non-Governmental Organizations
O&M	Operation and Maintenance
OHS	Occupational Health Safety
OP	Operational Policy
OPD	Outpatient Department
PAD	Project Appraisal Document
PCRs	Physical Cultural Resources
PDO	Project Development Objective
PLA	Participatory Learning and Action
PWDs	Persons with Disabilities
QC	Quality Control
RAP	Resettlement Action Plan
RDC	Residence District Commissioner
RGC	Rural Growth Center

RWHT	Rainwater Harvesting Tanks
RWSSD	Rural Water Supply and Sanitation Department
SAS	Senior Assistant Secretary
SDGs	Sustainable Development Goals
SEA/H	Sexual Abuse and Exploitation or Harassment
SH/SEA	Sexual Harassment/Sexual Expolitation and Abuse
SHS	Second Hand Smoke
SMC	Safe Male Circumcision
SPP	Source Protection Plans
STI/Ds	Sexually Transmitted Infections/Diseases
TC	Trading Centre
TSCs	Timed Species Counts
UBOS	Uganda Bureau of Statistics
UNCCD	United Nations Convention to Combat Desertification
UNFCCC	United Nations Framework Convention on Climate Change
UNICEF	United Nations International Children's Emergency Fund
UNRA	Uganda National Roads Authority
UWSSD	Urban Water Supply and Sanitation Department
VAC	Violence Against Children
VECs	Valued Environmental Components
VES	Visual Encounter Surveys
VHT	Village Health Teams
WASH	Water, Sanitation, and Hygiene
WHO	World Health Organization
WMD	Wetlands Management Department
WSS	Water Supply and Sanitation

EXECUTIVE SUMMARY

BACKGROUND

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) of IWMDP is to improve access to water supply and sanitation services, build capacity for integrated water resources management and support the operational performance of service providers in the water sector. IWMDP comprises the four components namely:

- Component 1–WSS in Small Town & Rural Growth Centres which will cover Support to Small Town & Rural Growth Centres and Support to Refugee & Host Communities;
- Component 2–WSS in Urban Large Towns;
- Component 3–Water Resource Management and
- Component 4–Project Implementation & Sector Support.

Sub-components 1.1- designed to support Small Towns and Rural Growth Centres will be implemented by MWE team at central level through the Urban Water Supply and Sanitation Department (UWSSD) and Rural Water Supply and Sanitation Department (RWSSD), with close collaboration with staff in Water and Sanitation Development Facilities (WSDFs) as well as district local governments.

Under this sub component, twenty five (25) solar powered piped water supply systems and associated public sanitation facilities will be developed in the districts of Buyende, Kaliro, Namayingo, Mayuge, Jinja, Namutumba and Kamuli in Eastern Uganda; Mityana, Mubende, Kassanda, Kyankwanzi, Nakasongola, Rakai, Lyandonde, Sembabule, and Mukono in Central Uganda; and Kagadi, Kakumiro, Kiruhura, Kazo, Kisoro, Kyegegwa, Kyenjonjo in Western Uganda.

Specific for Buyende District, MWE intends to develop a solar power piped water supply system and an improved sanitation facility in Igwaya RGC located in Kagulu Sub County.

This is to respond to the low coverage of safe water (37%) and the ever-dropping attention given to sanitation facilities that are dysfunctional in Igwaya Sub County as indicated in the Buyende District Development Plan (2020/21-2025/26). As a result of the limitations in access to drinking water in the sub county, women and children still have to bear the burden of fetching water, from long distances (1.8 to 2.5 Km) and for a long-hours (between 1-2 hours) per day. Additionally, latrine coverage severely deplorable especially in growing urban agglomerations such as; hamlets, and trading centres. The communities have adopted sharing of available pit latrines and open defecation among other adopted practices.

PROJECT COVERAGE AND LOCATION

The proposed water supply and sanitation system for Igwaya RGC is located in Kagulu Sub County, Buyende district, Busoga Sub region in Eastern Uganda. Igwaya RGC is approximately 25 Km by road from Buyende Town, and 113 Km through Kamuli from Jinja, the main city in Busoga Sub region. Buyende District is bordered by the districts of Kamuli to the South, Luuka to the Southeast, Kaliro to the East, Pallisa to the Northeast, Serere to the North, Kaberamaido and Amolatar to the Northwest and Kayunga to the West.

The project is designed to serve 5 villages as direct area of influence within the RGC namely; Nakawolo LCI, Mailo, Butemera LCI B, Butemera LCI A and Busubo Mpanga using a borehole (**DWD 60898**) in Mailo Village, Bulamoji Parish.

PROJECT DESCRIPTION

The water supply system will comprise of a production borehole (DWD 60898) of 140m in depth, with a pump installation level of 102m and a safe yield of 10.0 m³/hr located at UTM GPS coordinates 36N 530610.86mE, 138914.46mN, with solar powered submersible pump in Mailo Village, Bulamoji Parish, pumping 239.53m³ of water over 16-hour pumping regime on daily basis through 6.34 Km transmission main to a pressed steel storage tank at GPS coordinates 36N 534045.80mE, 138139.84mN in Butemera Village, Igwaya Trading Centre – Kagulu Parish. From the reservoir, water will be distributed by gravity through a distribution network to five (5) villages, namely, Nakawolo LCI, Mailo, Butemera LCI B, Butemera LCI A and Busubo Mpanga, spread in the 2 parishes of Kagulu Sub County. Fifty-five (55) household and 7No. Public stand post connections will be established in the first phase of the project. A field water office will be constructed at Kagulu Sub County at GPS Coordinates 36N 53379272mE, 136487.71mN to support the operation and maintenance of the water supply system. The estimated quantities for network intensification lines for Phase I are 4 Km of pipe work.

Under sanitation, the project will construct a 6-stance waterborne public sanitation facility at GPS Coordinates 36N 533940.10mE, 136577.39mN at Kagulu Health Centre III. The sanitation facility will be gender segregated and will comprise of 4No. Single Stances, 1No. Urinal, 2(No) stances for people with disabilities, shower facility and complete hand washing facilities.

RATIONALE FOR THE ESIA STUDY

The proposed project was assessed against the World Bank Operational Policies and found to trigger OP/BP/GP 4.01: Environmental Assessment, OP/BP 4.04: Natural Habitats, OP 4.11: Physical Cultural Resources, and OP/BP 4.12: Involuntary Resettlement. Furthermore, the Environmental and Social Management Framework developed for the project, classified it under Category B, for projects with moderate environmental and social risks and impacts that can be mitigated and/or managed through an Environmental and Social Impact Assessment (ESIA). At national level, the proposed water supply system and sanitation facilities project falls under Schedule 5 Section 4 (a) “Surface water abstraction for urban use of more than 1000 M3/day”, and Schedule 4 section 9 (d) “Construction of public sanitary facilities” of the National Environment Act, 2019; as those for which an ESIA Study is mandatory before project activities implemented. This report therefore, presents the outcomes of an ESIA study conducted for the Igwaya RGC WSS and improved sanitation facilities project.

ESIA OBJECTIVES

The purpose of this ESIA Study was to detail the potential positive and adverse bio-physical and socio-economic impacts of the proposed Water Supply and Sanitation System and propose enhancement and mitigation measures in compliance with the National Environment Act 2019 other environment regulations and standards in Uganda, as well as with the World Bank’s Operation Policies and Practices; and will not have a lasting adverse impact on the country’s population and their livelihood, the natural environment or assets of particular cultural heritage value. The specific objectives of the ESIA were to: (i) provide a description of the environmental and social baseline settings of the project areas; (ii) investigate the likely impacts of the proposed project on the biophysical and social-economic environment and propose appropriate mitigation measures to avert or reduce such impacts; (iii) promote environmental sustainability through identifying and implementing appropriate mitigation measures in the proposed project; (iv) involve and engage stakeholders including

communities in the project area in the decision- making process and make them part of the project; and (v) facilitate informed decision making by the Ministry of Water and Environment (Project Proponent), National Environment Management Authority and other Lead agencies and to set terms and conditions for sustainable implementation of the project.

ESIA METHODOLOGY

The study was preceded by internalization of the Terms of Reference and formulation of appropriate data collection tools. It assessed the project environmental and social related project alternatives in relation to the project design and feasibility assessments. It further analysed each of the activities of the project covering physical, biological, socio- economic (including occupation health and safety); and socio-cultural environment as detailed herein. It determined and listed potential direct and indirect environmental impacts for each of the planned activities; evaluated and recommended mitigation measures for adverse negative/adverse effects. Key aspects involved in the study focused on literature review, field baseline environmental and socio-economic studies which included noise and vibration measurements, air quality, in situ and ex-situ water quality measurements, biological surveys covering flora and faunal investigations. Other activities involved environmental and social screening of the project, impact evaluation and preparation of environmental and social management plan (ESMP) alongside the environmental monitoring plan.

STAKEHOLDER ENGAGEMENT

Effective and meaningful stakeholder engagement can improve the environmental and social sustainability of projects, enhance project acceptance, and make a significant contribution to successful project design and implementation. Consultations were organised at target sites, villages, and parish, Sub County, and district levels and at relevant ministries, departments, and authorities of government. The meetings engaged farmers, fishermen, women, men, youth, lake/wetland user groups, transporters local leaders and administration, technical officers. Over 193 stakeholders were engaged, 145 of whom were males, and 46 females.

Some of key issues raised from stakeholder engagements are summarised as follows;

- Community ownership of the project should be a key component enshrined in project development;
- There is need to extend piped water to Igwaya, Buyumba & Iyingo fishing villages, Kagulu Hill, Kagulu HC II, Kagulu weekly market and the nearby Miru TC, locations which is highly populated in the RGC and;
- There is a cultural tree about 100m from the abstraction point where some of the resident to worship ancestral spirits. Activities of the project implementation should not disturb the peace and cultural beliefs at the site.

ASSESSMENT OF PROJECT ALTERNATIVES

The comparison of project alternative was done to evaluate and address the design alternatives that were examined and proposed during the feasibility and pre-design study of the proposed project. Assessment of project alternatives/options was guided by the 2011 EIA Guidelines for Water Resources related projects as follows: The process took into consideration environmental, social, technological, engineering and economic aspects of the project which would effectively and efficiently deliver the development objective of the Project. The best alternative was the underground water

source as opposed to surface water source. This was because, high cost of investment as well as the operational cost for surface water.

POLICY, LEGAL AND REGULATORY FRAMEWORK

The proposed project was assessed taking into consideration policy, legal and related statutory requirements with which its activities amongst other has to comply with alongside World Bank Operational Polices. A summary of these instruments is presented as follows:

Policy Framework and Plans

Vision Uganda 2040

The Third National Development Plan III 2020/2022-2024/25

The National Environment Management Policy 1994,

The National Policy on Conservation and Management of Wetland resources 1995,

The National Water Policy 1999,

The Uganda National Land Policy 2013,

National Health Policy 2010,

The National Environment Health Policy 2010,

National Policy on Elimination of Gender Based violence 2016,

The National Equal Opportunities Policy 2006,

The National Policy on HIV/AIDS and the world of work 2007,

The Uganda Gender Policy 2007,

National Policy on Disability 2006,

National Climate Change Policy 2012.

Legal Framework

The Constitution of the Republic of Uganda 1995,

The National Environment Act 2019,

Water Act Cap 152,

Local Governments Act Cap 243,

The Employment Act 2006,

The Occupational Safety and Health Act 2006,

The Climate Change Act 2020,

The Land Acquisition Act 1965,

The Public Health Act Cap 281,

The Workers' Compensation Act Cap. 225,

Children Act Cap 59,

Domestic Violence Act 2010,

Regulations, Standards and Guidelines

The National Environment (Environmental and Social Assessment) Regulations, S.I No.143 of 2020;

Water Resources Regulations 1998;

Water Supply Regulations 1999;

The National Environment (Wetlands, Riverbanks and Lakeshores Management) Regulations 2020;

National Environment (Waste Management) Regulations S.I. No. 49 of 2020;

National Environment (Standards for Discharge of Effluent into Water or on Land) Regulations, 2020; The National Environment (Noise Standards and Control) Regulations 2003; National Environment (Audit) Regulations, 2020, Uganda National Roads Authority (General) Regulations 2017; Water Source Protection Guidelines 2007; and National Environment (Control of Smoking in Public Places) Regulations 2004. World Bank safeguards operational policies (OP) and Bank procedures (BP), namely; OP 4.01 Environmental Assessment, OP 4.04 Natural Habitats, OP 4.09 Pest Management, OP 4.10 Indigenous Peoples, OP 4.11 Physical Cultural Resources, OP 4.12 Involuntary Resettlement, OP 4.36 Forests, and OP 4.37 Safety of Dams.

During IWMDP Project Preparation, an ESMF and RPF were prepared that are guiding the preparation of this ESIA. Much as the World Bank in 2017 published its new Environmental and Social Framework which sets out standards designed to support sustainability in projects, IWMDP project was prepared and approved under the World Bank Safeguards Operational Policies (OP) hence, its implementation is guided by the Operational Policies and the following OP/BP 4.01: Environmental Assessment, 4.04: Natural Habitats, 4.11: Physical Cultural Resources and 4.12: Involuntary Resettlement and World Bank Policy on Access to Information (2015) are triggered.

DESCRIPTION OF THE PROJECT AREAS

This is summarized under the themes as follows:

Physical Environment Baseline

Topography: The lowest and highest points in the project area are 1020 to about 1270 m ASL with a mean elevation of 1145 m ASL. The entire slope of the project area drains towards L. Nawampasa, which is part of L. Kyoga.

Hydrogeology: The project drilled borehole DWD 60898 has a consistent yield of 10m³ per day. The drilled borehole will serve 5 villages with 160m³ of water on a daily basis.

Hydrology: The Igwaya RGC production well is located within the 200m protection zone located on Lake Nawampasa (L.Kyoga). During the assessment, the team noted the production well is prone to flooding given the recent changes in lake water levels. The engineering design should consider proper landscaping, extending the well casing at least 2 feet above the highest known flood elevation, placing grout between the casing and the sides of the bore hole to a depth of at least 10 feet, raising the platform and put in place an embankment to protect the borehole (water source) from flooding and contamination.

Geology and soils: The project area is mainly comprised of gneisses and sediments rock types and undifferentiated gneiss. On the lakesides of Lake Kyoga one finds quaternary sedimentary rocks. In and around the project area, the dominant soil type is greyish and yellowish-brown sands which covers the biggest area of the pipeline (both transmission and distribution).

Air quality, noise, and Vibration: Measurements were taken at Igwaya Trading Centre for peri-urban and Kagulu Health Centre III for institutional settings, for sensitive receptors in the project area. All average values of gases (Nitrogen dioxide, Carbon monoxide, Sulphur Dioxide and Volatile Organic Compounds) and particulate matter (PM2.5 & PM10) were in conformity with World Health Organisation Air Quality Standards. Correspondingly, baseline noise levels recorded at the two sites

were within the maximum permissible noise limits as prescribed in the First Schedule of National Noise Standards and Control Regulations, 2003. Vibration results averaged between 0.1mm/s in Igwaya Trading Centre and 1.79mm/s at Kagulu Health Centre III, both below the adopted standards (12.5mm/s) for vibrations associated with construction activities.

Water Quality: According to detailed engineering report the water quality parameters from the drilled production well met the drinking water quality standards. However, during ESIA process, samples picked from the nearby surface waterbody (L. Nawampasa) indicated that all parameters were within national standards except for E. coli. This points out risk for potential contamination and the developer therefore should consider continuous quality water monitoring and undertaking appropriate water source protection measures.

Biological Environment Baseline

The plant diversity in the project area with only 91 plant species recorded. Fabaceae family registered the highest number of species (10), followed by Poaceae (Gramineae) 9, Moraceae 8, Euphorbiaceae 7, Asteraceae (Compositae) 6, Amaranthaceae and Rubiaceae 4 each. The rest of the families registered 3 or less. Out of the ninety-one (91) plant species encountered from the project sites and routes, only one (1) species - *Milicia excelsa* (Mvule) (*Moraceae*) was listed under the IUCN Red List of Uganda of 2018. The trees (*Milicia excelsa* (Mvule) were recorded along transmission lines from the borehole to the reservoir up to the Kagulu Sub County.

For fauna; fifteen species of butterflies belonging to 4 families and 12 genera were recorded during the survey. Five species of amphibians were registered at the Borehole water source site. Two lizards, One Chameleon, one crocodile and two snake species were recorded in the project area. Three of the species were reported by the residents including the Nile Crocodile *Crocodylus niloticus*, Olive Marsh Snake *Natriciteres olivacea* and Nile Monitor *Varanus niloticus*. A total of thirty-three bird species were registered in the water system project areas. The registered species represent twenty-two families and thirty-one genera. Four mammal species were recorded including; Black Rat *Rattus rattus* East African epauletted fruit bat *Epomophorus minimus*, Marsh mongoose *Atilax paludinosus* and striped ground squirrel *Xerus erythropus* were recorded along the distribution and supply pipeline areas. Except for the reported **Nile Monitor *Varanus niloticus* and Nile Crocodile *Crocodylus niloticus*** by communities around the project borehole, which are listed under the *Endangered Species Decree in 1975. International trade of the species is prohibited. The Species is listed under CITES Appendix II (Branch 1998). All other species according to IUCN 2020 Red List of Threatened species are categorized as Least Concern.*

Socio-economic Baseline

Population demographics: The population of Igwaya RGC is 7,031 people with Butemera B village having 369 Households, followed by Butemera A (349 HHs), Mailo (202 HHs), Nakawolo (169 HHs) and Busubo Mpanga (144HHs).

Settlement and housing: The major human settlement patterns in Igwaya RGC were compact or nucleated settlements commonly observed in Butemera A and B villages / Igwaya, characterized by congested dwellings constructed very close to each other, and Dispersed or dotted settlements with dwellings located far apart and often within a village landscape, as observed in source area (Mailo village) and linear settlements along roads. Majority of the houses are built with mud and wattle (35.3%) and mud block with plaster (23.5%).

Income: The primary occupations of the residents within the project area are farming (60.9 %) followed by casual labour (23.1%), trading (9.9%) and service provision (7.3%). Majority of the households (48.7%) earn more than 1,403,000, followed by those that earn between 503,000 - 1,403,000 (34.9%) and less than 503,000 (16.4%).

Access to water: In Igwaya RGC, there are 50 functioning water source points of different technologies serving a total population of 24,021 people. More specifically, there are 15 open-source points along wetlands of Lake Kyoga; 2 community wells and springs; and 32 functional boreholes. From the main water source, majority of households

Sanitation: There are no functional public sanitation facility nor a designated solid waste management facility in Igwaya RGC as majority (94%) of households revealed using traditional Pit latrines, 3.3% VIP latrines and 1.3 % pour flush toilet.

Common water related illness: The major water related illnesses in Kagulu Sub County included Cough or Cold, Malaria, Diarrhea, Intestinal worms, Gastrointestinal Disorders, Pneumonia, STIs, GBV related injuries, Typhoid, Stomach Aches, HIV/AIDs (HMIS2, 2021).

Gender Based Violence (GBV): The police crime report of the project area for the year 2020 recorded 217 cases of sexual assault, 20 cases of child abuse and 102 cases of common assault. Married women (41.7%) and Girls (39.9%) are the main victims while male spouses (49.4%) followed by female spouses (30.8%) are the main perpetrators of GBV.

HIV/AIDS: HIV/AIDS prevalence in Buyende stands at 4.7%. Major factors attributed to the spread of HIV/AIDS, included lack of information 20.9%, poverty 17.5%, peer pressure 16.8% and alcohol/drug abuse 10.5%. Numerous factors likely to contribute to the spread of HIV/AIDS.

PROJECT IMPACTS

These are:

Positive impacts of the project shall include:

- Creation of employment opportunities for the local communities.
- Creation of market for construction materials thus increasing household incomes
- Skills development amongst the local community
- Increased access to clean and safe water supply
- Improved hygiene, sanitation and public health conditions.

Negative impacts of the project shall include:

- Loss of vegetation and habitat for fauna
- Soil erosion and sedimentation of wetlands/rivers/lake
- Loss of land
- Risk of increase in HIV/AIDs in the project area
- SH/SEA and GBV risks due to labour influx
- Risks of OHS during project execution
- Environmental Pollution amongst others.

Generally, the purpose of this project is to increase sustainable access to safe water and basic sanitation in Igwaya RGC. From the assessment, the positive impacts outweigh the negative impacts

and appropriate mitigation measures have been proposed to address the negative measures. Therefore, the ESIA study recommends that the project should proceed but with the following recommendations;

- a. The Design should consider undertaking appropriate water source protection measures including additional works for preventing and managing flooding and contamination of the water source. These works may include proper landscaping, drainage works, raising the platform and put in place an embankment to protect the borehole (water source) from flooding and contamination.
- b. Ensure adequate and qualified staffing for Environmental and social safeguards management at MWE, Supervising Engineer, and Contractor during implementation to enhance oversight and compliance roles with environmental and social safeguards requirements.
- c. Keep the Right of Way within the existing Road reserves as much as practicable in order to minimize delays and expenditures associated with land acquisition. Where land has to be acquired, ensure that affected persons are fully and fairly compensated before commencement of works.
- d. During implementation, the Developer should engage with key stakeholders such as UNRA, LGs and the communities in laying of the water transmission and distribution lines so as to take care of any planned road upgrades, other developments and stakeholder support in the project area.
- e. Monitoring the implementation of the E&S mitigation during pre and post construction phase mitigation measures by coordinating with local authorities and involving the district and sub-county officials.
- f. The Contractor should develop a Construction specific ESMP after developing the final designs. This should constitute the monitoring checklist to be used by the Supervising Consult and MoWE.
- g. The environmental management and monitoring plan should be attached as a condition for the project construction contract so as to make the contractor aware of his environmental obligation before securing the contract and enhance the implementation of the ESMP.

The following general mitigation measures shall be undertaken and will include but not limited to the following:

- a. Ensure employment opportunities for the local people.
- b. Ensure health and safety for both workers and the public.
- c. Institute a programme where all communities affected by the water and sanitation project have access to adequate and clean water.
- d. Control negative impact on biodiversity and wetlands.
- e. Ensure all livelihoods lost are restored through a transparent and adequate compensation procedure and livelihood restoration plan.

- f. Mainstream HIV/AIDS prevention in contractors SEAP.
- g. The Contractor should develop a Construction specific ESMP after developing the final designs. This should constitute the monitoring checklist to be used by the Supervising Consult and MoWE.

The environmental management and monitoring plan shall be attached as a condition for the project construction contract so as to make the contractor aware of his environmental obligation before securing the contract and enhance the implementation of the ESMP.

The developer will also ensure that several licenses, permits and approvals are obtained from the relevant bodies before commencement of construction activities and also prior to particular activities during project implementation. These permits, licenses and approvals include Water Abstraction permits, Waste Disposal Permit, Waste transportation license, ESIA approvals for campsites and hoarding areas, approval of campsites and hoarding plans, permit to carry out regulated activity in a wetland, Riverbank, lakeshore; License to emit noise in excess of permissible noise levels, Mining permit, extraction of minerals opening up of quarries and sand pits; Permit for storage of petroleum products and dispensing license, Work place registration permit, Work permits, Statutory Certification of equipment, Road Permits (in case of road crossings), traffic diversion consent; and RAP approval conditions.

Overall; this will enhance environmental standards in the whole project. In case of any archaeological finds during excavation, these shall be reported and handed over to the Department of Museums and Monuments in the Ministry of Tourism, Wildlife and Antiquities for further follow up in accordance with the Chance Find procedure developed for this project.

CONCLUSIONS

In this study, the need for the project was examined, its compatibility with the surroundings and economic benefits evaluated and environmental impacts assessed and analyzed.

Adverse impacts were identified, mitigation measures to avoid, reduce and minimize these impacts have been suggested, either as part of the design, or as measures to be implemented. Good practice measures were also identified in order to minimize the impact of the proposed development further. The proponent has agreed to these mitigation measures and they are, therefore, expressed as commitments.

Overall, the negative impacts of this project are rated by this study as largely insignificant; however, adequate mitigation measures have been proposed to address them. When mitigation actions and environmental monitoring plans are implemented, the project would have minimal residual environmental effects. Hence the project can be implemented in a sustainable way.

Based on the above, it is recommended that NEMA approves this project because its planned activities do not pose a threat to environment and natural resources if the mitigation measures and monitoring plan are implemented effectively.

1 INTRODUCTION

1.1 BACKGROUND

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.

Component 1 of IWMDP is tagged to support Water Supply and Sanitation (WSS) in small towns & Rural Growth Centres (RGCs)¹. Sub-component 1.1 will support activities designed to improve the sustainable provision of water supply and sanitation services in small towns and RGCs as part of the strategy to improve access to clean water, improved sanitation, and hygiene in the selected RGCs. The sub component will be implemented by MWE team at central level through the Department of Urban WSS (UWSSD) and Rural Water Supply and Sanitation Department (RWSSD), with close collaboration with staff in Water and Sanitation Development Facilities (WSDFs) as well as district local governments.

Under this sub component, thirty-two (32) solar powered piped water supply systems and associated public sanitation facilities will be developed in the districts of Buyende, Kaliro, Namayingo, Mayuge, Jinja, Namutumba and Kamuli in Eastern Uganda; Mityana, Mubende, Kassanda, Kyankwanzi, Nakasongola, Rakai, Lyandonde, Sembabule, and Mukono in Central Uganda; and Kagadi, Kakumiro, Kiruhura, Kazo, Kisoro, Kyegegwa, Kyenjonjo in Western Uganda.

Specific for Buyende District, MWE intends to develop a solar power piped water supply system and an improved sanitation facility in Igwaya RGC located in Kagulu Sub County. The components of this system are described in section 3.3.

1.2 PROJECT JUSTIFICATION

Uganda's current (2022) population of 47.2 million is expected to reach 80 million by 2040. The country's annual urban growth rate (2.66%) is higher than the global average of 1.85 percent. The urban population has been growing from 6.4 million in 2014 to 12.1 million in 2021 and is expected to reach 22 million by 2040.

About 60% of the current urban population lacks basic amenities, such as decent WSS services. Over 30 percent of this population lives in many unplanned agglomerations (small towns and RGCs), with high demand but no proper allocation of basic services.

Despite considerable progress in the WSS sector, Uganda still faces challenges in improving WSS delivery in small towns and RGCs, ensure water security, and provide adequate sanitation in large towns. National water supply coverage levels (60 percent in urban areas and 67 percent in rural areas) mask disparities in service quality between urban and small towns/rural areas. In urban areas, 48 percent of households use piped water, but that number falls to 33 percent in small towns and to 9 percent in rural areas. Most of the country relies on community point sources. Despite an acceptable

¹ Small towns refer to urban centers considered town councils by the Uganda Bureau of Statistics (UBOS) with population between 5,000 and 15,000; the rural sector includes all rural communities with a population of up to 5,000. Communities are considered rural when they are in a rural sub-county defined by the UBOS. RGCs have a population between 1,500 and 5,000.

level of functionality of water systems (80 percent in rural and small towns), many people still travel long distances to fetch water. Populations with insufficient potable water oftentimes use unsafe water sources, triggering cholera, typhoid fever, and diarrhea outbreaks as well as adverse social consequences, such as sexual and domestic violence.

The United Nations Joint Monitoring Program reports that only 29 percent of the urban and 17 percent of the rural populations have access to individual improved sanitation facilities. Sewerage coverage is less than 7 percent in large towns and negligible in small towns. The low sanitation coverage indicates poor on-site sanitation conditions from unlined public and household toilets and inadequate wastewater treatment and fecal sludge management. These deficiencies have caused severe water pollution and related environmental and public health issues.

1.2.1 STATUS OF WATER SUPPLY AND SANITATION IN BUYENDE DISTRICT

According to the Uganda Water Atlas (2022), only 37% of the communities in Buyende District have access to safe drinking water. Access to water in urban areas stands at 53% and rural access at 36%. The situation is made worse by the high population density (320 people per Km²), together with inequality in access to drinking water (less than 45% of the rural population). Water consumption in the worst affected rural areas is around 10 litres per person per day, according to national poverty eradication documents, significantly less than the recommendations of what constitutes the right to water (between 50 to 100 litres p/d) and national targets (20 litres p/d) according to the “Ministerial Political Communication 2015/16” of the Ministry for Water and the Environment.

According to the Health Ministry, in 2011 diseases related to access to water, sanitation and hygiene (WASH) represented 40% of the national total. Some 70.3% of the population lived in poverty, with 33.3% living in extreme poverty (MoH, 2011). Given the limitations in access to drinking water in rural areas (under 50% compared to 95% in urban areas), women and children still have to bear the burden of fetching water, something which takes between 30 to 45 minutes per day (a round trip of between 1.8 to 2.5 km). This puts them at greater risk of sexual violence when collecting water, and also causes school absenteeism.

Kagulu Sub County, where Igwaya is located is a water stressed Sub County. Only 37% of the population has access to clean and safe water. The sanitation facilities in Igwaya RGC are in a deplorable, for example; the public latrine constructed by Kagulu Sub County at Igwaya RGC is dysfunctional as the sub county failed to empty it.

1.3 RATIONALE OF ESIA

Section 113 (1) of the National Environment Act 2019, requires a developer who proposes to undertake a project that falls in its Schedule 5 of to conduct an Environmental and Social Impact Assessment (ESIA) as prescribed by, and outlined in section 3(a)(ii) of the National Environment (Environmental Impact Assessment) Regulations 2020.

The proposed water supply system and sanitation facility falls under **Schedule 4 Section 4 (b) “Abstraction or utilization of ground water of less than 1000 m³/day**, and **section 9 (d) “Construction of public sanitary facilities”** of the NEA, respectively. Schedule 4 of the NEA requires Project Briefs to be prepared and submitted to the National Environment Authority (NEMA) for approval before project implementation.

Furthermore, the project ESIA will be carried out pursuant to the World-Bank Operational Safeguards policies {Environmental Assessment (OP/BP/GP 4.01), Natural Habitats (OP/BP 4.04), Physical Cultural

Resources (OP 4.11) and Involuntary Resettlement (OP/BP 4.12) which are triggered by the project activities. The ESMF of this project developed by MWE and approved by the World Bank classified it as Category B. This is in consideration of the nature of impacts of associated with the project.

Therefore, this ESIA was conducted and will be submitted to the National Environment Management Authority (NEMA) for its review and approval before commencement of project implementation.

1.4 OBJECTIVES AND TECHNICAL SCOPE OF THE ESIA

The overall purpose of the assignment was to identify, assess and evaluate the environmental and social impacts of the proposed water and sanitation project and propose mitigation measures to be put in place to ensure sustainability of the development.

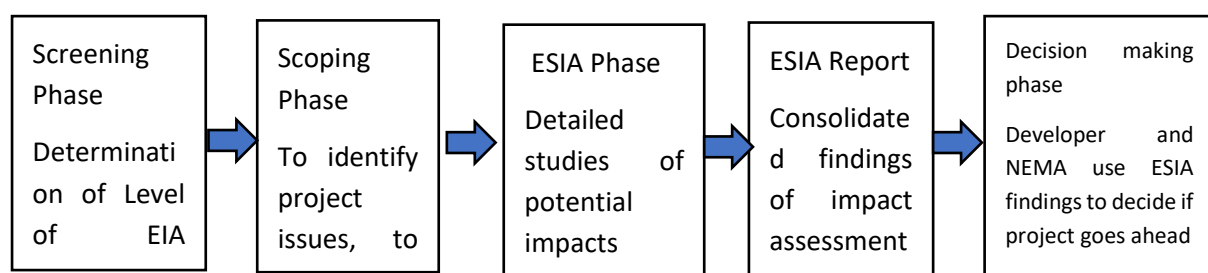
1.4.1 SPECIFIC OBJECTIVES

Primarily, the ESIA objectives included:

- a. Provide a description of the environmental and social baseline settings of the project areas;
- b. To investigate the likely impacts of the proposed project on the biophysical and social-economic environment and propose appropriate mitigation measures to avert or reduce such impacts;
- c. To involve and engage stakeholders including communities in the project area in the decision-making process and make them part of the project; and
- d. To facilitate informed decision making by the Ministry of Water and Environment (Project Proponent), National Environment Management Authority (NEMA) and other Lead agencies and to set terms and conditions for sustainable implementation of the project.

1.5 THE ESIA PROCESS

This ESIA was carried out in line with requirements of the legal, policy and regulatory framework of Uganda as well as the World Bank. Schematically, the ESIA study process is summarized in



(Source: Environmental Impact Assessment Guidelines, 1997)

Figure 1-1: ESIA Process

(a) Screening: The proposed Igwaya RGC Solar Powered WSSS project was screened to preliminarily establish its key potential environmental and social impacts and the level of environmental and social assessments that would be required. The project falls under Schedule 5 of the National Environmental Act 2019 which require mandatory assessments to be conducted before implementation.

(b) Scoping: This was the first step in the ESIA, and it was determining the scope/extent of work to be undertaken in assessing the likely environmental and social impacts of the proposed project. This process entailed literature review, site reconnaissance visits which was conducted in the project area from (14th- 22nd February 2022), consultative meetings with

relevant agencies and stakeholders including project affected persons (PAPs) and with the local leaders to obtain their views and comments on the project and the ESIA studies. This culminated in the preparation of an E&S Scoping Report and Terms of reference, which was submitted to NEMA in keeping with EIA practice and procedures on 7th June 2022 and approved. The NEMA conditions of approval of the terms of reference for this ESIA are presented below and included in **Annex A** of this report.

Table 1-1: NEMA approval conditions for the Terms of Reference

No.	Condition	Incorporation in the report
(i)	Provide a comprehensive description of the project components and activities covering the construction and operational phases, associated infrastructure, details of the design and capacity of water supply systems, the methods and chemicals to be used for water treatment, and size of the workforce; and the implications of these on the environment.	Included in Chapter 2 (Project Description) of this report
(ii)	Undertake geotechnical investigations of the proposed project sites to inform the design and construction of the Water Supply Systems and Sanitation Facilities.	Reviewed and required information included in the geology section (Section 6.1.5 and Section 6.1.5.2)
(iii)	Include in the ESIA reports hydrological investigative reports in regards to the potential impacts of the project on underground water resources within the proposed project areas, and mitigation actions to address such impacts.	Included in Section 6.1.3.2– Water Resources and Hydrology
(iv)	Provide a detailed description of the waste streams that will be generated from the activities of the piped water supply systems and sanitation facilities, and the measures and equipment that will be put in place to handle such waste.	Included in Section 3.4.1.5 as waste handling and disposal
(v)	Include in the ESIA reports other relevant baseline information that is project site specific, on the soils, water, air quality and noise levels; as well as, clear colored photographs depicting the current status of the project areas and the neighbouring environs.	Included as Chapter 6 (Baseline Conditions)
(vi)	Provide clear coloured and well-labelled location maps/images (preferably each covering A-3 size papery and accurate sets of GPS coordinates clearly indicating the site boundaries and locations of the various project components. Ensure that all GPS coordinates are provided in UTM format.	Included in Chapters 0 (project description) and 6 (Environment and Socio-economic Baseline) of the report
(vii)	Append to the ESIA report well-labelled copies of the proposed site layout plan (preferably covering A3 or larger paper size) that shows the layout and placement of the different project components.	Included as Annex B of this report

No.	Condition	Incorporation in the report
(viii)	Carry out comprehensive consultations with all the relevant key stakeholders of Buyende District Local Government Authorities, Department of Occupational Safety and Health (Ministry of Gender, Labour and Social Development), local communities in the neighbourhood and the Directorate of Water Resources Management (DWRM) particularly in regards to potential impacts of the proposed project on water resources in the project area. The views of the stakeholders consulted should be well documented and appended to the ESIA reports.	Detailed Stakeholder engagement with all the proposed stakeholders engaged has been included in Chapter 7
(ix)	Include in the ESIA report, comprehensive analysis of analysis of alternatives/ options to the selected project location, design and technology among other aspects.	Detailed Alternative analysis has been included as Chapter 4
(x)	Carry out a comprehensive evaluation of the negative environmental impacts associated with the proposed project activities and the relevant mitigation measures to minimize the identified environmental impacts of the proposed project.	Detailed Impact Analysis, including analysis of the project negative impacts with relevant mitigation measures is included as Chapter 8.
(xi)	Refer to all the relevant provisions of the applicable policies, laws, regulations, guidelines and standards the National Environment Act, No. 5 of 2019.	Detailed analysis of the applicable policies, laws, regulations, guidelines and standards is included as Chapter 5.
(xii)	Append to the ESIA reports, authentic copies of land ownership and acquisition documents.	A resettlement Action Plan for the project has been undertaken. Recommendations of which will guide land acquisition on the project.
(xiii)	Consider any other critical environmental aspects/concerns which, may have not been initially foreseen during preparation of the scoping report and TOR, and include an evaluation of such environmental and social concerns in the ESIA reports.	All the environmental aspects relevant to this ESIA have been included in Chapter 6 (Baseline conditions) and further assessed in Chapter 8 (Impact Analysis)
(xiv)	Indicate the estimated cost of the project evidenced by a certificate of valuation of the capital investment of the project, issued by a qualified and registered valuer in accordance with Regulation 18(1) of The National Environment (Environmental and Social Assessment) Regulations, S.I No. 143/2020.	The project cost is included in Section 3.5.2 as adopted from the project feasibility and design report.
(xv)	Provide evidence of payment of a non-refundable administration fee of 30% (thirty percent) of the total fees on submission of the Environmental and Social Impact Statements, in accordance with Regulation 49(2) of The	To be appended at submission of the report to NEMA

No.	Condition	Incorporation in the report
	National Environment (Environmental and Social Assessment) Regulations, S.I No.143/2020.	

(c) Detailed ESIA study and information collection: Upon completion of the Scoping study and approval (Annex A), detailed field investigations and consultations were undertaken then leading to the preparation of this Environmental Social Impact Assessment Report for stakeholder review and consideration by NEMA as part of its approval process.

(d) The study was preceded by internalization of the Terms of Reference and formulation of appropriate data collection tools. It assessed each of the activities of the project covering physical, biological, socio- economic (including occupation health and safety); and socio-cultural environment as detailed herein. It determined and listed potential direct and indirect environmental impacts for each of the planned activities; evaluated and recommended mitigation measures for adverse negative/adverse effects. Key aspects involved in the ESIA study focused on literature review, field baseline environmental and socio-economic studies which included noise and vibration measurements, air quality, *in situ* and *ex-situ* water quality measurements, biological surveys covering flora and faunal investigations. Other activities involved impact evaluation and preparation of environmental and social management plan (ESMP) alongside the environmental monitoring plan. Details of these process are presented under chapter 5 of this ESIA herein. In addition, this ESIA report was prepared with in consultation of the manual for EIA Guidelines for Water Resources Related Projects in Uganda (MWE, 2011); Environmental and Social Management Framework for the IWMDP; and the World Bank’s general Environment Health and Safety Guidelines (EHSGs), with specific reference to the EHSGs for Water and Sanitation Projects. The World Bank policy requirements, in instances that they were more comprehensive, were addressed over and above the requirements of the regulatory framework of Uganda.

Decision-making: Submission of the ESIA report to NEMA for due approval in accordance with the provisions of the National Environment Act No.5 of 2019 and National Environment (Environmental and Social Assessment) Regulations 2020. On the other hand, the Bank will review the ESIA report and upon clearance through its procedures, it will be disclosed in its external website.

1.6 ESIA REPORT STRUCTURE

The ESIA report is structured as summarized herein with section-based explanatory highlights.

Table 1-2: ESIA Report Structure

Chapter	Highlight on section content
Executive Summary	Executive Summary of the project and its activities, ESIA study methods, key findings and impacts as well as proposed mitigation measures.
Chapter 1	Introduction with details of project background, objective, justification, categorization of the Project and ESIA process.
Chapter 2	ESIA Methodology

Chapter 3	Project description detailing its location, project parameters and the proposed project activities at different phases.
Chapter 4	Analysis of project alternatives, a comparison of the options and their significance
Chapter 5	Outline of different laws, policies, regulations, institutions and international guidelines and conventions relating to implementation activities of the proposed project as well as ESIA study.
Chapter 6	Description of Environmental and Socioeconomic baseline information of the project area
Chapter 7	Public consultation and stakeholder engagement processes and Grievance Redress Mechanism (GRM)
Chapter 8	Description of the project anticipated environmental and social impacts and their mitigation measures
Chapter 9	The Environmental and Social Management Plan (ESMP) as well as the Environmental and Social Monitoring Plan
Chapter 10	Other Management Plans
Chapter 11	Key Recommendations and Conclusion
	References
	Annexes

2 ESIA METHODOLOGY

2.1 ESIA METHODOLOGY

The ESIA methodology presented is in line with the Environmental Impact Assessment Regulations, 2020, the National Environment Act 2019 as well as thematic tasks included in the Terms of Reference (ToRs). Reference will be made to the relevant World Bank Operational Policies (OP) as indicated in the project appraisal document (PAD), as well as other relevant legal, policy and regulatory frameworks at national and international levels.

Therefore, the ESIA included the following steps:

- a. Screening based on national legislation and World Bank Operational Procedures,
- b. Scoping for proposed projects components that require full ESIA after screening,
- c. Review the applicability of legal and institutional framework to the proposed projects;
- d. Discussion of proposed project alternatives;
- e. Consultation with stakeholders and disclosure;
- f. Baseline surveys in form of data collection field surveys to establish the baseline environment, supplemented by desk-based data collection to fill any data gaps;
- g. Impact identification and the evaluation of significance (Identification of mitigation measures (where required) to reduce the significance of, or avoid, any identified adverse impacts, evaluation of impacts, post-mitigation, to determine the significance of residual impacts, and assessment of cumulative impacts with other past, present and reasonably foreseeable future developments and plans);
- h. Identification of appropriate monitoring requirements; and
- i. Preparation of the ESIA study reports.

Pursuant to this approach, the following sections provide detail on how each stage of the ESIA process will be applied to the proposed project components.

2.2 PROJECT SCREENING

The consultant adopted the project screening based on the World Bank Operational Policies (OPs) and project screening undertaken during project appraisal by the World Bank and the Project Management (IWMDP).

The Consultant reviewed the Draft Engineering Designs for the respective proposed project components, contracting ToRs for ESIA and RAP, IWMDP Project Appraisal Document, IWMDP Project Implementation Manual, IWMDP Environmental and Social Framework, IWMDP Resettlement Policy Framework, and Feasibility Study Report for the Eastern Uganda WSSP. This was done to gain understanding of the environmental and social risk and categorization assigned to the proposed project.

At national level, the Consultant reviewed the National Environment Act of 2019 and the Environmental Impact Assessment Regulations, 2020 to determine whether the proposed project components require full ESIA or ESIA by way of project briefs.

2.3 SCOPING

Scoping was one of the initial steps in this Environmental and Social Impact Study (ESIS) process. It included consultation of a range of stakeholders to identify potential impacts or issues that were

unique to the project context and this allowed for in-depth analysis in the environmental impact study. The general objective of the scoping exercise was to identify the critical biophysical, socio-economic, and cultural issues which needed to be addressed by the ESIA. In this regard, the developer prepared and submitted a scoping report and ToR for the ESIS to NEMA, which were approved on 7th June, 2022 (Annex A).

2.4 REVIEW OF RELEVANT LITERATURE

The ESIA study was partly undertaken by intensive literature review, using documents provided by the Client and those from other sources such as:

- a. National Development Plan III 2020/2021-2024/2025;
- b. Ministry of Water and Environment Annual Sector Review Report 2021;
- c. UBOS Statistical Abstract 2021
- d. Project documents which included:
 - ❖ Uganda – IWMDP Project Appraisal Document-PAD No. P163782;
 - ❖ Uganda - IWMDP Project Implementation Manual, 2018;
 - ❖ Uganda - IWMDP Environmental and Social Framework 2018;
 - ❖ Uganda - IWMDP Resettlement Policy Framework 2018;
 - ❖ Detailed Design Igwaya Rural Growth Centre Water Supply System and Sanitation Report, 2021;
 - ❖ Feasibility Study Report for the Igwaya Rural Growth Centre Water Supply System and Sanitation Report, (2019); Environmental and Social Management Framework (ESMF) for the Integrated Water Management and Development Project N^o: P163782;
 - a. World Bank Operational Policies (OPs);
 - b. Uganda Poverty Assessment Report (2014)
 - c. IFC Environmental Health and Safety Standards for Water and Sanitation 2007;
 - d. Buyende District Development Plan 2015/14 –2019/20)
 - e. The Water Act, and accompanying regulations [Water Resources Regulations (1998), Waste Discharge Regulations (1998), the Water Supply Regulations (1999), Sewerage Regulations (1999);
 - f. The National Environment Management Policy (1994); The National Environment Act 2019; the National Environment (Environmental and Social Assessment) Regulations 2020; and the National Environment (Standards for Discharge of Effluent into Water or on Land) Regulations (1999), National Environment (Waste Management) Regulations (1999) as well as EIA Guidelines 1997;
 - g. The National Red List for Uganda 2016, published by Wildlife Conservation Society; and
 - h. The International Union for Conservation of Nature (IUCN) Red List of threatened species 2019.

2.5 PROJECT ALTERNATIVES

The ESIA included the analysis of the various feasible alternatives of the project, including the "No Project" scenario to identify and describe the potential feasible alternatives that would allow the project to reach its objectives, and present a comparison of the potential alternatives on the basis of technical, economic, environmental and social criteria, as well as of public views and concerns.

The alternative comparison was conducted to evaluate and address the design alternatives that were examined and proposed during the feasibility and pre-design study of the proposed project considering the concepts of;

- a) Aligning, siting and design;
- b) Technology selection; and
- c) Operation and maintenance procedures for the proposed systems.

For each of the alternatives, the potential environmental and social impacts, including land and energy requirements implications shall be analyzed as possible, including their economic values (estimated capital and operating costs) where feasible. The selected alternative/option shall be the most reliable and suitable under local conditions taking into account, their institutional, training, and monitoring requirements.

2.6 BASELINE DATA COLLECTION AND SURVEYS

2.6.1 NOISE, AIR QUALITY AND VIBRATION ASSESSMENT

Baseline measurement of noise, air quality (*Error! Reference source not found.*) and vibration were undertaken at Igwaya Trading Center and Kagulu Health Center III. The mentioned baseline measurements sites were selected considering the presence of potential receptor(s) and it (their) sensitivity to noise, air pollution and vibration impact.



Figure 2-1: Igwaya Trading Center

2.6.1.1 CRITERIA FOR SELECTION OF SAMPLED SITES

During the ESIA studies, the selected receptors for noise, air quality and vibration assessment were purposively sampled based on professional judgement and other factors as provided in *Error! Reference source not found.* As part of the ESIA studies, the consultant undertook site-survey/transect

walks or drive through to ascertain the number, distribution and potential of the sensitive receptors and their distance from the proposed facility. The selection of location and number of points was guided by the project areas topography, which mainly was characterized by the terrain. The kind of terrain influences horizontal mixing of air over long flat stretches as opposed to mountainous areas/complex terrains with flagpoles that would encourage vertical mixing of air. Additionally, the land use and land cover (LULC) i.e., existence of tall structures and vegetation would constrain air mixing and cause variation in baseline air quality. Therefore, the baseline focused on the two selected sensitive receptors (Igwaya TC and Kagulu HC III) based on their location from the proposed project sites.

Furthermore, the selection of sampling points in the ESIA study was guided by the provisions of the Uganda’s Draft Regulatory Air Quality Standards and National Environment (Noise standard and Control) Regulations, 2003 which defines noise limits for various land uses zones i.e., commercial (urban centers, health units), mixed land use (residential areas, farmlands, schools and administrative units) and industrial zones, therefore, the sampling points were selected to represent the above land uses as shown in *Error! Reference source not found.* below.

In light of the above, the selected potential receptors for noise, air quality and vibration assessment were clustered according to *Error! Reference source not found.* and then randomly sampled. The sampled sensitive receptors were:

- a) Representative of the different land uses and activities in and around the project sites;
- b) Potential candidates for noise and air pollution mitigation through site hoarding; and
- c) Sections within the project sites/areas.

Table 2-1: Potential air quality, noise and vibration sampling points

Location & Details (e.g., school, health center, highway etc.)	Date and Run time	GPS coordinates
Location 1: Igwaya Trading Center	16/02/2022 (3 hours)	36N0533986, 0138040
Location 2: Kagulu HC III	16/02/2022 (3 hours)	36N0533930, 013645

2.6.1.2 MONITORING OF PARTICULATE MATTER AND GASES

Ambient air quality monitoring for a range of parameters was undertaken at locations with potentially sensitive receptors where pollution impacts including dust nuisance will likely be a concern. These were selected as suitable for future monitoring during the projects’ implementation phases as given in *Error! Reference source not found.*.

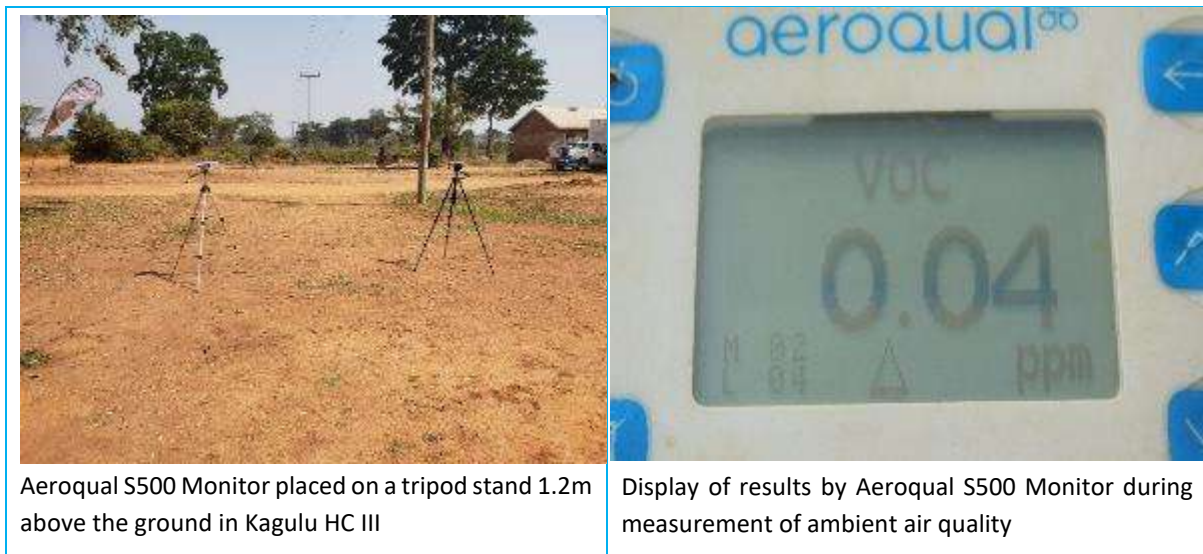
Table 2-2: Documentation of points for baseline air quality monitoring

No.	Site	District	GPS Coordinates	Key land use and receptor
1	Igwaya TC	Buyende	36N0533986, 0138040	Construction, TC
2	Kagulu HC III	Buyende	36N0533930, 013645	Farming, HC

2.6.1.3 AIR QUALITY MEASUREMENT PROCEDURE

Air quality monitoring was undertaken using the Aeroqual S500 Monitor to establish the baseline values for PM_{2.5}, PM₁₀, NO₂, SO₂, VOCs and CO. The Aeroqual monitor was placed on a tripod stand 1.2m above the ground, switched on, allowed 3 minutes of zeroing and 7 minutes of stabilizing

readings. The monitor was then set to start data logging at a frequency of five (5) minutes for 7-12 hours per site. The data was then downloaded using Aeroqual S500 V6.5 Software and analyzed. The software generates mass concentration graphs and also provides minimum (min), average (ave) and maximum (max) values for each parameter logged.



Aeroqual S500 Monitor placed on a tripod stand 1.2m above the ground in Kagulu HC III

Display of results by Aeroqual S500 Monitor during measurement of ambient air quality

Figure 2-2: How field air quality monitoring equipment was set up during the ESIA

2.6.1.4 NOISE MEASUREMENTS

Ambient noise measurements were undertaken at different receptors in and around the project sites (schools, hospitals, highways etc.). A duly calibrated Casella CEL-633B Environmental & Occupational Noise Meter was used for the assessment. The Casella CEL-633B device provides Sound Pressure Level (SPL) readings, Integrating and Octave band noise measurements compliant with the following international standards:

- a. IEC 61672-1: 2002-5 (Electro-Acoustics–Sound Level Meters) Group “X” instruments. Performance of Class 1 or 2 as relevant to the instrument model.
- b. IEC 60651: 1979, IEC 60804: 2000, ANSI S1.4 1983, ANSI S1.43-1997(R2007)
- c. 1/1 Octave and 1/3 Octave Filters comply with EN61260: 1996, Class 0 and ANSI S1.11 1986, Order-3 Type 0C.

The instrument has A, C and Z filter weightings satisfying IEC 61672-1: 2002 Class 1 and time weightings of Fast (F), Slow (S) and Impulse (I) according to IEC 61672-1: 2002. It has a memory capacity of 999 individual runs, or 400 separate runs of 24 hours’ duration with 1-minute periods and 1 second profiles.

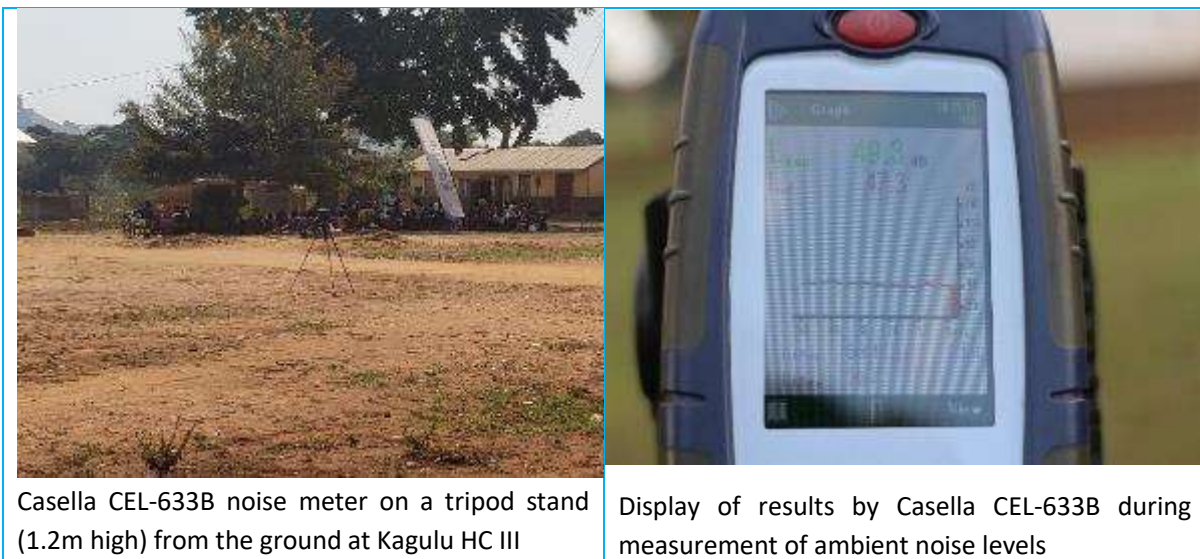
The instrument can measure the Equivalent continuous sound pressure levels (Leq) as follows: LAeq, LCeq, LZeq, LAleq, LC –LA and LAeqT80. It can also measure the Peak sound pressure level i.e., LApk, LCpk and LZpk. In addition to all the broadband results listed above, the instrument can also produce the following results for each of the octave or 1/3-octave bands: LZeq, LZFmax, LZSMax, LZF10, LZF50, LZF90, LZF95, LZF variable LCeq, LCFmax, LCSMax, LCF10, LCF50, LCF90, LCF95, LCF variable LAeq, LAFmax, LASMax, LAF10, LAF50, LAF90, LAF95, LAF variable.

- a. LAeq–is the constant noise level that would result in the same total sound energy being produced over a given period of time.
- b. LAFmax–the maximum Sound level with 'A' Frequency weighting and Fast Time weighting

- c. LAImax—the maximum Sound level with 'A' Frequency weighting and Impulse Time weighting
- d. LAFmin—the minimum Sound level with 'A' Frequency weighting and Fast Time weighting constant.
- e. LAImin—the minimum Sound level with 'A' Frequency weighting and Impulse Time weighting.

2.6.1.4.1 SET-UP AND MEASUREMENT

The Casella CEL-633B Environmental & Occupational Noise Meter was first calibrated using Acoustic sound level calibrator type CEL-251 for sound level meter at 114.0 dB (A) for every point measured. The device will be placed on a tripod stand (1.2m high) from the ground. It was then switched on and the run mode set up. The instrument has an initialization screen that displays for approximately 10 seconds and then the measurement screen is displayed and ready for use. The equipment does simultaneously recordings for all noise functions it completes and also makes periodic or cumulative data measurements, and stores acquired data on a repeating interval of time. The equipment was left to log noise readings at an interval of 30 minutes and the results were later downloaded to a computer for analysis using the Casella Insight software.



Casella CEL-633B noise meter on a tripod stand (1.2m high) from the ground at Kagulu HC III

Display of results by Casella CEL-633B during measurement of ambient noise levels

Figure 2-3: Typical field set up of noise measurement equipment

2.6.1.5 VIBRATIONS

Vibration measurements were undertaken at randomly selected locations within the project sites using Extech SDL800: Vibration Meter/Datalogger. The SDL800 measures and logs vibration data using a remote vibration sensor with magnetic adapter on 47.2"(1.2m) cable. It offers a wide frequency range of 10Hz to 1kHz with basic accuracy of $\pm (5\% + 2 \text{ digits})$. The machine continuously logs vibrations data using a SD memory card, which allows user to easily transfer collected data to a PC for further analysis. The distance from the point of measuring and the vibration source was measured and recorded. The machine was connected to a 6-inch nail using the magnetic adapter and the nail mounted into the ground near the facilities where vibrations were measured from. The machine was switched on and allowed 1 minute to settle, it was then set to start logging data at a frequency of 5 minutes. The peak particle velocity (PPV) was measured in mm/s.

2.6.2 BIODIVERSITY ASSESSMENT

The proposed Igwaya RGC piped water supply system project will be in Eastern Uganda and the project site is in highly modified environments by human activities (through cultivation, grazing and seasonal fires amongst others). The following biodiversity groups were studied:

2.6.2.1 VEGETATION

2.6.2.1.1 STUDY METHODS

To study the vegetation structure and composition of Igwaya-Kagulu in Buyende district, for the proposed Water supply project. A combined methodology, of field observations, was used to locate plots along with the proposed transmission, distribution, Borehole site, Reservoir site, sanitation facility and field water office. A diameter tape was used to record tree diameters at 1.3 meters or breast height, a pair of tape measures and stick poles were used to demarcate the plots along and within sites. Measuring tree heights was made possible by using yardsticks and estimates. A number of regional flora keys were used in the field for better species identification. Cover Classes this method uses six separate cover classes. The cover classes are shown in **Error! Reference source not found.** below:

Table 2-3: Cover Classes

Cover Class	Range of Coverage
1	0-5%
2	5- 25%
3	25 - 50%
4	50 - 75%
5	75 - 95%
6	95 - 100%

2.6.2.1.2 APPROACH AND PROCEDURES

The systematic sampling technique was operationally more convenient for this particular work, as it ensures that each unit has an equal probability of inclusion in the sample. In this method of sampling, the first unit was selected with the help of random numbers and the remaining units are selected automatically according to a predetermined pattern. Plots were laid within the limits of 30 m alternating along the proposed Transmission and Distribution routes bearing in mind the road effect but within the limits of thirty meters (30 m) from the centre of the road.

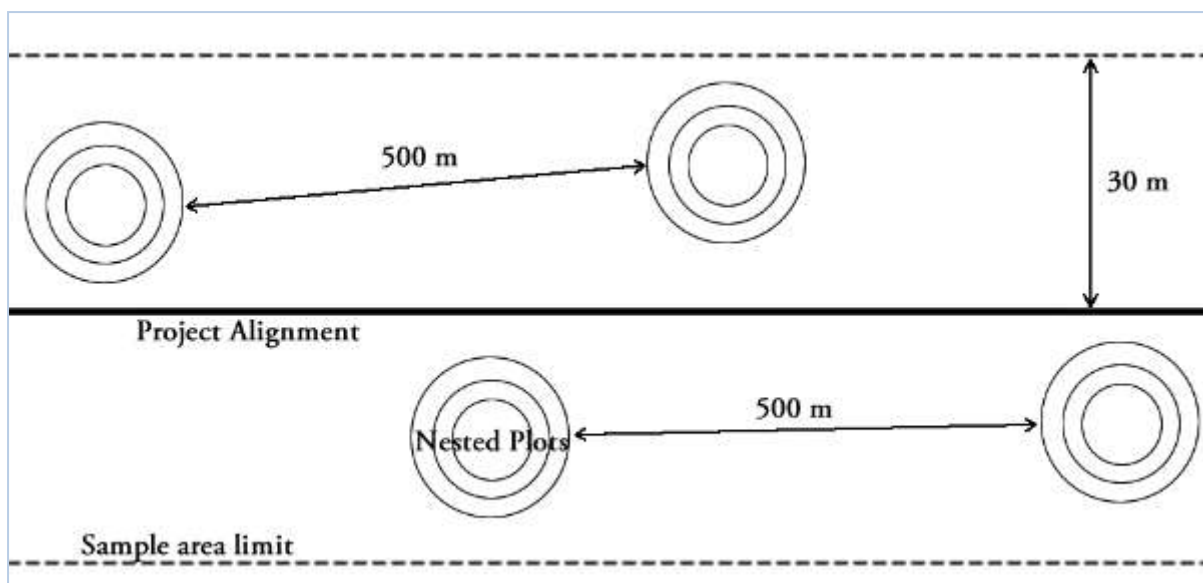


Figure 2-4: Illustration of the flora sampling technique

2.6.2.1.3 SAMPLING

Standard nested circular plots were located across the study areas, 0.5 kilometres (km) intervals were used along with Water transmission and distribution lines from the treatment to the reservoir sites and along the distribution lines .and a Random sampling technique was applied to sample vegetation at the proposed water intake, and reservoir sites. Circular plots consist of a 10m radius plot (where trees ≥ 10 cm of DBH (Diameter at breast height) are identified and counted), a 5m radius plot (where lianas, shrubs, and trees ≤ 10 cm DBH but greater than or equal 2.5 cm DBH were identified and counted) and a 2 m radius plot (where all grasses and herbs were identified).

2.6.2.1.4 OPPORTUNISTIC RECORDS

Although quadrants can register reasonable data on the distribution, diversity, and abundance of the various plant stratum according to the land use types of the area, a cumulative list was compiled from both the quadrants and opportunistic encounter that were recorded as they were encountered in the case study areas.

2.6.2.1.5 VOUCHER SPECIMENS

Plant species that could not be instantly identified were collected and photographed for further confirmation at Makerere University herbarium (MHU) where identification and archiving were done.

2.6.2.1.6 ANALYSES

A plant species list (species richness) has been compiled from the plot data and additional opportunistic observations and presented in tables and graphs.

2.6.2.2 FAUNA

Fauna assessment were undertaken within the proposed project area especially along the proposed water distribution/transmission lines as well as proposed site for establishment of different project

facilities, namely; at the boreholes, at the reservoir site, the project water offices and proposed sites for the sanitary facilities.

Three main approaches were employed in conducting the baseline survey. The approaches include: 1) Literature review, 2) Informal community consultations, and 3) Use of field scientific sampling methods

Literature Review

Literature was reviewed to establish known habitat types, fauna species diversity and ecological communities in the project area. This was done by reviewing publications and visiting different websites on the internet. Among the publications reviewed include:

- The National Red List for Uganda 2016, published by Wildlife Conservation Society
- Biodiversity Inventory Reports for Central Forest Reserves by Forest Department 1996
- The International Union for Conservation of Nature (IUCN) Red List of threatened species 2019.
- Previous fauna studies conducted in the Study Area and region by universities, research centres, Government Departments, NGOs and international organizations. Field guides for the different fauna groups were also consulted
- Search was also conducted for distribution ranges for the different fauna groups

The literature review informed all aspects of this terrestrial biodiversity and habitats baseline study.

Field Surveys and local consultations)

During the field visit (14th-18th February 2022), the fauna specialist consulted the community members. The purpose of these consultations was to document information on fauna which the fauna specialist may not be able to get during field sampling. Discussions with the community members revolved around faunal groups / species that occur in and along the project alignment. Detailed baseline information are in Section 6.4.3 below.

Use of scientifically tested and approved methods

Several methods are available for studying fauna and they vary from animal to animal as well as the type of habitat. The time available for conducting the study also dictate the type of method to use. The following methods were used to study the fauna in and around the proposed project area.

2.6.2.2.1 BUTTERFLIES

Butterflies were surveyed using Pallard's sweep net method (Gall, 1985; New, 1991; Warren, 1992; De Vries 1997) along established transects within a radius of 500m of sampling point. The method was used to document the butterfly species richness, as well as estimate their relative abundance. The method was chosen because it is time-efficient and also chosen for the reason that the negative effects associated with handling of individuals are avoided (Nowicki, P *et al.*, 2008).

At each of the sampling point, transects of 10m wide and 100m long were established. The fauna ecologists moved through the transect along a fixed line with 5m stretch on either side of the data collectors left and right hand. The observer moved at a slow and uniform / even pace of approximately 1km/h (Pellet 2007) through the transect area, recording individuals sighted within the 10m width. Sampling was conducted when weather warmed up or in sunny weather (13-17°C) and between 9am-5pm.

On spotting an individual butterfly, the fauna ecologist swept the net back and forth to capture the seen butterfly. On anticipation of a capture, the net was flipped over, with the bag hanging over the rim, trapping the individual fly. Trapped butterflies were gently removed from the net and identified. The captured individuals were released once identity was ascertained. If identity of an individual butterfly is not known, the butterfly was photographed and placed in collection envelopes, with details of GPS coordinates, Time and the photograph number written on the labels and taken to Makerere University Museum for identity determination. All trapped butterflies were identified to species level.

Collected data was analyzed by (1) Estimating species richness based on recorded species presence or absence at the different sites that were sampled. (2) Estimating species relative abundance by counting and recording the number of individuals of the different butterfly species that were encountered while sampling. (3) by ascertaining species conservation status from the 2019 published IUCN red data list and the National red list of Uganda's threatened species (Wildlife Conservation Society 2016).

Standard guide by Larsen (1991) was used to identify specimens to species level, and also by matching with Makerere University Museum collections. The species were arranged into families Hesperidae, Lycaenidae, Nymphalidae, Paeridae and Papilionidae and genera.

2.6.2.2.2 DRAGONFLIES

Pallard's sweep net method (Gall, 1985; New, 1991; Warren, 1992; De Vries 1997) was used to survey dragonflies at the different project sites. Same design and analysis as for butterflies was adopted (see above). Dragonflies need sunny warm weather to fly; the temperature below 25 °C slowed the activity whereas an optimal temperature above 30 °C increased activity. If it is too cold or wet, they usually hide in vegetation. Sampling was therefore conducted when weather warmed up. Each sampling event was conducted between 09:00h to 17:00h time and lasted about 1hour at each sampling point. All dragonflies that were flying or be perched within 5m of transect routes were recorded. All flying species were easily detected within the project area and an aerial net was swept through the vegetation to elicit a flight response from less conspicuous, resting individuals. Same amount of sampling effort (time given to searches) was applied at each site.

2.6.2.2.3 HERPETOFAUNA (AMPHIBIANS AND REPTILES)

Herpeto-fauna (reptiles and amphibians) was surveyed using a combination of scientifically tested methods as described by Heyer et al, (1994); Fellers and Freel, (1995); Halliday, (1996); and Olson, et al, (1997). The methods included the following:

- ✓ *Visual Encounter Surveys (VES)*: The method involves moving through a habitat watching out for and recording surface-active herpeto-fauna species. VES was complimented by visual searches, by examining under logs, leaf litter, in vegetation, and crevices. Species encountered were recorded and where possible photographed.
- ✓ *Audio Encounter Surveys (AES)*: This method uses the species-specific calls / vocalizations / sounds / advertising calls made by breeding males. The identity of the amphibian species heard calling and their numbers were counted and recorded.
- ✓ *Dip netting*: Using a dip net, ponds, pools, and streams and other water collection points were dip netted. Adult amphibians and tadpoles encountered were also recorded.
- ✓ *Opportunistic Encounters*: Herpeto-fauna species encountered opportunistically while moving in the project area were also recorded.

The methods were used within 500metre radius pre-geo-referenced points and were only undertaken during the day because of the curfew imposed by the government of Uganda due to COVID-19 restrictions.

Reptiles were identified using (Schiøtz, 1975, 1999; Stewart, 1967) while amphibians were identified using Channing and Howell (2006) and information was collected on relative species abundance, distribution and richness. Data analysis was done by 1) compiling Species checklist, 2) determining the species conservation status using IUCN 2019 published Red List of threatened species as well as use of the 2016 National Red List for Uganda published by Wildlife Conservation Society.

2.6.2.2.4 AVI-FAUNA (BIRDS)

A combination of Timed Species Counts (TSCs), transect walks, and opportunistic observations were used to survey bird fauna diversity within the road alignments (Bibby et al., 2000 and Voříšek et al., 2008) as well as in and around the different interchanges and U-turns. The survey targeted the different habitats (forests, woodlots, wetlands, streams, Lake Shores and peri-urban areas) identified during the scoping.

Prior to the commencement of field sampling, transects and sampling points were established in and around the different habitat types. The fauna ecologist walked along each transect searching for the presence of birds. Each TSC lasted one hour, during which time all bird species seen or heard were listed in order of detection. The bird surveys were also supplemented with opportunistic observations by recording species found present along the road alignment outside the time of the count. Species were identified through visual observations and the identification of bird vocalizations. The observer's eyes were aided by a 10 x 40 binocular. Efforts were made to sample the different habitats represented along the road alignment. Sampling was conducted in the early morning and towards the evening. All identifications were made to species level. Birds that were recorded during the survey were categorized according to the following criteria:

Table 2-4: Birds Identified During the Survey

Main Category	Sub-Category with Codes		Descriptions
Forest Birds	FF	Forest specialists	Forest interior birds
	F	Forest generalists	Normally breed in the forest or fragments but may occur outside the forest
	f	Forest visitors	Non-forest birds
Aerial	AA	Aerial feeders	Species feeding on the wing
Water Birds	W	Water specialist	Restricted to wetlands or open water
	w	Water generalist	Often found near water
Grassland	G	Grassland specialist	Characteristic of open grasslands
	g	Grassland generalist	May be found in grassland habitats but also able to utilize woodland and forested habitats.
Migrants	A	Afrotropical	Species migrating within Africa

Main Category	Sub-Category with Codes		Descriptions
	P	Palearctic	Species breeding in Europe or Asia
	Ap	Afro-Palearctic	Species with both Palearctic and Afrotropical populations

Data analysis was done by 1) compiling Species checklist, 2) determining the species conservation status using IUCN 2019 published Red List of threatened species as well as use of the 2016 National Red List for Uganda published by Wildlife Conservation Society.

2.6.2.2.5 MAMMALS

The mammals were surveyed using three main methods:

- ✓ *Direct observation/opportunistic encounters:* This entailed the collection of direct evidence of fauna activity (e.g., sightings, vocalizations). All mammals seen or opportunistically sighted or heard vocalizing while moving in and around the project area were identified, counted and recorded;
- ✓ *Use of Signs e.g., footprints and/or dung or calls:* This entailed the collection of indirect evidence (e.g., faeces or dung, footprints). Mammal species whose signs / indirect evidence were recognized were recorded for their presence;
- ✓ *Local consultations:* The fauna specialists held discussions with local residents in and around sampling points about the availability of mammal species in the area.

The surveys were mainly limited to the identification of medium and large sized mammals. Small mammals were included if sighted. Nocturnal mammals were excluded since the survey was conducted during day light hours.

mammal identifications were based on Kingdon (1974), Delany (1975) and Kingdon *et al.* (2013). The conservation status of the encountered mammal species was ascertained using the 2019 version of the IUCN Red List of Threatened Species.

2.6.3 OCCUPATIONAL HEALTH AND SAFETY ASSESSMENT

To prevent the negative effect of the project on the health and safety of the workers and community members, the identification and assessment of hazards inherent in the project during construction and operation phases was conducted. This was conducted through;

- Assessing the capability of the district to handle fire outbreaks;
- Assessing whether there are enough health facilities to handle emergencies that may arise during construction and operation of the project;
- Assessing the common mode of traffic within the project area;
- Assessing if the police have enough resource to provide security to the project's facilities
- Identifying health and safety hazards construction and maintenance workers will be directly exposed to;
- Assessing how the project will influence adherence to COVID-19 SOPs; and
- Assessing how the project will impact on the health, safety and security of the communities where it is being implemented.

The above assessments were conducted through;

- Field visits
- Observation
- Interviewing the respective stakeholders
- Reviewing primary and secondary literature
- Direct measurement of noise, air quality and vibrations

To ensure that the negative health and safety impacts of the proposed project, reference was made to the Environmental, Occupational Health and Safety (OHS), Community Health and Safety (CHS), in line with WBG EHS Guidelines, Occupational Health and Safety Act of 2006, MGLSD Social, Safety and Health Safeguards Implementation Guidelines, etc.

2.6.4 SOCIO-ECONOMIC ASSESSMENT

Mixed Methods approach in collecting and analyzing data and information were used. Survey questionnaire as a quantitative method was applied. In terms of qualitative methods, the ESIA applied focus group discussions (FGDs), key informant interviews (KIIs), in addition to integration of Participatory Learning and Action (PLA) methods.

2.6.4.1 SAMPLING PROCEDURES

Study Area: The study covered Igwaya RGC in Kagulu Sub County, in Buyende district. The study area included 23 beneficiary villages within the core project area (distribution and source / water catchment).

Study Population: The total study population was 4,159 households.

Sample Size: The sample size was 151 households determined using Morgan and Krejcie (1970) Sample Size Determination Table as shown in Annex C.

Sampling Methods: The ESIA applied 1) Probability (random) sampling methods that included a) Simple random; b) Stratified random (divided households into strata based on location, beneficiary and non-beneficiary area; and 2) Non-probability (non-random) sampling methods - a) Purposive sampling using pre-determined characteristics such as proximity to proposed water facility (production well, reservoir, pipes), water source, trading centre, etc; b) Cluster sampling by identifying a manageable number of respondent households within a zone or micro catchment; d) Convenience sampling by picking respondents that are easily accessible.

Sampling Plan: A representative study sample using a two (2) stage stratified sampling method was used. In the 1st stage, it involved identifying and sub dividing beneficiary villages and non-beneficiary areas, and the 2nd stage it involved identifying respondent household members, Key Informants and groups.

2.6.4.2 DATA COLLECTION METHODS & INSTRUMENTS

- Survey Questionnaire (KoboCollect Forms): The consultant will apply Survey Questionnaire to collect baseline data on socio-economic characteristics that include water, sanitation & hygiene, among others. Analysed data will have corresponding GPS Coordinates which will be stored in GIS Database for detailed GIS mapping and analysis.
- Using Digital Tools (KOBO COLLECT): The structured questionnaire will be converted, validated, loaded and aggregated the into a digital form called KOBO COLLECT FORM. The form will be loaded and aggregated on mobile devices (smart phones or tablets), used to

collect the data. It should be noted that the using of digital tools to collect data increases efficiency, minimize errors and ensures timely analysis of data.

- Qualitative tools - Consultative meetings discussion guides; Focus Group Discussion (FGD) guide; Key Informant Interview (KII) guide; Direct Observation checklist; Photography guide; Document Review Checklist.
- Participatory Learning & Action (PLA) tools - Transect walks / drives; Timeline & Trend Analysis; Seasonal calendar; Pairwise Ranking.

2.6.4.3 DATA ANALYSIS METHODS

Data was analysed using a) Thematic Analysis for qualitative findings obtained from FGDs, KIIs, etc; b) Statistical Analysis using Ms Excel for quantitative findings obtained using Kobo Collect.

2.6.4.4 DATA QUALITY MANAGEMENT

The consultant ensured proper quality management of all data processes, protocols and methods i.e., team training (Fig. 1), design and Pre-test of tools, collection, handling, processing, analysis, interpretation and reporting consistently followed appropriate data life-cycle requirements. The consultant ensured that all data collected is sufficient, accurate, reliable, valid and acceptable to serve the purposes for which it is gathered. All the 6 stages of data management cycle were properly managed and controlled namely data sources, data collection, data collation, data analysis, data reporting and data usage.

2.6.4.5 QUALITY CONTROL & ASSURANCE

Quality Control (QC) and Quality Assurance (QA) was done to ensure defect detection and prevention respectively. This was through pre-testing survey tools; training research team; debriefing of research assistants; applying mixed methods in same study areas; timely deployment of research assistants. Research ethics and principles were adhered to such as creating rapport and obtaining informed consent from respondents through use of introductory letters; ensuring cultural sensitivities such as language, dress code and conduct. At the same time, the CSA team adhered to the JBN Code of Professional Conduct.



Figure 2-5: Team Training before data collection



Figure 2-6: Team briefing during field work



Figure 2-7: Fieldworker interviewing local

2.6.4.6 STAKEHOLDER AND PUBLIC CONSULTATIONS

The consultant conducted stakeholder consultative meetings with both state and non-state actors. The dates of consultations and the cadre met have been highlighted in table 3.5. Effective and meaningful stakeholder engagement can improve the environmental and social sustainability of projects, enhance project acceptance, and make a significant contribution to successful project design and implementation. 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 consultations organised at target sites, villages, parish, sub county, and district levels. The key aspects consulted on are stated in consultative meeting guide attached. The meetings engaged farmers, fishermen, women, men, youth, local leaders and administration, lake/wetland user groups, transporters etc. In this ESIA studies, the process of stakeholder engagement involved:

- Stakeholder identification and analysis;
- Planning the stakeholder engagement method and process;
- Disclosure of information;
- Consultation with stakeholders;
- Addressing and responding to concerns and issues; and
- Reporting to stakeholders (second round of disclosure).

2.6.4.6.1 STAKEHOLDER IDENTIFICATION

In this context, stakeholders are individuals and organizations potentially affected by the project (directly or indirectly), or who have an interest in or influence on the project and its impacts, either

positive or negative. Therefore, to ensure a successful project, the project team identified and engage all stakeholders, determine their requirements and expectation, and manage their influence in relation to their requirements. Several stakeholders, important to this project were identified and analysed in respect to location, interest, mandate, influence, and vulnerability; and including level of literacy and potential mode of engagement. This criterion is explained below.

- a. The location criterion was used in respect to proximity to the proposed project sites. Village/ community members close to the project sites will be considered as primary stakeholders using this criterion;
- b. Interest criteria was used in the study to refer to the level of concern and significance to the project site and the proposed project;
- c. Mandate refers to consideration for the level of directive reasonability the stakeholder has in respect to the project or the affected project sites. This is usually considered together with influence which implies the ability or powers to influence encourage or discourage project activities; and
- d. Vulnerability refers to levels of susceptibility that compromise or makes a stakeholder unable to meaningfully participate in planned stakeholder engagements or equitably benefit from other project activities or outcomes such as inability to attend meetings, interpret messages, among others. This can be a function of literacy, age, gender, physical barriers, relation to land tenure, income, and livelihood activities.

2.6.4.6.2 STAKEHOLDERS ENGAGEMENT

- 1) **Focus Group Discussions (FGDs):** Focus Group Discussions (FDG) are useful for revealing through interaction the beliefs, attitudes, experiences, and feelings of participants, in ways that would not be feasible using other methods, such as individual interviews, observation or questionnaires (Gibbs 1997). Focus group discussions were chosen in order to; provide detailed information; on the many qualitative, non-measurable issues (for example, gender roles in the community, youth and women access to social services, nature of economic activities, cultural perceptions about water supply and sanitation, social issues such as child abuse, violence against children, gender based violence, sexual harassment, access to natural resources or the structure of social institutions); and to ensure a more inclusive, participatory approach. Having carried a reconnaissance to the field and established the location and the concentration of different groups such as neighbouring communities and businesses, schools among others, the ESIA study selected members of these groups (women, vulnerable, elders, Youth), as they are likely to be affected by the project especially during its implementation.
- 2) **Key Informant Interviews (KIIS):** The KII were used to collect information from relevant respondents closely related to the proposed project. Several KIIs were done with different key personnel at different levels to understand perceptions, concerns, fears, and expectations regarding the proposed water and sanitation project and related issues like environment conservation, gender-based violence, sexual exploitation and abuse/ sexual harassment. The key informants included the District Water Officer, District Natural Resources Officer, District Environment Officer, Parish Chiefs, District Health Inspector, District Community Development Officer, and Town Clerk. The details of the stakeholders consulted are listed in Table 5.5, and photographically catalogued below:



Meeting with Buyende District Officials on 4th February 2022



Meeting in CAO's office – Buyende District



Meeting with Kagulu Sub county officials on 14th February 2022 in relation to Igwaya RGC



Community engagement at Igwaya Trading Centre on 6th May 2022



Community engagement at Igwaya Trading Centre on 6th May 2022



Community engagement at Buyumba Trading Centre on 6th May 2022



Enumerator engaging with a household at Bumogoli village on 6th May 2022



Meeting at Kagulu Health Centre III on 6th May 2022



Community engagement at Kagulu Health Centre III on 16th February 2022



Meeting UNRA HOD at UNRA on 25th March 2022



Meeting MGLSD on 17th May 2022



Meeting with DWRM and DWM at MWE Head Offices on 8th June 2022

Table 2-5: Stakeholders engaged

Date/Venue	Stakeholder	Designations	Gender		Total
			M	F	
3rd February 2022, Buyende District Board room	Buyende District Technical and Political Teams	Chief Administrative Officer, Deputy Chief Administrative Officer, District Water Officer, Asst. District Health Officer, District Health Inspector, District Natural Resources Officer, District Community Development Officer, PAS, Resident District Commissioner,	6	5	11
14th February 2022, Kagulu Sub County Headquarters	Kagulu Sub County Technical and Political Teams	Local Council III Chairperson, In-charge Kagulu HCIII, Chair persons LCI Butemera, C/P – Kamugoya,, C/P – Usuba, OC kagulu, Senior Assistant Secretary, Secretary Finance, Secretary for Production, Secretary for Health, Parish Chief Kagulu, Parish chief (02), DHO, ADHO-EH, SDWO	15	2	17

Date/Venue	Stakeholder	Designations	Gender		Total
			M	F	
6 th May 2022, Igwaya Trading Centre	Igwaya, Butemera, Kamugoya villages	Community members	77	20	97
6 th May 2022, Buyumba Trading Centre	Buyumba, Namwizukya villages	Community members	22	10	32
6 th May 2022, Bumogoli Village	Mailo Bumogoli village	Community members	7	3	10
6 th May 2022, Kagulu Health Centre III		In-charge Enrolled nurse	0	2	2
25 th March 2022, UNRA Head Quarters	Uganda National Roads Authority -	Head of Design – Roads and Bridges	2	0	2
17 th May 2022, MGLSD Head quarters	Ministry of Gender Labour and Social Development	Directors: Occupational Safety and Health	2	0	2
8 th June 2022, MWE headquarters	DWRM and DWM	Water officers, Water quality Wetlands Department	8	5	23
Total			137	47	194

2.7 IMPACT IDENTIFICATION AND ANALYSIS

RECEPTOR SENSITIVITY

Sensitivity is generally site specific and criteria the was developed from baseline information gathered. The sensitivity of a receptor was determined based on review of the population (including proximity, numbers, vulnerability, among others) and presence of features (sensitive ecosystems), such as rare and endangered species, unusual and vulnerable environments, architecture, social or cultural setting, major potential for stakeholder conflicts on the site or the surrounding area. Generic criteria for determining sensitivity of receptors are outlined in **Error! Reference source not found.** below.

Table 2-6 Criteria for rating receptor sensitivity

Criteria	Sensitivity Description	Rating scales
Very Low	Vulnerable receptor (human or ecological) with good capacity to absorb proposed changes or and good opportunities for mitigation	1
Low	Vulnerable receptor (human or ecological) with some capacity to absorb proposed changes or moderate opportunities for mitigation	2
Medium	Vulnerable receptor (human or ecological) with limited capacity to absorb proposed changes or limited opportunities for mitigation.	3
High	Vulnerable receptor (human or ecological) with little or no capacity to absorb proposed changes or minimal opportunities for mitigation.	4

2.8 INTENSITY OF IMPACT

Impact severity describes the actual change that is predicted to occur to the receptor. The magnitude of an impact considers all the various impact characteristics in order to determine whether an impact is negligible or significant. The assessment of magnitude was undertaken through: firstly, the key issues associated with the project i.e., categorized as beneficial or adverse and secondly, the intensity of potential impacts, categorized as major, moderate, minor, or negligible based on consideration of the parameters such as:

- Type of impact (i.e., direct, indirect, induced);
- Size, scale, or intensity of impact;
- Nature of the change compared to baseline conditions (i.e., what is affected and how);
- Reversibility (ranging from no change to permanent requiring significant intervention to return to baseline);
- Likelihood (ranging from unlikely to occur to occurring regularly under typical conditions);
- Geographical/Spatial extent and distribution (e.g., local/within the site, regional, national and international); and
- Persistence/Duration and/or frequency (e.g., temporary, short-term, long-term, permanent).
- Compliance with legal standards and established professional criteria - ranging from meets or exceeds minimum standards or international guidance to substantially exceed national standards and limits / international guidance.
- Cumulative (such an impact results from the aggregated effect of more than one project occurring at the same time, or the aggregated effect of sequential projects. A cumulative impact is *“the impact on the environment which results from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions”*).

Each of these characteristics is addressed for each impact. Consideration of the above gives a sense of the relative intensity of the impact. The sensitivity of the receiving environment was determined by specialists based on the baseline data collected during the study.

Table 2-7: Criteria for rating impact intensity

Criteria	Intensity Description (considering duration of the impact, spatial extent, reversibility, ability of comply with legislation, etc)	Rating scales
Intensity (the expected magnitude or size of the impact)	Very Low - where the impact affects the environment in such a way that natural, and /or cultural and social functions and processes are negligibly affected and valued, important, sensitive or vulnerable systems or communities are negligibly affected.	1
	Low - where the impact affects the environment in such a way that natural, and/or cultural and social functions and processes are minimally affected and valued, important, sensitive or vulnerable systems or communities are minimally affected. No obvious changes prevail on the natural, and / or cultural/ social functions/ process as a result of project implementation.	2
	Medium - where the affected environment is altered but natural, and/or cultural and social functions and processes continue albeit in a modified way, and valued, important, sensitive or vulnerable systems or communities are moderately affected.	3
	High - where natural and/or cultural or social functions and processes are altered to the extent that they will temporarily or permanently cease, and valued, important, sensitive or vulnerable systems or communities are substantially affected. The changes to the natural and/or cultural / social-economic processes and functions are drastic and commonly irreversible.	4

2.9 IMPACT EVALUATION AND DETERMINATION OF SIGNIFICANCE

The impact severity was determined by evaluating the intensity of the impact and the sensitivity of the environmental and social receptors, which is largely subjective, but based on the professional judgement of the specialist team considering several impact characteristics

Impacts will be identified and significance will be attributed considering the interaction between intensity criteria and sensitivity criteria as in the significance matrix (Error! Reference source not found.). The impact severity is then calculated as the product of the two numerical descriptors;

$$\text{Impact Significance} = \text{Impact Intensity (I)} \times \text{Impact Sensitivity (S)}$$

The results are equivalent to **negligible, minor, moderate or major**. This is a semi-qualitative method designed to provide a broad ranking of the different potential impacts of a project.

Table 2-8: Determination of impact severity

		Sensitivity			
		1 Very low	2 Low	3 Medium	4 High
Intensity	1 Very low	1 Negligible	2 Minor	3 Minor	4 Minor

		Sensitivity			
		1 Very low	2 Low	3 Medium	4 High
	2 Low	2 Minor	4 Minor	6 Moderate	8 Moderate
	3 Medium	3 Minor	6 Moderate	9 Moderate	12 Major
	4 High	4 Minor	8 Moderate	12 Major	16 Major

- **Major:** These denote that the impact is unacceptable and further mitigation measures must be implemented to reduce the significance. More details are provided in Error! Reference source not found..
- **Moderate:** Impacts in this region are considered tolerable but efforts must be made to reduce the impact to levels that are as low as reasonably practical. Shaded orange in the impact significance matrix.
- **Minor:** Impacts in this region are considered acceptable. Shaded blue.
- **Negligible:** Impacts in this region are almost not felt. Shaded green.

Table 2-9: Impact Severity

Impact Rating	Impact Description	Rating scales
Major	<ul style="list-style-type: none"> • Highly noticeable, irreparable effect upon the environment • Significant, widespread and permanent loss of resource • Major contribution to a known global environmental problem with demonstrable effects • Causing mortality to individuals of a species classified as globally or regionally endangered • Major expedience of water/air quality and noise guidelines representing threat to human health in long and short term • Causing widespread nuisance both on and off site 	> or = 12

Moderate	<ul style="list-style-type: none"> • Noticeable effects on the environment, reversible over the long-term Localised degradation of resources restricting potential for further usage • Sub-lethal effects upon a globally or regionally endangered species with no effect on reproductive fitness and/or resulting in disruption/disturbance to normal behaviour returning to normal in the medium term • Elevated contribution to global air pollution problem partly due to preventable releases • Frequent breaches of water/air quality and noise guidelines • Causing localised nuisance both on and off site 	> or = 6 but < or = 9
Minor	<ul style="list-style-type: none"> • Noticeable effects on the environment, but returning naturally to original state in the medium term • Slight local degradation of resources but not jeopardising further usage • Disruption/disturbance to normal behaviour of a globally or regionally endangered species returning to normal in the short term • Small contribution to global air problem through unavoidable releases • Elevation in ambient water/air pollutant levels greater than 50% of guidelines • Infrequent localised nuisance 	> or = 2 but < or = 4
Negligible	<ul style="list-style-type: none"> • No noticeable or limited local effect upon the environment, rapidly returning to original state by natural action • Unlikely to affect resources to noticeable degree • No noticeable effects on globally or regionally endangered species • No significant contribution to global air pollution problem • Minor elevation in ambient water/air pollutant levels well below guidelines • No reported nuisance effects 	= 1

2.10 CUMULATIVE IMPACT ASSESSMENT

The combined, incremental effects of human activity, referred to as cumulative impacts, pose a serious threat to the environment. While they may be insignificant by themselves, cumulative impacts accumulate over time, from one or more sources, and can result in the degradation of important resources.

Step 1: Scoping Phase I – VECs, Spatial and Temporal Boundaries

This involved identification and establishment VECs, spatial and temporal boundaries of assessment. It further involved identification and agreement on VECs in consultation with stakeholders, determining the time frame and establishing the geographic scope. This guided on knowing whose involvement is key; which VEC resources, ecosystems, or human values are to be affected by the development (based on prior sectoral assessments or the project's ESIA); known or anticipated cumulative impact issues within the region; concerns for cumulative impacts identified in consultation with stakeholders, including potentially affected communities (these may exist at distance from the planned development); regional assessments prepared by governments, multilateral development banks (MDBs), and other stakeholders (if any); CIAs prepared by sponsors of other developments in the region and any other Information from NGOs.

Step 2: Scoping Phase I - Other Activities and Environmental Drivers

This involved identification of other past, existing, or planned activities within the analytical boundaries. Assessment of their potential presence of natural and social external influences and stressors (e.g., wildfires, droughts, floods, predator interactions, human migration, and new settlements). This guided on knowing if there are any other existing or planned activities affecting the same VEC and if there are any natural forces and/or phenomena affecting the same VEC

Step 3: Establish Information on Baseline Status of VECs

This involved definition of the existing condition of VEC; understanding VEC's potential reaction to stress, its resilience, and its recovery time through assessment of trends. This is because determination of the trend of change in the baseline condition of a given VEC over time may indicate the level of concern for cumulative impacts. Therefore, it was helpful; to know what is the existing condition of the VEC; establish the indicators to be used to assess such conditions; identify any other additional data are needed and know those who may already have this information required. Data that are needed focus on the most important VECs though the collection of baseline data tends on these VECs was limited and targeted to indicators that would allow determination of any changes in VEC conditions as it provides a baseline condition that integrates the collective effects of all existing developments and exogenous pressures.

Step 4: Assess Cumulative Impacts on VECs

This involved estimating the future state of the VECs that may result from the impacts they experience from various past, present, and predictable future developments through identification of potential environmental and social impacts and risks; assessment expected impacts as the potential change in condition of the VEC (i.e., viability, sustainability) and identification of any potential additive, countervailing, masking, and/or synergistic effects. This guided on answering the questions on key potential impacts and risks that could affect the long-term sustainability and/or viability of the VEC; the known or predictable cause-effect relationships and interaction of these impacts and risks to each other.

Step 5: Assess Significance of Predicted Cumulative Impacts

Determination of impact significance and overall agreement among affected communities and other relevant stakeholders strengthens mitigation measures and monitoring programs, focusing on expected probable cumulative impacts. The significance of all CIs was evaluated not in terms of the amount of change, but in terms of the potential resulting impact to the vulnerability and/or risk to the sustainability of the VECs assessed implying evaluation of CIs in the context of ecological thresholds.

Therefore, appropriate thresholds and indicators were defined to determine impact and risk magnitude and significance in the context of past, present, and future actions including identification of identify trade-offs hence establishment of how these impacts will affect the sustainability and/or viability of the resource and/or VEC and the consequences and/or trade-offs of taking the action versus no action.

Step 6: Management of Cumulative Impacts – Design and Implementation

Depending on the context in which the development impacts occur (i.e., the impacts from other projects and natural drivers that affect the VECs) and the characteristics of the development's impacts, mitigation measures were proposed as a result of views and actions of multiple stakeholders. This involved utilisation of the mitigation hierarchy to design management strategies to address significant cumulative impacts on selected VECs; engage other parties needed for effective collaboration or coordination; propose mitigation and monitoring programs on how to manage uncertainties with informed adaptive management. This included aspect of how cumulative impacts can be avoided, minimized, and/or mitigated; how can the effectiveness of proposed management measures be assessed and what are the triggers for specific adaptive management decisions, among others.

2.11 FORMULATION OF THE ENVIRONMENTAL AND SOCIAL MANAGEMENT AND MONITORING PLAN

The Environmental and Social Management Plan (ESMP) specified mitigation measures and monitoring actions with time frames, specific responsibilities assigned, and follow-up actions defined in order to check progress and the resulting effects on the environment by the project's implementation activities. The objectives of the ESMP included:

- a. To ensure that all the recommendations in the approved ESIA report are adhered to by the relevant lead agencies/institutions;
- b. To ensure that the prescribed environmental and social mitigation measures as well as the enhancement actions are well understood and communicated to all project stakeholders;
- c. To ensure that the proposed environmental and social corrective/offset measures are implemented throughout the project implementation phases;
- d. To evaluate the effectiveness of environmental and social mitigation/offset measures; and
- e. To evaluate the effectiveness of various evaluation techniques and procedures.

The ESMP is included in **Chapter 10** Error! Reference source not found. of this report.

2.12 INSTITUTIONAL CAPACITIES AND STRENGTHENING PLAN

The ESIA outlines the adequacy of the institutional capacity within the project implementing agency to oversee the implementation of the ESMP. This process involved assessing institutional capacity in terms of its role in the ESMP implementation, its capacity to effectively undertake that role and wider management of cross-cutting entities and gaps. The institutional strengthening plan addresses weaknesses identified at the environmental and social management level. Initiatives that could be considered, among others include:

- (i) Training for existing staff;
- (ii) Hiring short-term consultants during the period of the project; and

(iii) Equipping in terms of computers and transport to facilitate field monitoring amongst others.

2.13 MONITORING PROGRAM AND OTHER PLANS

This section summarizes the surveillance and monitoring activities proposed in the Environmental and Social Management Plan prepared for the project. It identifies the roles and responsibilities of stakeholders in the implementation as well as the estimated cost of the activities. To provide the Proponent and the relevant Lead Agencies with a framework to confirm compliance with relevant laws and regulations. The Consultant specifies the types of monitoring needed for measuring potential environmental and social impacts during construction and operation phases of the facilities. As in the case of the mitigation plan, requirements have been specific as to what is to be monitored, how and by whom (with clear delineation of responsibilities between the different groups or agencies will be outlined. A monitoring programme includes a follow-up on the management measures and providing a feedback mechanism to determine the effectiveness of the ESIA process, as well as identifying further changes that may be needed to improve the selected alternative. Other plans include:

- Disaster Management Plan
- Chance Finds Procedure

Grievance redress mechanism

2.14 IMPACT IDENTIFICATION AND ANALYSIS

2.14.1 IMPACT DESCRIPTION

Describing a potential impact involved an appraisal of its characteristics, together with the attributes of the receiving environment. Relevant impact characteristics included whether the impact is:

- Adverse or beneficial;
- Direct or indirect;
- Short, medium, or long-term in duration; and permanent or temporary;
- Affecting a local, regional, or global scale; including trans-boundary; and
- Cumulative (such an impact results from the aggregated effect of more than one project occurring at the same time, or the aggregated effect of sequential projects. A cumulative impact is “the impact on the environment which results from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions”).

Each of these characteristics is addressed for each impact. Consideration of the above gives a sense of the relative intensity of the impact. The sensitivity of the receiving environment was determined by specialists based on the baseline data collected during the study.

2.15 PROJECT POSITIVE IMPACTS

2.15.1 IMPROVED / INCREASED ACCESS TO SAFE AND CLEAN WATER AT COMMUNITY AND INSTITUTIONAL LEVELS

The proposed piped water supply system will supply **239.53** m³ of safe affordable (Ugx 83 per 20 litres) water to 5 villages with a population of 8,031 people in Kagulu Sub County – Buyende District. The water supply will cover a 5.848 Km distribution network. By design, the first phase of the project proposes 55 N^o. service connections and 7 Public Stand Posts by the intermediate year 2031.

The proposed project will partially contribute to achieving the global SDG - Target 6.1 of universal and equitable access to safe and affordable drinking water for all by 2030. Additionally, the project will contribute to achieving the national targets of increased access to safe water in rural and semi-urban

areas to 85 percent by 2025 and 100 percent by 2040 according to the third Uganda NDP and the Uganda Vision 2040, respectively (UNPA, 2020).

According to baseline information, the current safe water coverage in Kagulu Sub County is 37%. The project anticipates to cover 5 core beneficiary villages that make up Igwaya RGC. The project will therefore increase safe water coverage from 37% in Kagulu Sub County to 50%, close to the national average of 66 percent in 2022. Improved safe water coverage will eliminate disparities related to access, namely;

- a. Reduce average distance to a water source for the 13.9% of the people in Kagulu that travels more 1km to a water source to the recommended 100 meters to a water source by WHO standard. The project shall reduce critical walking distance for a hamlet to reach a PSP to less than 500m between each PSP/Yard Tap. Presently, 13.9% of household access water in distance of more than 1km. This will be reduced because the recommended users per yard tap (YT 1 & 2) is 2- 5 households, as per SGI / MoWE Design Report 2021.
- b. Reduce the time spent collecting water to less than one hour (all respondents indicating more than an hour fetching water per day), and
- c. Improve the gender inequalities related to collection of water, where boys more than girls and women more than men collect water in households; and
- d. Furthermore, to some extent, farmer households may increase usage of piped water for production from the current 5.7% used in animal husbandry and 1.0% for crop irrigation.



Figure 2-8: Children carrying water on bicycles from a water source in Igwaya RGC

Furthermore, improved access to safe water will directly influence better public health conditions and health security. In this regard, the project will specifically impact on health facilities, schools, landing sites and markets in Igwaya RGC. According to baseline information there are 8 health centre, over 30 primary schools, several mushrooming landing sites and one weekly market in Igwaya RGC. Baseline information further indicates that there are mainly boreholes and rainwater harvesting tanks at some public institutions used by both institutions and the neighbouring communities. The boreholes and rain water harvesting tanks tend to dry up during the dry seasons as such, this intervention will be an added source to address the water shortage issue.

2.15.2 IMPROVED COMMUNITY SANITATION AND HYGIENE

The project proposes to construct 1N°. 6 stance water borne public toilets complete with 4N°. Single Stances, 1N°. urinal, 2N°. disabled people equipped stances, shower facility; complete with hand washing facilities. There were several suggestions by community members to locate the sanitation facility at priority locations for the proposed public sanitation facilities due to high semi-urban populations. These locations are: Kagulu HC II connected to Kagulu Weekly market.

According to baseline information, although access to sanitation facilities stands at 72% in Kagulu Sub County, 26.2% of the population noted sharing of latrines, 68.3% noted evidence of open defecation near water sources, 39.4% on open ground and 27.7% near market places. Furthermore, there are no functional public sanitation facility in all the 4 satellite trading centres of Igwaya RGC. 43% of the respondents noted the need for public sanitation facilities in Igwaya RGC. This indicates challenges of access to sanitation facilities and behavioural characteristics in the RGC that require transformation.

Therefore, the proposed facilities will contribute to increased access to improved sanitation and reduce the rate of open defecation in the RGC if coupled with behavioural change campaigns. Additionally, the proposed sanitation technologies namely; water borne toilets with shower and hand washing facilities, are currently not existing in Igwaya RGC. It is anticipated that the planned new water distribution system at household level will influence the adoption and use of water flush toilets with septic tanks, showers, and handling facilities as new and improved sanitation facilities in the RGC. The impact is Certain with a high magnitude resulting in Major impact significance.

2.15.3 SHORT TERM EMPLOYMENT OPPORTUNITIES FOR LOCAL COMMUNITIES

The project will create direct and indirect employment to local people. The possible direct jobs for community workers include unskilled (casual labour) and semi-skilled works for trenchers, plumbers, masons, painters, carpenters, mechanics, electricians, mixer operators, steel benders, drivers, community educators, porters, cooks, and security guards. These will be involved in construction works for laying pipes, water towers, sumps, pump stations, among others. Indirect employment opportunities will involve supply of materials such as sand, stones and food stuffs, and petty business such as food kiosks. The income earned will enhance access to basic needs among the local communities. The likelihood of occurrence of the above positive impacts is Certain. The impact magnitude has been assessed as Low due to availability and willingness of community members to work on the project. Furthermore, these jobs will be short term, temporary in nature and may not pay a significant sum to change the incomes levels of those involved. Enhancement measures:

- a. Involve LC 1 village leaders in identifying casual and semi-skilled workers (offer identification/registration forms). However, the contractor should have jurisdictions over recruitment process and eligibility requirements.
- b. Conduct Labour Inspections on contractor's workplaces by District Labour Officer (DLO).
- c. Contractor should adhere to national labour laws, policies and regulations more so on remuneration and worker grievance management.

2.15.4 CONTRIBUTE TO LOCAL ECONOMY GROWTH IN THE AREA

The GoU would invest heavily in the construction phase of the proposed project which would involve use of locally available materials. The business community could take advantage of the proposed development to establish businesses that would otherwise be impossible without piped water. This impact will be enhanced through:

- a. Ensuring that the project uses locally produced materials where possible.
- b. The water distribution network connections should target SMEs.
- c. The project should have an initiative of promoting productive use of water.

2.15.5 HUMAN CAPACITY BUILDING AND CREATION OF JOBS

Human capacity building and the creation of jobs in water management through the involvement of private operators in the construction, management, repair and maintenance of water supply facilities will come along with this project. These will constitute skilled, semi-skilled and unskilled labourers. Skilled personnel will be employed as managers, supervisors, and in other technical positions whereas unskilled laborers will be support staff and perform non-technical work. The income accruing from such activities will obviously change their standards of living. During construction, about 10-30 people will be employed and about 10 people will get jobs during operation phase (*Error! Reference source not found.*). More employment will be created to the local proprietors who will be providing services like food, accommodation, medical care, among other services.

Table 2-10: Proposed job opportunities and remuneration in the operation phase

POSITION	TOTAL SALARY	STAFF REQUIRED	TOTAL STAFF COSTS
	('000 USH/MONTH)	(NO.)	(MIO. USH /YEAR)
Branch Manager	1,500	1	18.0
Commercial Officer	800	1	9.6
Technician	400	2	9.6
Plumber	600	2	14.4
Security Guards	400	3	14.4
Total		9	66

Source: Project Estimates

2.16 NEGATIVE IMPACTS

2.16.1 CONSTRUCTION PHASE

2.16.1.1 LOSS OF LAND AND DISPLACEMENT OF ECONOMIC ACTIVITIES

The project components, namely; borehole, transmission, water reservoir and distribution, mostly traverses farmland under cultivation along settled and built-up areas. According to the RAP (2022), the project will require a permanent land take and an easement corridor (*Error! Reference source not found.*):

Table 2-11: Project Land Takes

Impact	Land Affected in Acres
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Permanent Land Affected (Water Source Sites, Reservoir Sites, Access Roads, and Sanitation Facility Sites)	7
Permanent Land Restriction (Easement for Transmission and Distribution Pipes)	663
Total Land Affected	670

The project infrastructure is planned to a large extent, to mostly use road reserves of the existing public roads for its water transmission and distribution lines. However, the water source and as well as the reservoir sites shall be located on private land, whose owners will be engaged by MoWE in the process of land acquisition as per the laws governing land acquisition.

The clearing of corridor, movement of equipment and contractor staff and laying of pipes may lead to spot destruction of crops. Construction of the borehole, reservoir, water transmission and distribution system, water office and sanitation facility will to certain extents involve taking of land permanently from the original owners. In general, the loss of land will be direct, permanent, and irreversible thus resulting to a high impact sensitivity. The extent of land take/ project footprint is however is low (**Error! Reference source not found.**), thus a low impact Intensity. Overall impact significance is rated as Moderate.

		Sensitivity			
		1 Very low	2 Low	3 Medium	4 High
Intensity of Impact	1 Very low	1 Negligible	2 Minor	3 Minor	4 Minor
	2 Low	2 Minor	4 Minor	6 Moderate	8 Moderate
	3 Medium	3 Minor	6 Moderate	9 Moderate	12 Major
	4 High	4 Minor	8 Moderate	12 Major	16 Major

Mitigation measures

- LGs in the respective areas should be involved in mobilisation and sensitizing PAPs on the project land requirements;
- Where land take is envisaged, compensation should be adequate and timely done. All land acquired for establishment of the water sources, water treatment plant, reservoir tanks and any other activity either by the developer shall be compensated for in accordance with applicable land acquisition legal instruments and GIIP relating to land acquisition;
- PAPs should be given financial literacy on how to use their compensation packages to avoid squandering and remaining in worse off conditions;
- In-kind compensation can be considered especially where the PAPs prefer so;
- Sensitize the community early enough about the project so that, those affected by the project will have time to relocate their businesses and manage their cropping calendars to avoid loss of crops.

2.16.1.2 DEGRADATION OF THE LAND

Sourcing earth construction works materials such as murrum and gravel will impact on the landscape through borrow pits and stock-piles of such excavations if not satisfactorily managed and restored can pose considerable visual intrusion and degrade the landscape. Furthermore, water impounded in the borrow pits can be breeding grounds for mosquitoes and other disease vectors thereby posing health risks to local communities and related impacts from such areas, hence resulting in a medium impact sensitivity.

However, since the duration of these activities is considered short term and limited in extent, the resultant intensity of the impact is scaled as Low and overall, the impact is rated as moderate.

		Sensitivity			
		1 Very low	2 Low	3 Medium	4 High
Intensity of Impact	1 Very low	1 Negligible	2 Minor	3 Minor	4 Minor
	2 Low	2 Minor	4 Minor	6 Moderate	8 Moderate
	3 Medium	3 Minor	6 Moderate	9 Moderate	12 Major
	4 High	4 Minor	8 Moderate	12 Major	16 Major

Mitigation Measures

- Construction materials (stone-based products, murrum and related fill materials) subsoil will be sourced preferably from relevant licensed sources i.e. extraction and processing of such materials (as applicable) be in accordance with the provisions in such licences. It is suggested that, the contractor(s)/suppliers be asked to provide copies of proof for such licenses before effecting the supply process;
- The sites be fully revegetated with plants species approved by the Supervising Engineer and DEO;
- Excavated soil shall be stock-piled with its edges protected from erosion and such materials can be used during site restoration with the approval of the Engineer and Buyende DEO;
- Restoration of materials source sites be approved by both the Supervising Engineer and the District Environment Officer of Buyende before issuance of certificate of works completion; and
- There should be close and routine monitoring of restoration activities in the site by environmentalist from the Contractor and the Engineer.

2.16.1.3 LOSS OF VEGETATION COVER

Vegetation clearance and removal will take place at the water source site, water treatment plant, transmission mains, reservoir sites and distribution. According to the project baseline studies on vegetation, the entire project footprint has been modified by a combination anthropogenic factor such as cropping/farming grazing and seasonal fires amongst others, hence the areas do not have any pristine natural vegetation. In addition, baseline information indicates that plant diversity was considered to be too low in the project area. Fabaceae family registered the highest number of species (10), followed by Poaceae (Gramineae) 9, Moraceae 8, Euphorbiaceae 7, Asteraceae (Compositae) 6, Amaranthaceae and Rubiaceae 4 each. The rest of the families registered 3 or less. Out of the ninety-one (91) plant species encountered from the project sites and routes, only one (1) species - *Milicia excelsa* (Mvule) (*Moraceae*) was listed under the IUCN Red List of Uganda of 2018. The species is globally listed as Near-threatened and nationally as (EN A2acd,) the species are therefore critically

threatened and they deserve protection wherever it occurs. The trees (*Milicia excelsa* (Mvule) were recorded along transmission lines from the borehole to the reservoir up to the Kagulu Sub County. Although, the species raises a great conservation concern in the country and in the region, the tree is widely distributed in the Busoga region and it was observed planted on private land with community user rights on its management.

Apart from vegetation clearance at the borehole, water office and the proposed locations of the public sanitation facilities, vegetation clearance is expected to be linear and minimal along the transmission and distribution lines with allowable instances of repositioning to avoid sensitive vegetation. The reservoir sites and pipeline routes are mainly covered by short grass that will rejuvenate on completion of construction works. However, several invasive/alien plant species, namely; *Amaranthus spinus*, *Acanthospermum hispidum*, *Bidens pilosa*, *Conyza sumutrensis*, *Senna spectabilis*, *Leonotis neptifolia*, *Sida acuta*, *Eichhornia crassipes* (Pontederiaceae), and *Stachytarpheta indica* (Verbenaceae) were registered in project area and if not appropriately handled could be spread further by construction activities.

However, given the project land requirements are smaller rather compared and largely linear and based on limited land-take, this impact gauges as of low impact sensitivity. In addition, only two tree species of conservation concern were identified within the project foot print and the study suggests that, the design leaves their locations outside the project. The overall impact significance is assessed as Minor.

		Sensitivity			
		1 Very low	2 Low	3 Medium	4 High
Intensity of Impact	1 Very low	1 Negligible	2 Minor	3 Minor	4 Minor
	2 Low	2 Minor	4 Minor	6 Moderate	8 Moderate
	3 Medium	3 Minor	6 Moderate	9 Moderate	12 Major
	4 High	4 Minor	8 Moderate	12 Major	16 Major

Mitigation measures

- The project design should avoid the locations of the two trees of conservation importance to ensure their protection;
- Vegetation clearance should be limited to only localities required for project development needs; and
- The contractor should restore sites where activities will be carried out at all the project sites. This site restoration and revegetation should involve planting of indigenous trees/vegetation types.

2.16.1.4 LOSS OF FAUNA AND HABITATS

During project implementation, vegetation clearance, excavation and landscaping are expected to compromise some habitats. The clearance will lead to temporary loss of foraging habitat, basking, reproduction and hiding habitat for fauna. However, the baseline studies indicated:

- Fifteen species of butterflies belonging to 4 families and 12 genera were recorded during the survey. Eight species were recorded at the Borehole Water Source, seven species recorded at the

water Reservoir Tank and ten species recorded at Distribution and Supply pipelines. *The IUCN 2020 red list of threatened species and the National Red List for Uganda lists all the butterflies recorded during the survey as Least concern.*

- b. Only one species of dragonfly, the Southern Banded Groundling *Brachythemis leucosticta* was recorded at the Borehole Water Source site. *The species is categorized as Least Concern by the 2020 IUCN Red List of threatened species.*
- c. Five species of amphibians were registered at the Borehole water source site. *All the species encountered are categorized as least concern according to 2020 IUCN Red List of threatened species.*
- d. Two lizards, One Chameleon, one crocodile and two snake species were recorded in the project area. Three of the species were reported by the residents including the Nile Crocodile *Crocodylus niloticus*, Olive Marsh Snake *Natriciteres olivacea* and Nile Monitor *Varanus niloticus*. *All the species are listed as least concern by IUCN 2020 Red List of threatened species.* The reported **Nile Monitor *Varanus niloticus* and Nile Crocodile *Crocodylus niloticus* by communities were listed under the Endangered Species Decree in 1975. International trade of the species is prohibited. The Species is listed under CITES Appendix II (Branch 1998).**
- e. A total of thirty-three bird species were registered in the water system project areas. The registered species represent twenty-two families and thirty-one genera. Nineteen species were registered along at the Borehole Water Source site, seven species registered at the water Reservoir Tank site and fourteen species registered along the distribution and supply pipelines areas. *All species according to IUCN 2020 Red List of Threatened species are categorized as Least Concern.*
- f. Four mammal species were recorded including; Black Rat *Rattus rattus* East African epauletted fruit bat *Epomophorus minimus*, Marsh mongoose *Atilax paludinosus* and striped ground squirrel *Xerus erythropus*. were recorded along the distribution and supply pipeline areas. *The four species are listed as Least Concern by the IUCN 2020 Red List of threatened species.*

Based on these, project sensitivity is low and the impact intensity of the project on fauna is rated as low with its overall impact significance is **Minor**

		Sensitivity			
		1 Very low	2 Low	3 Medium	4 High
Intensity of Impact	1 Very low	1 Negligible	2 Minor	3 Minor	4 Minor
	2 Low	2 Minor	4 Minor	6 Moderate	8 Moderate
	3 Medium	3 Minor	6 Moderate	9 Moderate	12 Major
	4 High	4 Minor	8 Moderate	12 Major	16 Major

Mitigation measures

- a. Clearance of fauna habitat (vegetation and soils) should be limited only to localities required for development;
- b. The contractor should restore sites where activities will be carried out at all the project sites;
- c. All project workers should be sensitized to observe instructions aimed at no hunting of any opportunistic wildlife in the sites;

- d. Trenching, pipework laying as well as well as backfilling will be done concurrently. For pits like at the booster station, the contractor shall ensure that every evening, the pits are covered with timber while being secured with a warning tape to check accidental falls of wildlife and livestock in excavated pits;
- e. The natural vegetation at the location of the intake and water treatment plant should not unnecessarily cut to avoid impacting possible habitats for invertebrates.

2.16.1.5 DISTURBANCE AND DEGRADATION OF WETLAND ECOSYSTEMS

The project is likely to affect the wetland at the proposed location of the water source (borehole) in Mailo village. The borehole is located within 200m protection zone of Lake Kyoga as prescribed in seventh schedule of the National Environment (Wetlands, River Banks, and Lake Shores Management) Regulations, N°. 3/2000. At baseline, there was water logging on and around the site from the Lake.

Project works within/near the wetland will involve removal of wetland vegetation, excavation, drilling and casting the borehole, installation of project infrastructure and redesigning of topography to suit the proposed project structures. The land requirement for the borehole site is of 0.2113 acres. The need for earthworks to remove the vegetation and drill the borehole and other loose subsoils to reach stable ground suitable for the foundation works for the raw water transmission may likely impact on the soils thereby erosion.

Construction of the project infrastructure will therefore result in loss of wetland vegetation, disturbance/loss of habitat for fauna and/or killing of wetland fauna, water pollution, siltation, turbidity, and sedimentation of water resources, which will comprise the wetland function in/near the project.

By and large, the impact magnitude is low since the construction works will:

- Occupy a small space 0.2113 acres compared to the size of the wetland,
- short-term duration (duration of construction works),
- be reversible at completion of works, and
- The proposed project location within the wetland is already disturbed by human activity

Therefore, the overall impact significance will be Moderate.

		Sensitivity			
		1 Very low	2 Low	3 Medium	4 High
Intensity of Impact	1 Very low	1 Negligible	2 Minor	3 Minor	4 Minor
	2 Low	2 Minor	4 Minor	6 Moderate	8 Moderate
	3 Medium	3 Minor	6 Moderate	9 Moderate	12 Major
	4 High	4 Minor	8 Moderate	12 Major	16 Major

Mitigation measures

- Obtain a wetland user permit from NEMA before constructing the borehole and establishment of the water source infrastructure within the protection zone of the Lake Nawampasa, a satellite of Lake Kyoga;

- The project implementation should then keenly follow the conditions in the Wetland User Permit to issued by NEMA;
- Construction works of the borehole and associated infrastructure within the wetland should be limited to project footprint and allocated timeline;
- All project workers should be sensitized on minimization of damage to the wetland flora and fauna; and
- Close monitoring and supervision of the construction operations to ensure compliance to the NEMA permit conditions and avoid causing further damage to undesignated project areas.

2.16.1.6 RISK OF CONTAMINATION DUE TO FLOODING OF WATER SOURCE

Borehole DWD 60898 is located in a flood prone lowland where infiltration of surface run-off may occur during heavy rains thus contaminating the water source. Given that at the time of the assessment, the area was flooded the potential contaminants may include pollutants carried by runoff.

The sensitivity of the receptors is considered to be 'high' while the impact intensity is considered to be low given that the project design will put into consideration construction techniques for water source protection to ensure minimal risk of contamination. The overall impact significance is moderate.

		Sensitivity			
		1 Very low	2 Low	3 Medium	4 High
Intensity of Impact	1 Very low	1 Negligible	2 Minor	3 Minor	4 Minor
	2 Low	2 Minor	4 Minor	6 Moderate	8 Moderate
	3 Medium	3 Minor	6 Moderate	9 Moderate	12 Major
	4 High	4 Minor	8 Moderate	12 Major	16 Major

Mitigation measures

- The borehole should be constructed with a water tight casing above the water table
- The design and construction of the pump house at source should incorporate a raised apron slab above the ground by the required height for the predicted flood depth of the area.
- Aprons should be constructed with deep foundation edges to avoid erosion.
- Routine water quality tests should be carried out at borehole DWD 60898 and after events with potential to cause contamination, upon which appropriate water treatment should be carried out to remove the detected contaminants before its distributed to the users.
- A water source protection plan has been developed to ensure sustained water quality and quantity for the project.

2.16.1.7 GENERATION OF SOLID WASTE

The proposed project will likely generate waste based on its various activities and the waste can comprise food remains (kitchen based), polythene bags, plastic bottles, plastic offcuts from the HDPE and uPVC pipes papers, wrappings for components to be installed, excavated soil and left overs of

construction materials (timber, aggregates, sand, bricks/blocks, steel bar cuttings, glasses, and cement). Such waste needs to be handled reasonably and must not remain in the road reserves or along the water trenches. Inappropriate disposal of waste or spoil could have medium or long-term environmental and public health impact. Improper managing of these wastes could result in contamination of soil, air, surface water and thereby posing public health risks.

The sensitivity of project locations such as the water sources, reservoir sites and along the transmission and distribution networks, water office and sanitation facility location are also high since there is no regulated waste management in the RGC. The impact intensity is assigned Low due to the low volumes of waste expected on the project resulting in a **moderate** impact significance

		Sensitivity			
		1 Very low	2 Low	3 Medium	4 High
Intensity of Impact	1 Very low	1 Negligible	2 Minor	3 Minor	4 Minor
	2 Low	2 Minor	4 Minor	6 Moderate	8 Moderate
	3 Medium	3 Minor	6 Moderate	9 Moderate	12 Major
	4 High	4 Minor	8 Moderate	12 Major	16 Major

Mitigation measures

- The Contractor shall develop and implement a Waste Management Plan that will ensure that:
 - ❖ The wastes are properly segregated and separated to encourage recycling of some useful waste materials, that is, some excavated material can be used as backfills;
 - ❖ Solid waste storage bins and/or skips are provided at contractor’s sites and at the construction sites and ensure they are collected or emptied in time. Depending on the rate of accumulation, waste collection is made at least once in 24 hours and done in such a way to minimize nuisance of smell and dust during collection; and
 - ❖ Hazardous wastes such as paints, cement, adhesives are managed through a third-party contractor certified by NEMA. The wastes shall be transported in a NEMA approved box body trucks to the NEMA approved waste disposal facility in Kamuli.
- All sorts of waste generated during construction such as HPDE and uPVC offcuts and other accessories associated with water and sanitation projects shall be collected by the contractor and delivered to recycling facilities;
- All organic waste generated at eating places during construction such as food stuffs shall be collected and disposed appropriately;
- All solid waste from works site be collected and disposed at Buyende District waste dump sites. Once segregated, plastic waste such as mineral water bottles, polyethene bags, jerry cans and cups will be collected by individuals who collect and sell it to plastic waste dealers. The ESIA Team met some of these and they expressed readiness to take up such waste if they are notified of its existence in the project;
- The contractor will work with Buyende district Local government to facilitate sound waste handling and disposal. All wastes must be taken to the approved waste disposal facilities. Proof of delivery and safe disposal of waste will be provided and records always maintained.

2.16.1.8 NOISE AND VIBRATIONS IMPACTS

Noise and vibration will occur both on and off site. This will emanate from movement of trucks, excavation/drilling works, usage of equipment (compactors and generators). Exposure of communities, workers and fauna to high noise and vibration levels can be a health concern. According to baseline noise level recorded in Igwaya RGC, average noise levels ranged from 63.9dBA in Igwaya TC, a peri-urban area near the reservoir/transmission line/ distribution network to 54.0dBA at Kagulu HC II, the most sensitive receptor (hospital) along the transmission and distribution network. The baseline noise levels measured were within the maximum permissible noise limits for mixed residential areas. The noise levels emanated mainly from people talking and motor cyclists.

Noise from construction is known to range between 80dBA to 120dBA, which is above the recommended noise levels for mixed land uses. However, the construction of the project components will require few vehicles and equipment and for a limited amount of time. The impact sensitivity and significance of the project will vary as described in **Error! Reference source not found.** below.

Table 2-12: The noise impact significance per project component site

Component	Expected equipment on site	Sensitive receptors	Sensitivity	Intensity	Significance
Water source, raw water transmission and Pump house	Movement of trucks, Excavation works, Usage of equipment (compactors and generators) Masonry works.	Workers, households	Low	Use of heavy construction equipment for a short term and limited in extent = Low	Minor (4)
Water transmission	Movement of trucks, Excavation by casual workers, Use of mobile compactors	Workers peri-urban population (businesses and settlements) incl. school	Medium	Use of manual labor, short term and limited in extent = Very Low	Minor (3)
Water reservoir and chemical house	Movement of trucks, Excavation works, Installation of reservoir parts Masonry works, usage of equipment (compactors and generators).	Semi-urban population (mix of businesses and settlements)	Medium	Use of diverse equipment for a short term and limited in extent = Low	Moderate (6)

Component	Expected equipment on site	Sensitive receptors	Sensitivity	Intensity	Significance
Distribution network	Movement of trucks, Excavation by causal workers, Use of mobile compactors	Workers; Semi-urban population (mix of businesses and settlements), Schools	Medium	Use of manual labor, short term and limited in extent = Very Low	Minor (3)
Construction of sanitation facilities and water office	Manual labor, Metal work, Compressors	Semi-urban,; population (mix of businesses and settlements)	Medium	Short term and limited in extent = Very Low	Minor (3)
Along access roads	Movement of trucks	Workers; peri-urban population (mix of businesses and settlements), School	Medium	Approximately 3 trucks for the entire construction phase = Low	Moderate (6)

Mitigation measures

- a. Workers should be provided with the necessary personal protective equipment (PPE) such as ear muffs;
- b. Periodic medical hearing checks should be performed on workers exposed to high noise levels;
- c. Construction sites must be hoarded to curb noise impacts to neighbouring communities;
- d. Works should be undertaken during day time that is, from 8am to 6pm;
- e. Works near schools or health centres should be done in periods like weekends for noise not to interfere with learning/health environment;
- f. Weekly monitoring of noise levels at active sites should be carried out by the contractor; and
- g. Avoid operating noisy equipment when not required, such as idling of cars, operating of generators when not required.

Vibrations: The effects of vibration vary and depend on the magnitude of the vibration source, the ground conditions between the source and receiver, presence of rocks or other large structures in the area. Due to absence of Uganda standards for vibrations, the ground vibrations standards are adopted from Ireland.

Typical vibration from transportation and construction sources falls in the range of 10-30 Hz and usually centres around 15 Hz. Therefore, the limit of 12.5 mm/s for construction equipment was adopted.

Baseline information on structures in Igwaya RGC indicates that most of the houses are semi-permanent. The baseline vibration measurements in Igwaya RGC averaged at 0.1 mm/s in Igwaya TC and 1.79mm/s at Kagulu HC II

Vibration monitoring may be necessary in case the contractor utilizes equipment with vibration frequency beyond 30 Hz to detect any structural damage risks. However, given the scale of works, use

of equipment with such high levels of ground vibrations that can cause structural damage is not envisaged. Therefore, the sensitivity of the area to vibration is very low and even when it occurs the impact intensity is very low since vibration from construction equipment falls within the permissible limit of 12.5mm/s resulting in an overall Negligible impact.

		Sensitivity			
		1 Very low	2 Low	3 Medium	4 High
Intensity of Impact	1 Very low	1 Negligible	2 Minor	3 Minor	4 Minor
	2 Low	2 Minor	4 Minor	6 Moderate	8 Moderate
	3 Medium	3 Minor	6 Moderate	9 Moderate	12 Major
	4 High	4 Minor	8 Moderate	12 Major	16 Major

2.16.1.9 AIR POLLUTION

Baseline Ambient air quality measurements indicate that the environment around the project area has pollution levels which are lower based on-air quality measurements which averaged below the recommended limit prescribed in the World Health Organisation Air Quality Guidelines (WHO AQG), 2021 for Particulate Matter (PM_{2.5}, PM₁₀), CO, NO₂, and SO₂. The project location is generally rural with motorcycles as the main mechanism of transport on community roads.

The area sensitivity is low since it is generally rural with most households located far off the main road except in trading centres and near public institutions such as schools and health facilities. The impact intensity will be low due to the limited extent of earth works and few vehicles that will be required on the project that are the potential sources of air pollution. The overall impact significance is therefore Minor

		Sensitivity			
		1 Very low	2 Low	3 Medium	4 High
Intensity of Impact	1 Very low	1 Negligible	2 Minor	3 Minor	4 Minor
	2 Low	2 Minor	4 Minor	6 Moderate	8 Moderate
	3 Medium	3 Minor	6 Moderate	9 Moderate	12 Major
	4 High	4 Minor	8 Moderate	12 Major	16 Major

Mitigation measures

- Travel speeds of construction vehicles along the road especially at trading/ business centres will be controlled and should not exceed 50 km/h;
- Trucks will be covered during haulage of construction materials to reduce on spillage of materials and wherever dust suppression is necessary, water will be sprayed over dusty areas;
- Workers will be provided with PPE and the use of PPE shall be enforced;

- d. Accessed roads which of murrum/gravel will be routinely sprinkled with water to suppress dust and frequency of which shall be included in the Contractor’s Traffic Management Plan.
- e. Stockpiles of friable material will be grassed to prevent wind erosion; and
- f. A maintenance programme for equipment and vehicles will be implemented, to ensure air emissions like particulates, SO₂ and NO₂ are minimised.

2.16.1.10 TRAFFIC SAFETY

The proposed project will cut across several roads within the project area (2 major and two minor road crossings) and the baseline information indicates that there are few road accidents in the project area. Those that occur mainly involve motorcycles. Children were also noted to ride bicycles to fetch water along community roads. Motorcycle and bicycle riders therefore need to be notified about works at possible road crossings and the presence of construction trucks within the project area.

Due to the rural nature and introduction of construction activities not common in the project location, the impact on traffic will be easily noticeable. The occurrence of the impact is therefore Low and moderate in nature.

		Sensitivity			
		1 Very low	2 Low	3 Medium	4 High
Intensity of Impact	1 Very low	1 Negligible	2 Minor	3 Minor	4 Minor
	2 Low	2 Minor	4 Minor	6 Moderate	8 Moderate
	3 Medium	3 Minor	6 Moderate	9 Moderate	12 Major
	4 High	4 Minor	8 Moderate	12 Major	16 Major

Mitigation measures

- The Contractor shall develop and implement a Traffic Management Plan which is to guide aspect of traffic in the project;
- Likely disruptions to public access shall be identified in the Contractor's works schedule and responsive traffic management measures instituted to guide traffic through such areas;
- Vehicular access through areas of public institutions (markets, schools and health centres) shall be managed by traffic/flag persons who are work hand-in-hand with the traffic police in their areas;
- Road and site safety training should be conducted as part of tool-box talks in the project;
- Conspicuous signage shall be well placed on roads and the Contractor’s Traffic guides on ground shall direct traffic in case of diversions or open trenches.
- All company vehicles used in the transportation of construction workers, material and equipment to and away from the site shall be in sound mechanical conditions. Evidence shall always be provided by recording the status of the vehicle in the Daily Vehicle Inspection Form before usage;
- All drivers to be employed by the Developer or Contractor shall be qualified, skilled with valid driving permits; and

- The vehicle speed shall be limited to a maximum of 30km/hr areas near sensitive facilities; and
- Works near sensitive facilities like schools and health centres shall only be limited to day time (7am to 6pm).

2.16.1.11 OCCUPATIONAL HEALTH AND SAFETY RISKS

Inadequate OHS risks management could result from insufficient medical capability at the construction site; or neglect of safety equipment, precautions, and procedures. Other causes of OHS problems in similar site could include amongst others, lifting of heavy and sharp objects, poor transportation of materials for maintenance, improper storage as well as handling and use of dangerous substances/chemicals, inadequate lighting and ventilation in workplaces, 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, eye hazards such as splashes, lack of adequate PPE, and biological hazards (vermin, mosquitos, pathogens, etc.). Accidents could cause considerable ecological damage, financial loss and harm to human life. While largely reversible, some impacts such as loss of human life and body injury are irreversible.

The sensitivity of the impact will be high even if MoWE procures a qualified contractor who is aware of OHS measures, the workers may not follow OHS requirements. Nevertheless, this gives rise to an impact of Moderate significance.

		Sensitivity			
		1 Very low	2 Low	3 Medium	4 High
Intensity of Impact	1 Very low	1 Negligible	2 Minor	3 Minor	4 Minor
	2 Low	2 Minor	4 Minor	6 Moderate	8 Moderate
	3 Medium	3 Minor	6 Moderate	9 Moderate	12 Major
	4 High	4 Minor	8 Moderate	12 Major	16 Major

Mitigation measures

- The Contractor shall prepare and implement an occupational safety and health plan for all sites, approved by the MoWE;
- The Contractor shall provide safety guidelines to all operations prior to start of work;
- Strict adherence to safety measures and procedures are required to minimise (or eliminate) risks of accidents or hazardous developments occurring and ensure healthy and safe conditions for all persons working on the site;
- On-site training shall be conducted on how to prevent and manage incidences and such could involve proper handling of electricity, water etc. and sensitization on various modes of escape, conduct and responsibility during such incidences;
- Regular drills on site safety will be routinely conducted followed 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 case of incidences;

- f. Personnel on duty shall always wear appropriate PPEs, such as safety glasses with side shields, face shields, hard hats/helmets, and safety boots be required for all site staff;
- g. The Contractor shall establish emergency entrances, exits and amenities in the project facilities;
- h. The Contractor shall ensure that there are First Aid Kits on the site and such shall be modestly stocked with consumables that are key in delivery of first aid on the site;
- i. The Contractor shall secure site boundaries with fences or hoardings as appropriate to keep off intrusion in the project;
- j. The Contractor shall install caution signage around the site to discourage the public from being close to the site, for example, “falling debris”, “keep off the site” etc;
- k. The Client through the Construction Supervisor will continually monitor Contractors’ compliance with Health and Safety measures;
- l. An Accident Log will be maintained onsite to register all injuries and to investigate their causes during both the construction and operation phases of the project;
- m. The manufacturer's instructions and Material Safety Data Sheets (MSDS) shall be followed for the storage of all chemicals used in water treatment. Storage must conform to compatibility restrictions; and
- n. Work force shall be subjected only to standard work shifts/hours. Overtime allowances, if applicable/warranted shall be paid with ceiling limits. Working beyond such ceiling limits shall be discouraged, even if, so desired workforce or contractor.

2.16.1.12 RISK OF SPREAD OF HIV-AIDS AND OTHER STDS AND STIS

According to baseline information, HIV alone contributes to the total disease burden in Buyende district with a prevalence rate of 4.7%. This is attributed to factors that include the districts’ strategic location at cross roads of boarder district, widow inheritance, polygamy, poverty and prostitution which is rampant in Buyende and the fishing villages. Residents of fishing communities are one of the most-at-risk groups for HIV in Sub-Saharan Africa owing to frequent mobility, transactional and commercial sex, multiple sexual partners, high consumption of alcohol, poor health infrastructure, and limited access to health services are reported among the main factors shaping the HIV epidemic in finishing communities².

The concentration of workers in the villages, in migration of people from different regions as well as occasional payment in wages may lead to behavioural influences which may increase the risk spread of diseases thus exposing the workers or other members of the surrounding community to the hazard of infections that include HIV-AIDS and sexually transmitted diseases. Similarly, labour influx of job seekers is associated with social vices which can disrupt the social order and even lay the ground for escalation of HIV/AIDS cases whose impacts are likely to be prolonged in prevalence. The impact is possible as sexual relations may occur between community members and workers, however due to the low numbers of workers, the spread may not be high. The magnitude is however High as these poor communities would struggle to cope with the challenges of being HIV positive. The impact significance *is Moderate*.

² HIV Epidemic in Fishing Communities In Uganda: A Scoping Review,2021

		Sensitivity			
		1 Very low	2 Low	3 Medium	4 High
Intensity of Impact	1 Very low	1 Negligible	2 Minor	3 Minor	4 Minor
	2 Low	2 Minor	4 Minor	6 Moderate	8 Moderate
	3 Medium	3 Minor	6 Moderate	9 Moderate	12 Major
	4 High	4 Minor	8 Moderate	12 Major	16 Major

Mitigation measures

- a. Sensitize workers and the surrounding communities on awareness, prevention, and management of HIV/AIDS through staff training, awareness campaigns, multimedia, and workshops or during community barazas;
- b. Provide VCT services and Anti-Retro-Viral Treatment to both the workers who test HIV positive and those from the community who come test at the project site;
- c. Integrate monitoring of HIV/AIDS preventive activities as part of the construction supervision. Basic knowledge, attitude and practices are among the parameters to be monitored, and particularly on provision of condoms, status testing and use of ARVs, as well as sexual health and rights; and
- d. Ensure supply of condoms for the workers and the community members who access the project through points where such items are deposited in the project sites.

2.16.1.13 RISK OF GENDER BASED VIOLENCE AND FAMILY / MARRIAGE BREAKDOWN

GBV constitutes acts of gross misconduct and are therefore grounds for sanctions, penalties and/or termination of employment. This impact refers to gender-based violence at the community level that women and girls may experience as a result of Project implementation. This includes, for example, an increase in intimate partner violence (IPV) when compensation schemes that share funds equally among husband and wife at the household level do not provide adequate sensitization and safety measures to reduce potential for increased tensions due to females receiving funds. This also refers to other GBV-related risks incurred as a result of project implementation that do not adequately consult women and adolescent girls in the community about safety and security issues related to the delivery of water and sanitation services. These communities already experience gender-based violence and therefore the impact is likely to occur. However, due to the low number of workers who would be exposed to incomes that can encourage irresponsible behaviour the impact magnitude is low. The overall significance is ranked as **Moderate**.

		Sensitivity			
		1 Very low	2 Low	3 Medium	4 High
Intensity of Impact	1 Very low	1 Negligible	2 Minor	3 Minor	4 Minor
	2 Low	2 Minor	4 Minor	6 Moderate	8 Moderate
	3	3	6	9	12

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

Mitigation Measures

- a. Develop and implement provisions that ensure that gender-based violence at the community level is not triggered by the Project such as effective and on-going community engagement and consultation, review of specific project components that are known to heighten GBV risk at the community level, for instance; compensation schemes; employment schemes for women; delivery of water supplies; etc;
- b. Amongst project staff, the project PCU shall have a GBV Specialist to oversee GBV issues in the project;
- c. Specific plan for mitigating such risks, for instance; sensitization around gender equitable approaches to compensation and employment; water services; etc
- d. Ensure adequate referral mechanisms are in place if a case of GBV conflicts on project staff level is reported to police due to their criminal nature;
- e. The Contractor should have a “No sexual harassment” policy and mainstream it to ensure strict adherence to established mechanisms to avoid the emergence of these challenges;
- f. Contractor to prepare and implement a Gender Action plan to include at minimum, in conformance with local laws and customs, equal opportunity employment, gender sensitization; and
- g. Include gender affirmative actions and workplace conditions such as engendered washrooms, changing rooms, female condoms, breastfeeding room for breast feeding mothers, observing working time of 8:00AM to 5:30 PM so that parents especially women can attend to their domestic duties.

Residual impact significance: **Minor**

2.16.1.14 RISK VIOLATION OF CHILDREN RIGHTS BY CONTRACTOR AND LABOUR FORCE ON SITE

The Children Act of Uganda 2016 prohibits contractors from “employing children in a manner that is economically exploitative, hazardous, and detrimental to the child’s education, harmful to the child’s health or physical, mental, spiritual, moral, or social development. The possibility of contractor children abuse is through hiring of child labour, also labour force on site might abuse children within the Project area through sexual advance that could lead to early pregnancies and school dropout including exposure to communicable diseases such as HIV. The impact is likely to occur since children are already engaged in community work, especially in collecting water. However, the impact sensitivity is low since few jobs for a short period of time will be available on the project. The impact significance is **Moderate**.

		Sensitivity			
		1 Very low	2 Low	3 Medium	4 High
Intensity of Impact	1 Very low	1 Negligible	2 Minor	3 Minor	4 Minor
	2 Low	2 Minor	4 Minor	6 Moderate	8 Moderate
	3 Medium	3 Minor	6 Moderate	9 Moderate	12 Major
	4 High	4 Minor	8 Moderate	12 Major	16 Major

Mitigation measures:

The contractor should among other things clearly stipulate Code of conduct that includes:

- a. **Strict adherence to rules prohibiting Child Labour as in national laws and ILO on matters outlawing child labor in the project establishment,**
- b. Continuous monitoring of VAC by CDOs, LCs, Police to ensure no child labor cases.
- c. Involving local CSOs in the prevention, reporting and management of VAC cases.

Residual impact significance: **Minor**.

2.16.1.15 RISK OF NON-PAYMENT OF WORKERS, SUPPLIERS AND SUB-CONTRACTORS

Delay in payment or the non-payment of suppliers and subcontractors of a contractor is a usual occurrence in projects, and poses a grave risk to project which negatively impacts on the effectiveness of the contractor and as such affect project delivery schedule and it creates mistrust between the parties impacted. It is therefore essential, that contractors ensure they are paid on time so that they do not unnecessarily 'renege' on their contractual obligations with suppliers of good and services to the project. Delays and failure to pay them for supplies to the project can affect their financial status and even survival in business. Lastly, non-payment would trigger grievances and also cause reputational damage to the project. This impact is ranked **Moderate**.

		Sensitivity			
		1 Very low	2 Low	3 Medium	4 High
Intensity of Impact	1 Very low	1 Negligible	2 Minor	3 Minor	4 Minor
	2 Low	2 Minor	4 Minor	6 Moderate	8 Moderate
	3 Medium	3 Minor	6 Moderate	9 Moderate	12 Major
	4 High	4 Minor	8 Moderate	12 Major	16 Major

Mitigation Measures

- a. All workers must sign contracts as part of engagement in the project;
- b. Include clauses for equal pay for equal work;
- c. Institute Contractor Grievance Committees to handle grievances including those related to labour issues;

- d. Involve the District Labour Officers in project supervision to offer guidance on management of labour issues;
- e. The provision of ‘pay when paid clause’ should be introduced in the contractor and supplier/sub-contractor contract;
- f. Understanding the terms or clauses of payment in the project;
- g. The effect of delayed payments on the project progress must be understood by all parties and personnel involved; and
- h. Right for contractors to suspend work in the event of late or non-payments by the client to avoid unnecessary stand offs with suppliers.

Residual impact significance: **Negligible.**

2.16.1.16 LIABILITY FOR LOSS OF LIFE, INJURY, OR DAMAGE TO PRIVATE PROPERTY

Some of the Construction activities may lead to accidents that may be mild or fatal depending on various factors. During the implementation of the proposed project, accidents could be due to negligence on part of the workers, machine failure or breakdown or accidental falls into the pipeline trenches. These incidents can be reduced through proper work safety procedures. In addition, during construction, there may be damage to private property that may not be foreseen by the RAP. This impact is ranked **Moderate**.

		Sensitivity			
		1 Very low	2 Low	3 Medium	4 High
Intensity of Impact	1 Very low	1 Negligible	2 Minor	3 Minor	4 Minor
	2 Low	2 Minor	4 Minor	6 Moderate	8 Moderate
	3 Medium	3 Minor	6 Moderate	9 Moderate	12 Major
	4 High	4 Minor	8 Moderate	12 Major	16 Major

Mitigation measures:

- a. Provision of PPE to all worker;
- b. The contractor will ensure that the Project is implemented by total adherence to the Employment Act 2006;
- c. The workers should receive requisite training especially on the operation of the machinery and equipment;
- d. There should be adequate warning and directional signs;
- e. Ensuring that the prepared code of conduct for staff is followed to prevent accidents;
- f. Develop a site safety action plan detailing safety equipment to be used, emergency procedures, restriction on site, frequency and personnel responsible for safety inspections and controls;
- g. Cordon off unsafe areas and provide safe crossing points across trenches;

- h. Provide an onsite clinic to provide first aid services to the staff;
- i. Recording of all injuries that occur on site in the incident register, corrective actions for their prevention are instigated as appropriate;
- j. Contractor to ensure compliance with the Workmen's Compensation Act, ordinance regulations and union agreements; and
- k. The Contractor to repair any damage done to private property.

Residual impact significance: **Minor**.

2.16.1.17 DESTRUCTION OF PHYSICAL CULTURAL RESOURCES

There are currently no known archaeological sites within the immediate vicinity of the proposed project area. However, the proposed transmission line and access footpath, which may be upgraded into an access road, from Mailo village, the location of the project borehole traverses a graveyard. There is also a sacred tree 100m from the location of the project borehole, which may be interfered with during works at and/or near the source. PCRs like graveyards and older-trees may be damaged during site clearance, laying of the transmission mains. Given the excavation works involved in the laying of the transmission and distribution system, the possibility that some cultural features being encountered along the alignment cannot be ruled out. Owing to the importance of and sentiments attached to burial sites and sacred trees, the impact is likely to occur. The impact Magnitude is Medium given that the grave yard and the sacred trees have already been identified by the project and their risks easily mitigatable. The overall impact significance is **moderate**.

		Sensitivity			
		1 Very low	2 Low	3 Medium	4 High
Intensity of Impact	1 Very low	1 Negligible	2 Minor	3 Minor	4 Minor
	2 Low	2 Minor	4 Minor	6 Moderate	8 Moderate
	3 Medium	3 Minor	6 Moderate	9 Moderate	12 Major
	4 High	4 Minor	8 Moderate	12 Major	16 Major

Mitigation measures

- a. At the local level, additional consultations will be carried out prior to commencement of works by the contractor at the project sites;
- b. A 'chance find' procedure will guide actions to be taken if suspected archaeological artefacts or paleontological items are encountered and they should be handed over to Ministry of trade and industry- Department of Museums and Monuments;
- c. Construction workers and managers should be trained in basic skills of how to identify and handle archaeological materials/artifacts before commencement of work. Such training should be administered in liaison with the Department of Museums and Monuments (DMM);
- d. Construction works will be designed to ensure no damage to any cultural sites or medicinal plants that may be encountered including older-trees that are culturally significant. Where such sites

cannot be avoided, culturally appropriate measures will be agreed and implemented prior to the construction activities;

- e. Compensation of the affected sites will be undertaken before construction activities commence in accordance with World Bank requirements; and

2.16.1.18 IMPACT ON SECURITY AROUND THE PROJECT AREA

The security situation at Kagulu Subcounty is characterized by assault cases, defilement, theft and incidences of mob justice (**Figure 6-20**). Since an influx of people going to work on the project is expected, the rise in assault cases, defilement, and theft is most likely. This is because there is going to be direct interaction between project workers and community members. There is also going to be increased alcohol intake because of an increase in disposable income, therefore leading to an increase in domestic violence cases. Given the few numbers of police officers at Kagulu Police Station to contain the situation, the sensitivity of the impact is medium, and the impact intensity of the impact is low due to the low numbers of workers that will be employed on the project and Therefore, the construction works will have a Moderate significance on the security situation of the community.

		Sensitivity			
		1 Very low	2 Low	3 Medium	4 High
Intensity of Impact	1 Very low	1 Negligible	2 Minor	3 Minor	4 Minor
	2 Low	2 Minor	4 Minor	6 Moderate	8 Moderate
	3 Medium	3 Minor	6 Moderate	9 Moderate	12 Major
	4 High	4 Minor	8 Moderate	12 Major	16 Major

Mitigation measures

- Perform community policing
- Draft an alcohol policy
- Allow married workers to visit their spouses
- Conduct reproductive health education
- Restrict community members from accessing camps
- Have own security guarding camps, construction sites, and material yards
- Install CCTV cameras in camps and material yards
- Establish a grievance redress committee
- Designate smoking areas and ensure smoking is only done in designated areas

2.16.1.19 IMPACT ON HEALTH SERVICES

Kagulu HC III serves about 21,742 people, which is relatively a big number for a health facility that is still designated as a HC II by the Ministry of Health. This health facility doesn't have an emergency unit, doesn't have an ambulance, and doesn't do blood transfusions, implying that it is not fully equipped to handle accident cases.

Accidents and illnesses are likely to occur among project workers; however, the magnitude of accidents is low since the traffic in the area is minimal. The intensity of illnesses is low due to manageable communicable diseases in the project area coupled with a low number of workers that

will be employed on the project resulting in a Moderate impact Significance. The construction works will therefore, have a minor significance on the health services of Kagulu Health Centre III, since accident cases will be minimal from community and project operations.

		Sensitivity			
		1 Very low	2 Low	3 Medium	4 High
Intensity of Impact	1 Very low	1 Negligible	2 Minor	3 Minor	4 Minor
	2 Low	2 Minor	4 Minor	6 Moderate	8 Moderate
	3 Medium	3 Minor	6 Moderate	9 Moderate	12 Major
	4 High	4 Minor	8 Moderate	12 Major	16 Major

Mitigation measures

- Provide own ambulance
- Provide own clinic with a nurse
- Train own first aiders and provide first aid boxes
- Conduct blood group tests for all project employees
- Conduct pre-employment medical checks

2.16.2 OPERATION AND MAINTENANCE PHASE

2.16.2.1 GROUND WATER DEPLETION

The project will abstract 160m³ of raw water from a drilled borehole (DWD 60898) in Mailo Village in Kagulu Sub County. The abstraction is based on a maximum yield of 10m³/hour over a 72hour test pumping duration. However, the borehole requirement for the project area is 68.96m³/hr as compared to the current supply which is 10.0m³/hr over a 16hour pumping period. The drilled borehole provides only 33.7% of the maximum day demand in the initial year (2021) and 14.5% of the maximum day demand for the year 2041 over a 16-hour pumping period. There is a deficit of 58.96m³/hr of a 16-hour pumping regime. At least 6No. additional wells of borehole yield of 9.8m³/hr are required to meet the maximum day demand in the ultimate year. Due to deficiency in supply, the project was scaled down ((Phase I) to supply only 5 villages using the drilled borehole; namely, Nakawolo LCI, Mailo, Butemera LCI B, Butemera LCI A and Busubo Mpanga.

Activity	Type of Impact	Intensity	Frequency / Duration	Sensitivity	Significance
Water extraction	Water drawdown	High	Permanent	Medium	Major +ve
	Unsustainable water use	Medium	Permanent	Medium	Moderate -ve
	Impact on neighboring wells (no nearby wells)	Medium	Permanent	Low	Moderate -ve
	Increase of water supply	High	Permanent	Medium	Moderate -ve

Even though the project has been scaled down to serve 5 villages, there will be incidences of overdrawing water from the borehole to serve the increasing demand for water in the RGC. Ground-

water depletion is primarily caused by un-sustained ground-water pumping. Some of the negative effects of groundwater depletion include increased pumping costs, deterioration of water quality, reduction of water in streams and lakes, or land subsidence. The likelihood of ground water depletion is Likely due to the present demand for water above the supply and possibility of authorizing other ground water abstractions in borehole village. The sensitivity will be high due to the fact that the maximum borehole yield will be drawn for a 16 hour schedule every day. Resulting a major impact significance.

		Sensitivity			
		1 Very low	2 Low	3 Medium	4 High
Intensity of Impact	1 Very low	1 Negligible	2 Minor	3 Minor	4 Minor
	2 Low	2 Minor	4 Minor	6 Moderate	8 Moderate
	3 Medium	3 Minor	6 Moderate	9 Moderate	12 Major
	4 High	4 Minor	8 Moderate	12 Major	16 Major

Mitigation measures:

- Proper monitoring of number of boreholes being authorized by the DWRM within the proposed area.
- EUWS should not exceed the daily water abstraction cap for the borehole per day.
- Monitor and meter the water system to determine the largest water consumption areas; monitoring also can help detect leaks in water systems (this step is more relevant to industrial water users).
- Implementation of the developed water source protection plan with nearby communities for sustainability of the ground water source.
- As recommended in the feasibility report, the project should drill 6No. additional wells of borehole yield of 9.8m³/hr are required to meet the maximum day demand in the ultimate year.

2.16.2.2 POTENTIAL WATER AND SOIL POLLUTION IN THE PROJECT SMALL TOWNS

Baseline information indicates there are no wastewater management facilities such as septic tanks, wastewater stabilisation ponds or lagoons in Igwaya RGC. The most common sanitation facilities are pit latrine both at homestead and institutional level while wastewater from washing and other tasks are poured on open ground. The closest wastewater stabilisation ponds are in Iganga town, and Jinja City, approximately 87.5Km and 89 Km from Buyende Town. The wastewater management challenge may also be an avenue for individual innovation and adoption of new wastewater technologies, however at RGC level, it will remain a challenge.

The first phase of the project will supply water to about five small and unplanned towns in Igwaya RGC, within Kagulu Sub County.

Improved water supply comes with an increase in the amount of wastewater generated by households and industrial or commercial facilities. Poor disposal or management of the wastewater generated will lead to land and/ or water pollution, formation of foul wastewater channels and ponds in small towns,

which will become eye sores and breeding grounds for water related illnesses and other related sanitation problems if proper treatment systems such as septic tanks are not utilized. In cases where household are connected to 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.

The impact sensitivity is High because Igwaya RGC/Kagulu Sub County does not have a development and structural plan with allocated fecal waste, waste water and general waste disposal sites. Therefore, the impact will be long term and will be spread across all the semi-urban locations/ small towns of Igwaya RGC. Thus, the impact intensity is high, resulting in a Major overall impact significance

		Sensitivity			
		1 Very low	2 Low	3 Medium	4 High
Intensity of Impact	1 Very low	1 Negligible	2 Minor	3 Minor	4 Minor
	2 Low	2 Minor	4 Minor	6 Moderate	8 Moderate
	3 Medium	3 Minor	6 Moderate	9 Moderate	12 Major
	4 High	4 Minor	8 Moderate	12 Major	16 Major

Mitigation measures

- The project (EUWS) should support Kagulu Sub County should develop and implement a development and structural plan that incorporates waste and/or wastewater management;
- EUWS/MWE should create awareness on wastewater management and promote through community/youth skills development affordable technologies such as construction of soak pits, septic tanks at household and institutional levels.

2.16.2.3 IMPACT OF SOLID WASTE NUISANCE AS A RESULT OF THE PROJECT

During the operation of the project, solid waste will be generated from the activities of the water office, and activities of maintaining the water transmission and distribution lines. The wastes that will be generated include food remains, polythene bags, plastic bottles, papers, wrappings for spare parts, and offcuts from plastic pipes among others. Waste expected from maintenance works will include used oils and grease from operations and maintenances activities, containers for treatment chemicals such as chlorine. Wrappings/cylinders for treatment chemicals can be hazardous to humans and the environment if not safely disposed.

Baseline information indicate that there is no designated solid waste disposal site within Igwaya RGC. The closest waste management disposal/management site are in Kaliro and Kamuli Towns, 61.4 Km and 30.8 Km from Buyende Town away from the RGC, respectively.

The impact occurrence is medium since waste will be generated from the project operation. The impact is long term and continuous; however, minimal volumes of waste are expected from the operation of the Igwaya RGC water supply system and sanitation project in the project area resulting in low impact intensity due to the low volumes of waste expected from operations. The overall impact significance is Moderate.

		Sensitivity			
		1 Very low	2 Low	3 Medium	4 High
Intensity of Impact	1 Very low	1 Negligible	2 Minor	3 Minor	4 Minor
	2 Low	2 Minor	4 Minor	6 Moderate	8 Moderate
	3 Medium	3 Minor	6 Moderate	9 Moderate	12 Major
	4 High	4 Minor	8 Moderate	12 Major	16 Major

Mitigation measures

- A Waste management plan for the operation phase of the project should be developed and implemented;
- Waste collection bins should be provided at strategic positions at the water offices, WTP and reservoirs sites for temporary waste storage. The waste collection bins should be provided with covers to avoid spillage by scavengers and clearly coded for sorting purposes;
- The water supply system operator should hire a certified waste collection company to transport the waste for final disposal to designated waste dumping sites by NEMA; and
- Project workers (both sub-contracted and EUWS) should be trained on appropriate waste handling by category for appropriate management.

2.16.2.4 RISK OF POLLUTION FROM POOR MISMANAGEMENT OF SANITATION FACILITIES

The project will support construction of one waterborne toilet at a selected public location to serve the residents of Igwaya emerging towns. Baseline information indicates that the area has no sewerage system. Therefore, the waterborne public toilets will have septic tank systems. The septic tanks shall be emptied and treated at a site (waste treatment plant) gazetted by NEMA such as the waste stabilization ponds at Iganga town, Iganga town, and Jinja City, approximately 87.5Km and 89 Km from Buyende Town. Therefore, the collection, transportation and disposal of sewage must be done correctly to minimise or avoid health risks to communities. Any mismanagement of sanitary waste generated during the operation may lead to pollution of the area which may end up polluting the water sources. This may cause risk to public health.

The sensitivity of the impact is high since there are no sewerage system in the project area, and the allocated sites are significantly far from the project area. The impact is long term and continuous although low volumes of waste are expected from sanitation facilities per time interval (emptying may take 6 months) resulting in medium impact intensity. The overall impact significance is Moderate.

		Sensitivity			
		1 Very low	2 Low	3 Medium	4 High
Intensity of Impact	1 Very low	1 Negligible	2 Minor	3 Minor	4 Minor
	2 Low	2 Minor	4 Minor	6 Moderate	8 Moderate
	3 Medium	3 Minor	6 Moderate	9 Moderate	12 Major
	4	4	8	12	16

		Sensitivity			
		1 Very low	2 Low	3 Medium	4 High
	High	Minor	Moderate	Major	Major

Mitigation measures

- A Periodic maintenance regime including emptying and desludging should be put in place and implemented to prevent sewage over flows.
- Use of manifest system to ensure that the wastes are disposed of at a site (waste treatment plant) gazetted by NEMA.
- A robust management system for the sanitation facilities involving the communities, their leaders and the health workers should be put in place to monitor, detect, and alert the responsible authorities to call for emptying of any septic tank that poses a danger to the community.

2.16.2.5 INCREASED COST PER UNIT/REDUCED AFFORDABILITY

At baseline, more than quarter of the respondents (37.1%) already pay for access to water through vendors and/or user fees at boreholes. Over 5% of the respondents indicated a willingness to pay for piped safe water, with 57.3% willing to pay Ugx.100 per 20l jerry can and above. In fact, most (58.9%) preferring yard taps while 35.8 percent requested for household connection. The project proposes to charge Ugx.83 per 20l jerry can.

Considering the average annual household income levels for most households (>Ugx.4,03,000) and the amount of water fetched on a daily basis (1-3 trips of 20l per trip).

Assumption 1: Average amount considered 1,403,000,

Assumption 2: Average amount of water fetched per day (average no. of trips = 2. 20l fetched per trip = 50l of water used per household per day.

- Average amount of water used per household per year = 50l X 365 days = 18,565l = 928-20l jerry cans a year.
- Amount to be spent on water per household annually: 928 jerrycans X Ugx.83 = Ugx.77,024.

Percentage of annual income spent on access to safe water a year = 5.5%

Based on the assumption, the amount/percentage charged on a 20l jerry can is reasonable and may not hinder affordability and utilization, hence increased substitutability. The impact may Possibly occur. The impact intensity may be Medium to low since most people in the community did not previously pay for access to water, however they indicated a willingness to pay for improved access to clean water. The overall impact significance is Moderate.

		Sensitivity			
		1 Very low	2 Low	3 Medium	4 High
Intensity of Impact	1 Very low	1 Negligible	2 Minor	3 Minor	4 Minor
	2 Low	2 Minor	4 Minor	6 Moderate	8 Moderate
	3 Medium	3 Minor	6 Moderate	9 Moderate	12 Major
	4	4	8	12	16

		Sensitivity			
		1 Very low	2 Low	3 Medium	4 High
	High	Minor	Moderate	Major	Major

Mitigation measures

- a. Alternative water sources such as the boreholes and the mini solar powered piped water supply at Iyingo landing site should continue to be maintained/rehabilitated by the Local government and water user committees.
- b. EUWS under the guidance of MWE should put into consideration the project area's economic profile and vulnerability when setting affordable water prices.

2.16.2.6 RISK OF SEXUAL EXPLOITATION AND ABUSE OF COMMUNITY MEMBERS BY PROJECT WORKERS

This impact refers to sexual exploitation and abuse committed by Project staff against communities, and represents a risk at all stages of the Project, especially when employees and community members are not clear about prohibitions against SEA in the Project. Commercial sexual exploitation is reportedly practiced in bars in the small towns which provides a fertile ground for this practice to be propagated by the workers. Other places are clubs, streets, pimps' homes, brothels, and nearby trucks. The magnitude of the impact is expected to be low because 5-7 workers on average per site are expected to be involved in the operation of the system, some of whom may be recruited locally. The impact is likely to happen however with a low magnitude as abused persons face challenges of unwanted pregnancies, as well as associated psychological torture. The impact significance is **Moderate**.

		Sensitivity			
		1 Very low	2 Low	3 Medium	4 High
Intensity of Impact	1 Very low	1 Negligible	2 Minor	3 Minor	4 Minor
	2 Low	2 Minor	4 Minor	6 Moderate	8 Moderate
	3 Medium	3 Minor	6 Moderate	9 Moderate	12 Major
	4 High	4 Minor	8 Moderate	12 Major	16 Major

Mitigation measures:

- Develop and implement and SEA action plan with an Accountability and Response Framework as part of the C-ESMP. The SEA action plan will follow guidance on the World Bank's Good Practice Note for Addressing Gender-based Violence in Investment Project Financing involving Major Civil Works (Sept 2018) and the Ministry of Gender, Labour and Social Development (Social, Safety and Health Safeguards Implementation Guidelines for Local Governments, 2020)
- The SEA action plan will include how the project will ensure necessary steps are in place for:
 - **Prevention of SEA:** including COCs and ongoing sensitization of staff on responsibilities related to the COC and consequences of non-compliance;

- **Response to SEA:** including survivor-centred multi-sectoral referral and assistance to complainants; staff reporting mechanisms; written procedures related to case oversight, investigation, and disciplinary procedures at the project level
- **Engagement with the community:** including development of confidential community-based complaints mechanisms discrete from the standard GRM; mainstreaming of PSEA awareness-raising in all community engagement activities; IEC materials; regular community outreach to women and girls about social risks and their PSEA-related rights;
- **Management and Coordination:** including integration of SEA in job descriptions, employments contracts, performance appraisal systems, etc.; development of contract policies related to SEA, including whistle-blower protection; training for all project management; management of coordination mechanism for case oversight, investigations, and disciplinary procedures; supervision of dedicated PSEA focal points and trained community liaison officers

2.16.3 IMPACT ON OCCUPATIONAL HEALTH AND SAFETY

During the operation phase, the operation and maintenance crews shall be exposed to; water treatment chemicals, noise, and vibrations, risk of battery explosions, risk of fires due to the combustibility of water treatment chemicals, and many other hazards. The Sensitivity of occurrence of the impact is low, and the intensity of the impact considered low. The O&M works will have a Minor significance on the health and safety of the employees.

		Sensitivity			
		1 Very low	2 Low	3 Medium	4 High
Intensity of Impact	1 Very low	1 Negligible	2 Minor	3 Minor	4 Minor
	2 Low	2 Minor	4 Minor	6 Moderate	8 Moderate
	3 Medium	3 Minor	6 Moderate	9 Moderate	12 Major
	4 High	4 Minor	8 Moderate	12 Major	16 Major

Mitigation Measures

- Conduct a thorough Hazard Identification and Risk Assessment to capture all possible hazards, risks, and mitigation measures
- Provide necessary personal protective equipment to all employees
- Develop an extensive occupational health safety management plan
- Train employees on how to work safely
- Provide first aid boxes, with trained first aiders
- Provide accident insurance for all employees
- Provide medical insurance for all employees
- Provide fire extinguishers and train employees on fire fighting

2.17 CUMULATIVE IMPACTS

2.17.1 VALUED ENVIRONMENT AND SOCIAL COMPONENTS

Multiple projects currently under implementation and those planned within the spatial and temporal framework impact a set of environment resources and social systems. Although the scope of this report only covers the proposed development of the solar powered piped WSSS in Igwaya RGC, there are other projects in the project area. The identified VECs may include;

- a) **Material Source Areas:** Projects implementing infrastructure development especially water pumping station, water reservoirs, booster stations, water office blocks and sanitation facilities shall require gravel, murrum, sand, rocks and among other products hence impacting on source areas.
- b) **Shared Land Corridors:** Linear projects like roads, power lines and telecom cables normally share corridors. Relocation of such services is an impact and acquisition and compensation of such corridors may raise social and economic concerns.
- c) **Water Resources:** Project implementation in Igwaya may impact water sources especially during the dry season. The relatively high population in Igwaya trading centre and increase in patients at Igwaya HC III may heighten the challenge. Additionally, the proposed borehole is in Mailo village near L. Kyoga, therefore, the surface and underground water interactions may occur leading to contamination.
- d) **Land and Wetlands:** The project area has a major mushrooming trading centre, namely; Kagulu SC, which continue to expand due to the population growth as a result of services within and near the centres such as schools and Kagulu HC III being the biggest town from surrounding landing sites hence putting pressure on land and wetlands (cultivation, settlements and sanitation facilities). Kagulu boreholes are located within the flood plain of L. Kyoga, which renders it prone to floods during the rainy seasons from increased surface runoff in case of continuous and uncontrolled land use activities e.g., clearing landcover and wetland degradation.
- e) **Social Services:** The most critical service affected by multiple construction projects is health infrastructure. Increased inflow of workers may place a burden on health units. Security services may experience increased demand due to the inflow of workers.
- f) **Gender and Sexual Harassment:** Increased inflow of migrant labour working on different projects may increase the anonymity of workers and possible offenders. Because there are many contract workers it becomes difficult to isolate those engaged in illicit sexual behaviour and further individual involved to harassment of women. There are several on-going projects and activities by Government of Uganda and private sector that target fishing within Igwaya RGC. Possible concurrent implementation of all these projects and interventions within the same project area or in proximity of the RGC project has the potential to generate cumulative impacts.

2.17.2 IDENTIFIED CUMULATIVE IMPACTS

The key cumulative impacts and risks associated with the project are summarized below:

- The ease of water fetching as a result of the project is expected to translate into an increase in the enrolment ratio, especially for girls, and in the female literacy rate and contribute to the reduction in social conflicts related to water use such as those associated with the congestions at the existing boreholes. This impact will be enhanced through ensuring that most of the communities in the project foot-print are connected or have access to the piped water.

- However, as noted under negative impacts, the project will supply water to more than 1 small and unplanned town and other 4 villages in Igwaya RGC. Improved water supply comes with an increase in the amount of wastewater generated by households and industrial or commercial facilities. Poor disposal or management of the wastewater generated will lead to land and/ or water pollution, formation of foul wastewater channels and ponds in small towns, which will become eye sores and breeding grounds for water related illnesses, lead to contamination of soil and/or groundwater and other related sanitation problems if proper treatment systems such as septic tanks are not utilized. There is therefore need to improve physical planning and conduct behaviour change campaigns to maximise benefits from the projects and deter cumulative negative impacts of the same.
- The hydrological connection between surface water (L. Kyoga) and groundwater (proposed boreholes) may be altered. The impact of surface water on groundwater table will depend on the soil permeability (due to the proximity of about 200m) as well as the agricultural practices, and settlements in Igwaya micro-catchment. The infiltration of surface water into the borehole may lead to groundwater contamination which may deteriorate the water quality hence triggering the treatment costs.
- Contribute to reduction in water borne diseases: The proposed water Supply and sanitation project will contribute towards reduction in the prevalence rates of waterborne diseases, especially cholera, dysentery and diarrhoea and the suspected bilharzia. This expected since the communities will access clean water for drinking and domestic activities. The people will have access to safe water; the people will have access to improved sanitation facilities. The awareness campaigns for public health, hygiene, and sanitation particularly targeted at women and girls will be widened to include measures for tackling HIV/AIDS and other diseases. The project will have significant strategic benefits in reducing the burden on the cost of health care services as diseases could be reduced. Improved water supply and sanitation will promote good health and reduce health care costs thus making overall national savings for investment in other developmental activities.
- Improved enrolment ratio of girl-child at primary school levels: The project is expected to translate into an increase in the enrolment ratio, especially for girls, and in the female literacy rate. Similarly, the ease of water fetching will contribute to the reduction in social conflicts related to water use such as those associated with the congestions at the existing boreholes. This impact will be enhanced through ensuring that most of the communities in the project foot-print are connected or have access to the piped water.
- Ensure environmental sustainability: The skill for managing water supply and sanitation 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. This impact will be enhanced through training of local communities on aspects of environmental and social management.
- 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 daily 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). This impact will be enhanced through:

Skills and Technology Transfer: Skills and technology transfer is foreseen to take place in all phases of the project, though most importantly at the construction phase. It is anticipated that construction works will be contracted to a reputable Ugandan firm which will employ and train local labour. This will avail an opportunity for skills and knowledge transfer into Igwaya community in Buyende District. The operational phase will equally offer skills build-up, particularly for students from technical institutes with respect to the operation, management and maintenance of the various water supply and sanitation facilities. The project proposes to a system manager, an accountant, a receptionist, a plumber, and a systems overseer. Two additional operators will be required to run the water treatment plant. The entire recruitment process for the workers will be managed by the EUWS in accordance with Uganda labour laws, the World Bank safeguard policies and EHS requirements/guidelines. Skilled local labour will be prioritised during recruitment.

3 PROJECT DESCRIPTION

This chapter describes the design and proposed locations of the Igwaya RGC Water Supply System and Sanitation Project components.

3.1 THE PROJECT AREA

The proposed Igwaya RGC Water Supply System and Sanitation Facilities will be located in Kagulu Sub County, Buyende district, Busoga Sub region in Eastern Uganda.

Igwaya RGC is approximately 25 Km by road from Buyende Town, and 113 Km through Kamuli from Jinja, the main city in Busoga Sub region. Buyende District is bordered by the districts of Kamuli to the South, Luuka to the Southeast, Kaliro to the East, Pallisa to the Northeast, Serere to the North, Kaberamaido and Amolatar to the Northwest and Kayunga to the West. The project main components will be located at GPS coordinates indicated in Table 3-1 **below**.

Table 3-1: Locations of Main Project Components

No.	Component	GPS Coordinates (UTM, 36N)	Village	Parish
1	Borehole (DWD 60898)	530610.86E, 138914.46N	Mailo	Bumogoli
2	Reservoir Tank	534045.80E, 138139.84N	Butemera A	Kagulu
5	Field water office	533792.72E, 136487.71N	Kagulu S/C	Kagulu
3	Sanitation facility	533940.10E, 136577.39N	Butemera	Kagulu

The project will cover 5 villages, namely; Nakawolo LCI and Mailo in Bulamoji Parish, and Butemera LCI B, Butemera LCI A and Busubo Mpanga in Kalgulu Parish, Kagulu Sub County, Buyende District shown on a map in **Figure 3-1** below.

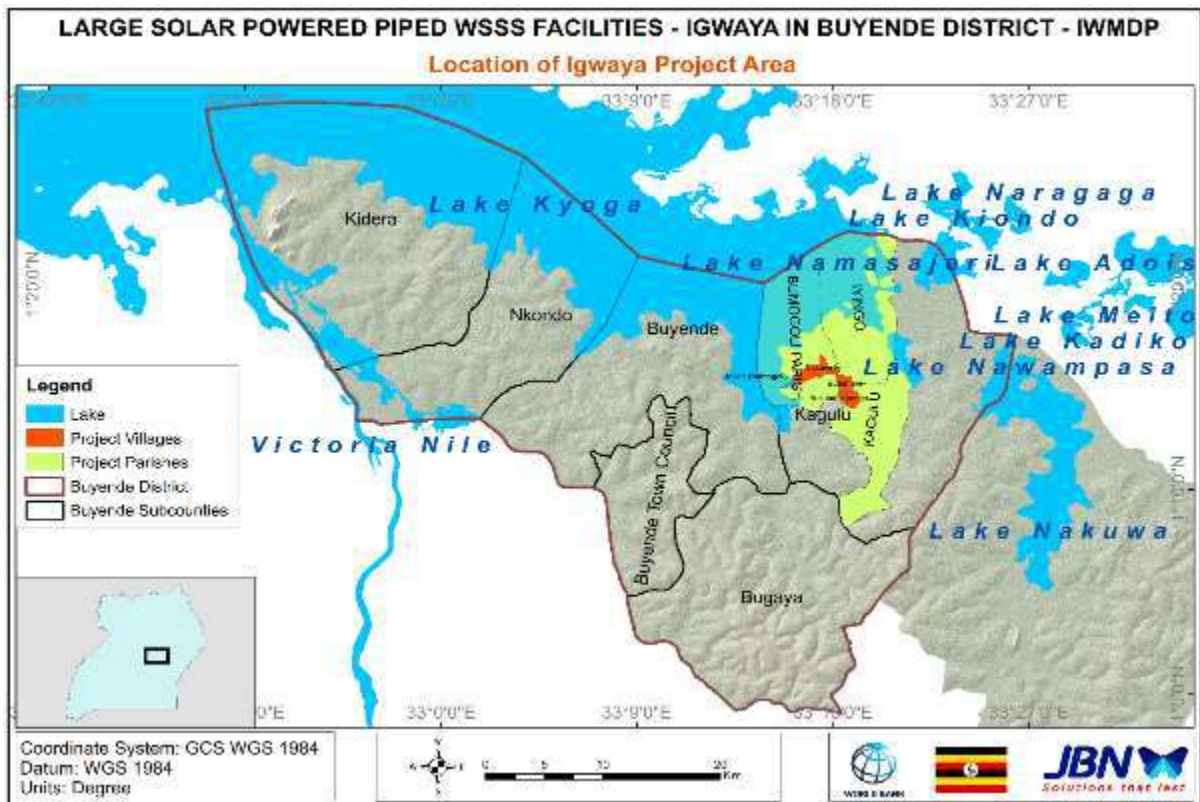


Figure 3-1: Proposed location of Igwaya RGC water and sanitation facility project

3.2 WATER DEMAND

Igwaya RGC WSS was designed based on a 20-year design period, starting with the initial year 2019 up to the ultimate year 2041. The projected population to be served by the water supply system by ultimate year is 8,076 people. The Maximum Day Demand (MDD) over a 16-hour pumping regime, which depicts the daily water consumption by domestic and non-domestic consumers is 239.53 m³. The water demand in Table 3-2 below was calculated based on the current and future projections on unit consumption rates by different categories of users (based on the ability to pay (5% of Income to access safe water), the preferred levels of service (house connections, tap standard and yard taps) and the total population of consumers. At a tariff of Ush 83/20 litres. Table 3-2 summarizes the water demand in Igwaya RGC

Table 3-2: Maximum Water Demand

Design year	MAXIMUM DAY DEMAND (M ³ /DAY)					
	2019	2021	2026	2031	2036	2041
Population in Served	3,198	3,479	4,295	5,301	6,543	8,076
Maximum water demand	88.85	117.11	122.43	153.10	191.48	239.53

Source: DED.

3.3 PROJECT COMPONENTS

Igwaya RGC will be supported with a water supply system and a sanitation facility. The water supply system will comprise of:

- i) Production borehole (DWD 60898) with solar powered submersible pump,
- ii) Solar powered pumping station,
- iii) Transmission main to storage reservoir,
- iv) Pressed steel storage tanks,
- v) Primary and secondary distribution systems and yard connections, and
- vi) A field water office.

Under sanitation, the project will construct a 6-stance waterborne public sanitation facility within the RGC.

3.3.1 THE WATER SUPPLY SYSTEM

The Igwaya RGC WSS is designed to serve 5 villages in Bumogoli and Kagulu Parishes, Kagulu Sub County, Buyende District by 2041.

The project will utilize water from a borehole (**DWD 60898**) in Mailo Village, Bumogoli Parish. On a daily basis, 160m³ of water will be pumped and transmitted using a 6.34 Km transmission line from the borehole in Mailo Village to a reservoir in Igwaya TC – Kagulu Parish. From the reservoir, water will be distributed by gravity using a 5.848 Km distribution line to five (5) villages spread in the 2 parishes of Kagulu Sub County. The villages are; namely, Nakawolo LCI, Mailo, Butemera LCI B, Butemera LCI A and Busubo Mpanga, (**Figure 3-2**).

The size and capacity specifications of the water supply system components is presented in Error! Reference source not found. below. The designs and technical drawings for the water supply system components are included in **Annex B**

Table 3-3: General specifications of the main water supply system components

PARAMETER	DESCRIPTION
Project Area	Igwaya RGC
Parish	Kagulu and Bumogoli
Sub County	Igwaya
Water Source	Borehole DWD 60898
Borehole Yield	10.0 m ³ /hr
Borehole Pump	Q = 10.0 m ³ /hr, H = 243 m
Water Treatment	Post Chlorination (Dosatron D30)
Power Source	Primary Power Source - Solar Power (50 multi crystalline PV solar panels rated at 280pW 24 Volts DC, 105 cells) and Secondary Power Source –Hydroelectricity (Grid)
Maximum Water Demand (ultimate year)	239.5 m ³ /day
Reservoir tank	69 m ³ Tank on 15 m tower
Transmission	6.34km

PARAMETER	DESCRIPTION
Distribution System	5.85 km
OD 225 uPVC PN10	1,776m
OD 110 uPVC PN10	3,034m
OD 50 HDPE PN10	1,038
Intensification Network	
OD40 HDPE PN10	1,000 m
OD32 HDPE PN10	1,000 m
OD25 HDPE PN10	2,000 m
Service Connections	55
PSPs	7
Sanitation	Public Toilet, one 6 stance waterborne toilet

LARGE SOLAR POWERED PIPED WSSS FACILITIES - IGWAYA SITE IN BUYENDE DISTRICT - IWMDP

All RGC Pipeline of Igwaya Project Area

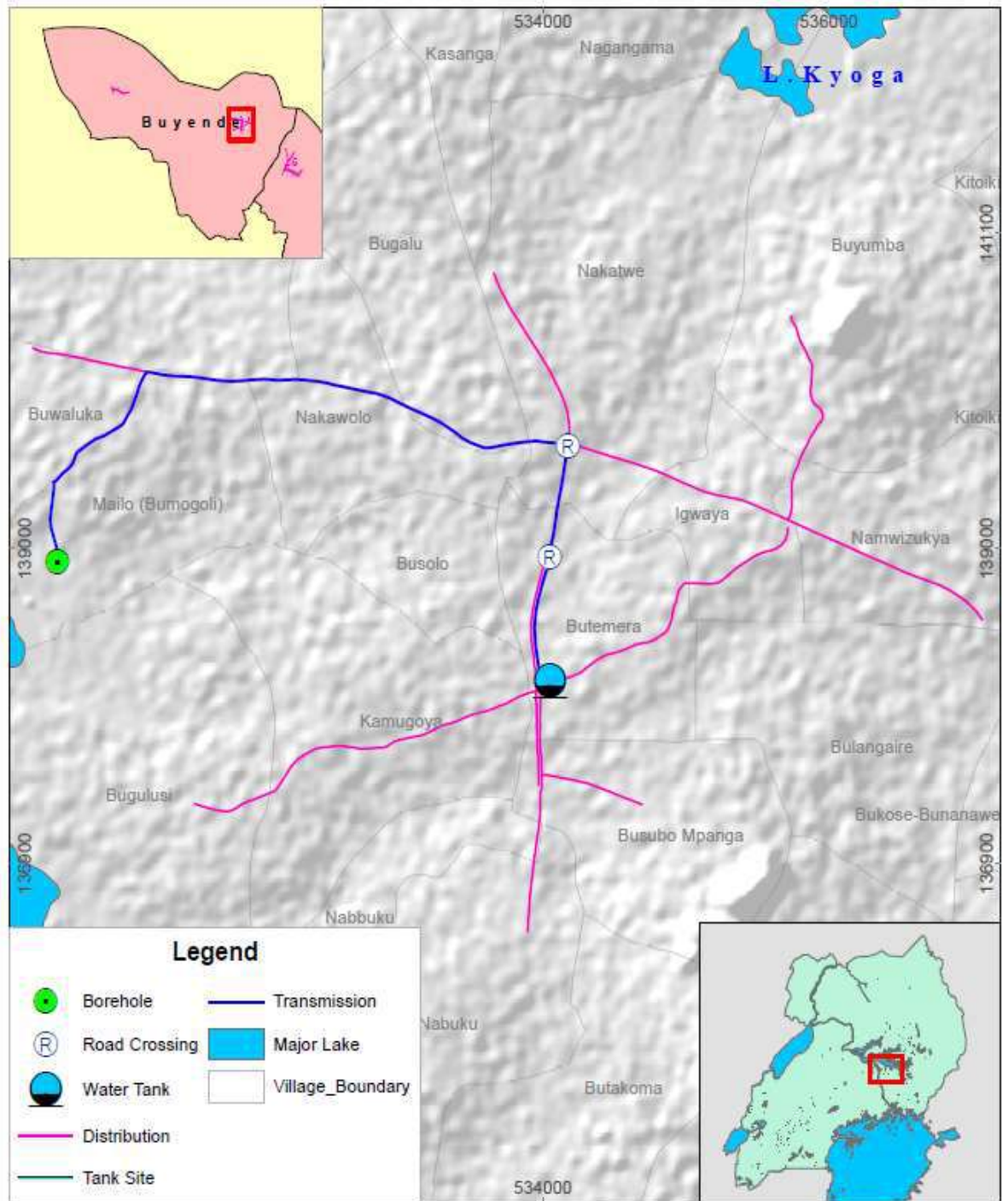


Figure 3-2: Location of project components in Kagulu Sub County, Buyende District

3.3.1.1 WATER SOURCE

The proposed water supply systems will abstract water from a borehole (DWD 60898) in Mailo village, Bumogoli Parish, at coordinates 530610.86E, 138914.46N (**Figure 3-3, Figure 3-4**).



Figure 3-3: Proposed Borehole (DWD 60898) water source

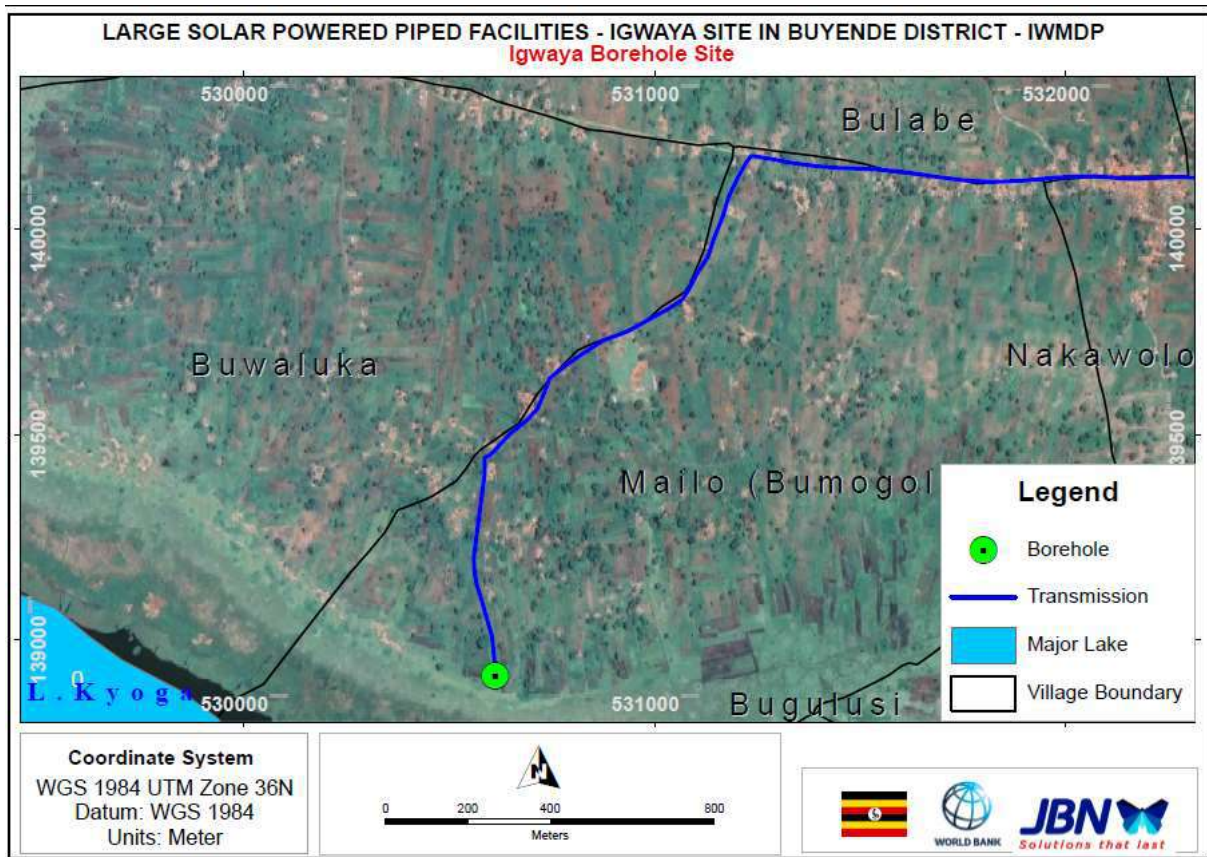


Figure 3-4: Map of the proposed ground water abstraction site for Igwaya RGC

3.3.1.1.1 BOREHOLE (DWD 60898)

At the borehole, a submersible pump with a complete control kit and dry run protection will be installed (**Table 3-4**). A pump-house will be constructed and detailed including plastering and painting, fitted with steel panel doors, windows and ventilation units; including security lights. A Perimeter fence of will be constructed using chain link and barbed wire fastened to steel poles will be secured in a concrete foundation. Paspalum grass will be planted in the compound area.

Table 3-4: Borehole specifications

Component	Specification
Borehole Number	DWD 60898
Borehole Yield (m ³ /hr)	10.0
Hours of Pumping (hr)	16
Total Daily Delivery (m ³ /day)	160
Pumping Main Section No. 01 (From Pump Installation Point to Ground Level at Borehole)	
Ground Level at Borehole (m AMSL)	1053.760
Pump Installation Depth in Borehole (m BGL)	102.000
Static Lift (m)	102.000
Cwh	120
Pipe Details	DN 50 Steel Pipe
Pipe Diameter ND (mm)	50.00
Pipe Diameter ND (m)	0.050
Flow in Pipe (m ³ /hr)	10.000
Flow in Pipe (m ³ /s)	0.003
Velocity (m/s)	1.41
Length of Pipe Section No. 01 (m)	102.00
Friction Loss (m)	6.16
Fitting losses - 10% (m)	0.62
Total Head in Section 01 (m)	109
Source: Project estimates.	

3.3.1.1.2 POWER SUPPLY

The borehole pump will use a hybrid of solar energy and a standby generator. The solar energy can only solely satisfy the demand over a 6hr pumping period; therefore, a standby generator will be required. The system will consist of multi crystalline PV solar panels rated at 280pW 24 Volts DC, 90 cells, with a control unit, support structure, and electrical accessories and cabling. An additional 20

cells will also be provided as backup power. Standby power will be provided by 1No. 50KVA diesel driven generator. The pump power requirement is summarized in **Table 3-5** below.

Table 3-5: Borehole Pump Power Requirement

LOCATION	PARAMETERS								
	Head (m)	Flow (m ³ /hr)	Power (kW)	Required Motor Size KW	Available Motor (kW)	kva	Total power (KVA)	Amperage (A)	Starting KVA
DWD 60898	242.72	10.00	10.58	12.2	13.0	16.25	16.25	22.61	40.63

Source: Project Estimates

3.3.1.2 WATER TRANSMISSION PIPELINE

Water will be pumped from a borehole in Mailo village and transmitted for 6.34 Km along existing footpaths in Mailo village and access roads in Nakawolo, Bugalu, Nakawate and Butemera A villages to the storage reservoir at Igwaya Trading Centre (Butemera A village) (**Figure 3-5**).

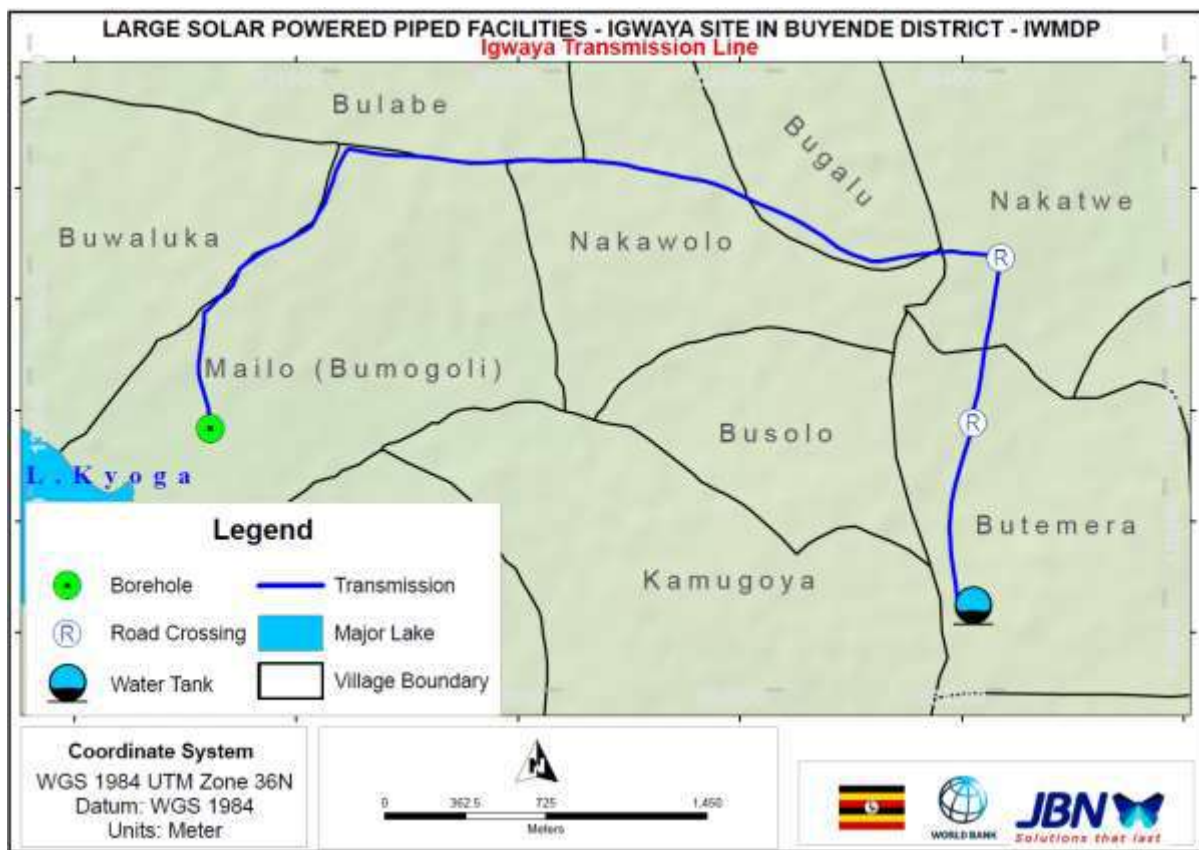


Figure 3-5: Water Transmission main

The transmission mains will consist of a borehole riser main and pumping main from the borehole to the storage reservoir. The nature of the environment traversed by the transmission pipe is not rich in terms of biodiversity. The design specifications for the transmission line are presented in **Table 3-6** below.

Table 3-6: Design specifications for water transmission

Component	Specification
Pumping Main Section No. 02 (From Ground Level at Borehole to Inlet level of Reservoir)	
Reservoir Tank inlet level (m AMSL)	1071.400
Ground Level at Borehole (m AMSL)	1053.760
Static Lift (m)	17.640
Cwh	140
Pipe Details	OD 75 HDPE PN16
Pipe Diameter ND (mm)	61.40
Pipe Diameter ND (m)	0.061
Flow through pipe section 02 (m ³ /day)	10.000
Flow through pipe section 02 (m ³ /s)	0.003
Velocity (m/s)	0.94
Chainage at Borehole	0+000
Chainage at Reservoir	6+338
Length of Pipe Section No. 02 (m)	6,338.00
Friction Loss (m)	105.73
Fittings losses - 10% (m)	10.57
Total Head in Section 02 (m)	134
Total Head from Borehole to Reservoir (m)	243
<i>Source: DED</i>	

3.3.1.3 RESERVOIR

3.3.1.3.1 TANK

The reservoir tank will be located in Butemera A Village, Igwaya TC, Kagulu Parish, Kagulu Sub County (**Figure 3-6, Figure 3-7**).



Figure 3-6: Igwaya RGC reservoir tank site in Butemera A village

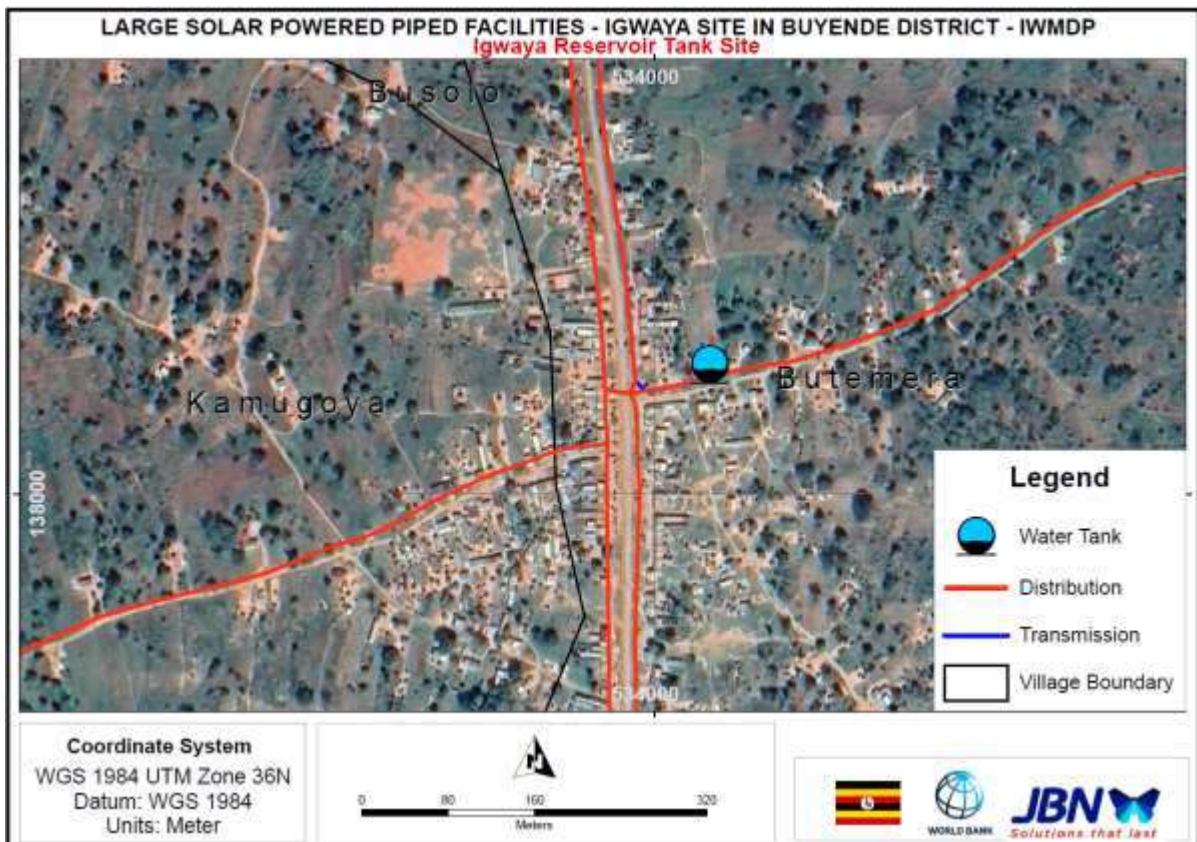


Figure 3-7: Google location of the Igwaya RGC reservoir tank

A pressed steel tank with square 1.22m panels measuring 6.10m long, 4.88m wide, and 2.44m high was adopted for the water supply system. Due to the topography of the RGC and the pressures experienced in the distribution network around the tank and in the far reaches of the network, the reservoir tank will be erected on a 15m high steel tower. The required storage capacity has been computed at 30% of the maximum day demand. The required storage capacity is 72m³. It is proposed to install a 69m³ storage reservoir as shown in **Table 3-7** below.

Table 3-7: Size of reservoir tank

ITEM	2019	2021	2026	2031	2036	2041
MD Demand- m ³ /day	89	117	122	153	191	240
Storage Capacity (m ³)	69	69	69	69	69	69
Hours of Storage	19	14	14	11	9	7
Storage Capacity (%)	78%	59%	56%	45%	36%	29%
<i>Source: DED</i>						

3.3.1.3.2 WATER TREATMENT/DISINFECTION FACILITIES

Disinfection of the water from the Igwaya RGCs production well will be achieved by the installation of a DOSATRON online proportional chemical dozer at the sump. However a possibility of using local materials such as sodium chloride to generate chlorine gas will also be looked at. A sump will be constructed to receive the water from the borehole. The water will be disinfected at the sump after which it will be pumped to the reservoir tank. One of the sump pump house rooms will be used to house the dozer. Water Distribution Network

3.3.1.3.3 DISTRIBUTION NETWORK

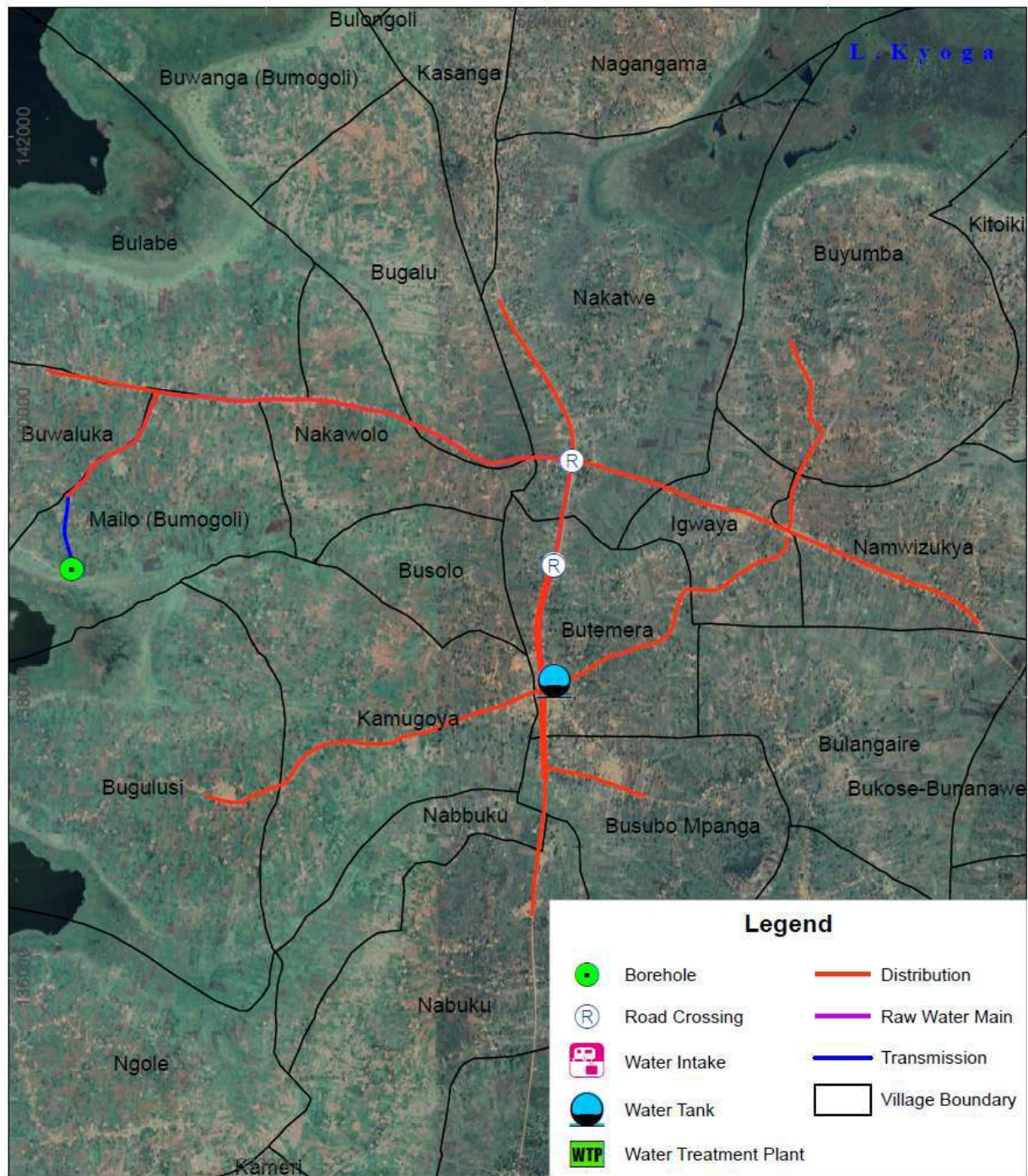
The distribution network for the project area will be gravity fed from the reservoir tank. The complete network of 21.305km was designed using EPANET 2.0 software for the ultimate year 2041 with a peak hour factor of 2.0. However, for the first phase of the project, a distribution network of approximately 5.9Km (**Table 3-8**) is proposed to serve Nakawolo LCI, Mailo, Butemera LCI B, Butemera LCI A and Busubo Mpanga villages (**Figure 3-8**).

Table 3-8: Distribution Mains – Phase I

PIPE DETAILS	LENGTH (MM)
OD 225 uPVC PN10	1,776
OD 110 uPVC PN10	3,034
OD 50 HDPE PN10	1,038
Total	5,848

The estimated quantities for network intensification lines for Phase I are 2 Km of pipe work and the start-up number of connections is estimated as 55No. and 7No. public stand posts.

LARGE SOLAR POWERED PIPED WSSS FACILITIES - IGWAYA SITE IN BUYENDE DISTRICT - IWMDP
Igwaya Distribution Lines



Coordinate System
 WGS 1984 UTM Zone 36N
 Transverse Mercator
 Datum: WGS 1984
 Units: Meter

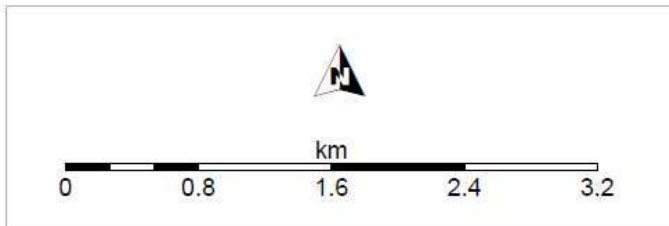


Figure 3-8: Igwaya RGC - Groundwater Supply System Distribution network

Along the distribution network, two district road crossings (road crossing 2- Igwaya T/C and road crossing 4 – Butemera T/C) and two community access road crossings are envisaged as presented in Table 3-9 and **Figure 3-9** below.

Table 3-9: Villages and GPS coordinates for road crossings

Road Crossing	Village	Easting (E)	Northing (N)
1	Busubo Mpanga	533995.00 m E	137483.00 m N
2	Butemera	533977.00 m E	138092.00 m N
3	Nakatwe	534164.00 m E	139686.00 m N



Figure 3-9: Road crossings along the transmission line

3.3.1.3.4 NETWORK INTENSIFICATION

There are some parts of the proposed water supply areas where the trunk mains are adequate but the mains are too far away for the customers to be able to connect at reasonable cost. As a measure to increase the densification of the distribution networks as a drive to increase the customer base, and allow a neater layout of the service connection pipes, some pipe work intensification will be required. The intensification lines will be demand-driven, and installed where there are adequate applications for connections.

3.3.1.4 ACCESS ROADS

Access to all the project components will be gained through existing public roads, given their convenient location in close proximity to the existing road network. However, there is no designated access to the borehole site. An access road will need to be open to allow convenient access by the construction and operations teams. Access to the reservoir will be along a town access route in Butemera A village.



Figure 3-10: Access footpath to the borehole site



Figure 3-11: Access to the reservoir site in Butemera A village

3.3.1.5 WATER FIELD OFFICE

The field water office will be located at Kagulu Sub County head office at GPS coordinates 533792.72E, 136487.71N. The office (**Figure 3-12**) will include a general office, manager’s office, accounts office, sanitation facilities, postage and a store and will be refurbished with a power supply and internet connection (for the online billing and payment system) and IT equipment.



Figure 3-12: Design of the project water field office

3.3.2 SANITATION FACILITY

The project will construct 1N^o. 6 stance water borne toilets at (UTM 36N) GPS coordinates 533940.10E, 136577.39N at Kagulu Health Centre III in Kagulu Sub County (**Figure 3-13**). The facility will be comprised of:

- i. Gender separation (3No. stances for women and 3No. stances for men)
- ii. A shower,
- iii. A urinal,
- iv. 1No. stance for the disabled for both men and women,
- v. Handwashing facility, and
- vi. A 1000 litre water storage tank.

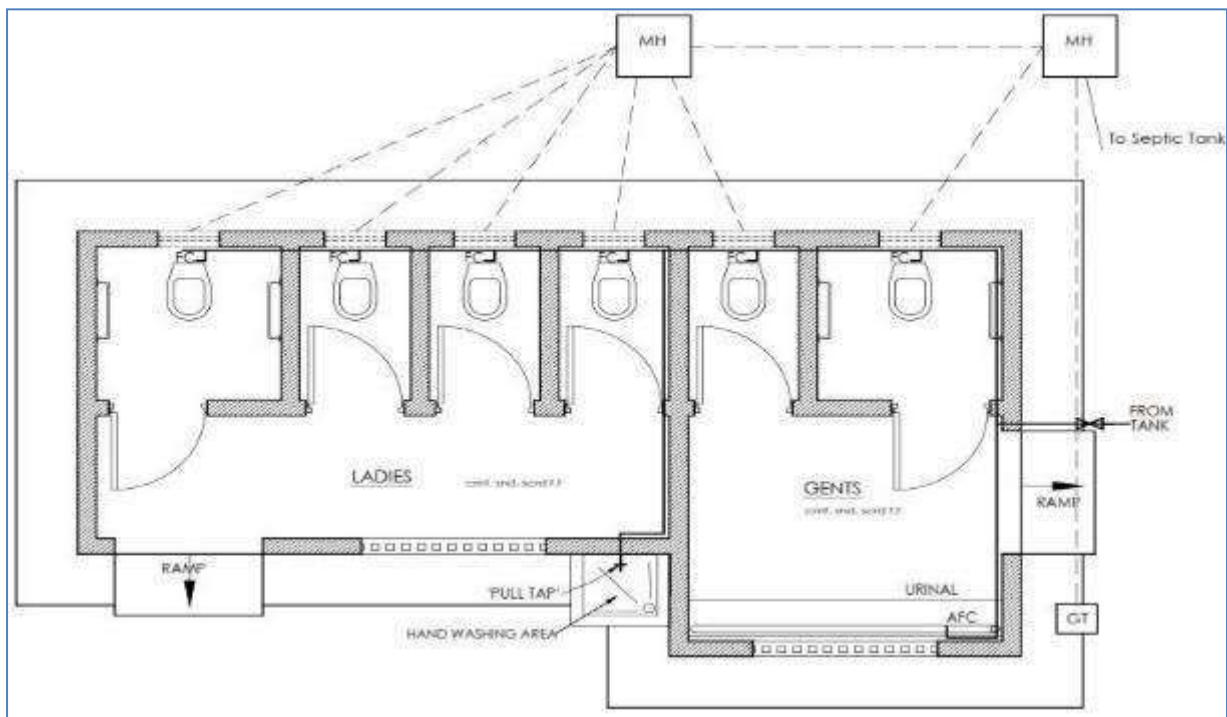


Figure 3-13: Design for the proposed water borne sanitation facility

3.4 PROJECT IMPLEMENTATION PHASES

The proposed Igwaya RGC solar powered Water Supply and Sanitation Systems works will be implemented in three phases, namely:

- i. Construction activities and installation of different water system infrastructure facilities.
- ii. Water system and sanitation facilities operation and maintenance works.

3.4.1 CONSTRUCTION PHASE

3.4.1.1 LABOUR FORCE

During construction phase, the project shall hire a supervising consultant who shall oversee the implementation of the project on behalf of the developer. The Supervising Consultant shall have among others a Resident Engineer, Environmental Expert and Social Safeguards Expert.

Others workers on the project will include both skilled and non-skilled workers, who will be sourced by the contractor according to his manpower needs. On average, an estimated 20-30 people are

anticipated to constitute the workforce on the project. These will typically include civil engineers, Environmentalist, Sociologist a, Health and Safety officer, Site Nurse, architects, site supervisor, foremen, equipment operators, administrators and support staff and about 15 – 20 casual labourers among others. Typically, locals will be employed depending on their skills set. While in many cases the workers will arrive at the site on foot, some pool transport can be provided as necessary to bring workers to the project sites. The entire recruitment process for the workers will be managed by the contractors in accordance with Uganda labour laws, the World Bank safeguard policies and EHS requirements/guidelines.

3.4.1.2 CONSTRUCTION MATERIALS AND EQUIPMENT

Construction Materials

Where there is need for local materials such as water, sand, aggregates and gravels, the contractor shall be required to get from legally existing and authorized sources. The supervising consultant shall undertake due diligence with further guidance from MWE and Local Governments to ensure that all material sources are acquired in compliance with the country E&S regulations. establishment of the sites.

The structural designs will make use of as much of the available local materials as possible provided they meet the project specifications for the anticipated design quality, strength, and life of the structures. As such, due consideration will be given to use of locally available materials such as timber, sand, aggregates and steel reinforcement and cement produced locally in the region and or country.

All component materials will be in conformance with the durability requirements of the project sites/localities. Material specifications shall meet the requirements of MoWT General Specifications Part 6 and the Special Specifications of the designs will be informed by international best practices. The overall objective in the selection of materials therefore will be to minimize maintenance requirements and facilitate simple and easy construction of structures.

Equipment

Equipment to be used during the implementation activities of the proposed solar-powered water supply and sanitation systems and support facilities under Igwaya RGC is envisaged to include excavator(s), wheel loaders(s), dump trucks and tippers, concrete mixers, welding machines and water bowser(s). Energy requirements including diesel fuel for the construction equipment will be locally sourced and it is recommended that all servicing of the equipment and heavy machinery be undertaken by a licensed and qualified service provider. A parking area for heavy mobile machinery and vehicles should be especially designated to allow for safe turning, servicing, and security on site during construction and this should serve as muster stations and staging areas for vehicles and equipment in case of any emergency.

3.4.1.3 CAMP SITES

It will be necessary for the contractor to establish workers camp to provide accommodations for experts that might come outside the project area as well as project offices for the contractor and supervising consultants. Other facilities with the camp shall include: parking yard, material storage yard, kitchen, sanitary facilities, site clinic etc. All the auxiliary facilities shall be subjected to independent and comprehensive Environmental and social impact assessment and approvals shall be secured.

3.4.1.4 OTHER AUXILIARY FACILITIES

Secondary facilities associated with implementation activities of the proposed solar-powered water supply and sanitation systems and support facilities under Igwaya RGC will include materials stockpile areas, workshops, equipment parking/storage yards, temporary site stores and sanitary facilities, site clinic etc. In addition, it will be necessary for the contractor with guidance from MWE to undertake assessments that include Technical, Environmental and social to establish suitability for the proposed sites. The contractor shall properly engage and document the land acquisition processes including agreements and consents. The supervising consultant shall undertake due diligence with further guidance from MWE and Local Governments to ensure E&S compliance in acquisition and establishment of the sites. Thus, all the facilities shall all be established by the contractor with approval of the supervising consultant and local leadership. On completion of the project implementation activities, all support infrastructure shall be decommissioned, and all disturbed areas shall be restored to their original state through landscaping and re-vegetation.

3.4.1.5 WASTE HANDLING AND DISPOSAL

During the construction, the contractor shall generate both hazardous and non-hazardous wastes which must be managed in by a waste handler in accordance with the national environment (waste management) regulation 2020 and Local Government Act (Amended) 1997.

3.4.2 PROJECT MANAGEMENT (OPERATIONS AND MAINTENANCE)

3.4.2.1 WATER SUPPLY SYSTEM

The proposed operation and management option is to handover the water supply system and public sanitation facilities to the Eastern Umbrella of Water and Sanitation (EUWS). Within the decentralization framework, the experience and capacity of Umbrella organization, applied directly to the management of the newly constructed facilities will increase the likelihood of sustainable commercial operations and management of the town systems in the next 5-10 years. It can use experience gained elsewhere in the past 5-years to extend services to rural & urban poor areas. The key roles and responsibilities of EUWS will be:

- a. Operating the system in accordance with the set guidelines
- b. Maintaining the system,
- c. Developing the system,
- d. Billing the consumers,
- e. Collecting revenue,
- f. Receiving applications for and making new connections,
- g. Making extensions to the system or assets,
- h. Attend to all customers,
- i. Prepare draft business plans for the authority,
- j. Prepare regular status reports for the operations of the system,
- k. Maintain regular accounts for submission to the Ministry.
- l. Operation of the Management Information System (MIS) as provided by the Ministry.
- m. Keep records of the operation of the water supply system - both physical and technical,
- n. Ensures that all accounts are audited,
- o. Set and publish Tariff & Charges.

3.4.2.2 SANITATION FACILITY

Operations and maintenance of the water borne toilet will be handed over to Kagulu Health centre III Management. The health Centre will be responsible with the day-to-day maintenance of sanitation facility. The excretion will be directed to a septic tank which will occasionally be emptied. It is proposed that the health centre disposals of the faecal sludge at the nearest faecal sludge treatment facility in Kamuli town, about 44km from the Igwaya Trading Centre.

3.4.2.3 HUMAN RESOURCE

The EUWS will employ a system manager, an accountant, a receptionist, a plumber, and a systems overseer. Two additional operators will be required to run the water treatment plant. The entire recruitment process for the workers will be managed by the EUWS in accordance with Uganda labour laws, the World Bank safeguard policies and EHS requirements/guidelines.

Table 3-10: Permanent roles during operation phase

Position	No. of Staff Required
Manager	1
Accounts Officer	1
Secretary	1
Plumbers / Technicians	3
Meter Readers	4
Intake Attendants / Guard	6
Total	16
Project estimates	

3.5 PROJECT PROPONENT AND INVESTMENT COST

3.5.1 THE PROJECT PROPONENT

Name and physical address of project proponent:

The Permanent Secretary

Ministry of Water and Environment,

Directorate of Water Development,

Rural Water Supply Department

Plot 3-7, Kabalega Crescent Road,

P.O. Box 20026, Kampala.

Email: ps@mwe.go.ug / mwe@mwe.go.ug

3.5.2 PROJECT INVESTMENT COST

The overall project has a Capital Investment Cost Estimate of Ush **2,228,605,813** see *valuation certificate (Annex H)*.

4 ANALYSIS OF ALTERNATIVES

This ESIA considered analysis of the various feasible alternatives of the project under different scenarios to identify and describe the potential feasible alternatives that would allow the project to reach its objectives. It also presents a comparison of the potential alternatives on the basis of several factors which can influence the choice of alternatives to be considered by a Developer i.e. technical, economic, environmental and social criteria, as well as of public views and concerns.

The comparison of alternative was done to evaluate and address the design alternatives that were examined and proposed during the feasibility and pre-design study of the proposed project. Therefore, according to the 2011 EIA Guidelines for Water Resources related projects, the following alternatives/options were considered:

- a. Project or No Project Alternatives;
- b. Water Source Alternatives;
- c. Water Treatment Technology Selection Alternatives;
- d. Tarif Alternatives for appropriate Operation and Maintenance (O&M) of the systems; and
- e. Alternative technology for sanitation facilities.

For each of the alternatives, the potential environmental and social impacts, including land and energy requirements implications were analyzed as possible, including their economic values where feasible. The selected alternative/options were the most reliable and suitable under local conditions considering, their institutional, training, and monitoring requirements i.e., strikes a balance on the above factors with viable mitigations measures for residual impacts.

4.1 THE “NO PROJECT” ALTERNATIVE PROJECT JUSTIFICATION

4.1.1 KEY BENEFITS OF THE “NO PROJECT” OPTION

- i. The water resource potential of the proposed ground water sources would remain unchanged as water will not be extracted;
- ii. Short-term impacts such as noise, dust generation, vibrations, etc., emanating from construction activities would be avoided;
- iii. The loss of the relatively small amounts of privately-owned agricultural land to the construction of water source facilities and storage reservoirs would be avoided;
- iv. Temporary disruption of property such as houses, roadside stalls, schools, crop gardens emanating from construction activities and temporary road closure for pipeline crossings within urban areas, would be avoided; and
- v. The health risks associated with handling of harmful water treatment chemicals would be avoided.

4.1.2 KEY BENEFITS OF IMPROVED WATER SUPPLY IF PROJECT IS IMPLEMENTED

- i. Easy access to potable water within homesteads at various levels – stand posts, yard taps and house connections;
- ii. Reduction in incidences of diarrheal and other water borne diseases; this leads to reduction in mortality and morbidity, especially of children;
- iii. Improvement in hygiene and sanitation from increased use of hand washing, personal hygiene and environmental sanitation;
- iv. Reduction in hours spent searching for and fetching water from distant sources which would significantly increase the time allowed for other activities; this is expected to lead to better livelihood for women and the girl child, who are traditionally, responsible for fetching water;
- v. Reduction in domestic violence and abuse of women as people in the homestead compete for the little potable water;
- vi. Reduction incidences of promiscuity which are often carried out in the guise of fetching water, some involving children; this leads to incidences of child abuse, domestic violence and early pregnancies;
- vii. Possibility of improving the quality of life of the poor neighborhoods in the RGCs where the most vulnerable people live. The project will offer pro-poor preferential tariffs to these communities;
- viii. Cleaner and more conducive environment for activities in the RGC such as sports, markets, public places, etc.;
- ix. Employment opportunities at all stages of the project – from construction, operation and marketing of the services; this leads to increased skills transferred to the community;
- x. Increased revenue to the local authority and the country in general through the collection of taxes.

4.1.3 KEY BENEFITS OF IMPROVED SANITATION FACILITIES IF PROJECT IS IMPLEMENTED

- i. Reduced incidences of diarrheal and other water borne diseases; this leads directly to lower rates of mortality and morbidity, especially of children;
- ii. Boost in the daily economic activities of the busy town centre characterized by restaurants, bars, saloons and a weekly market. This will supplement the 2-stance improved latrine with more comfortable, cleaner and safer toilets, thus improvements with community health and hygiene;
- iii. Cleaner and more conducive environment for urban activities such as sports, markets, public places, etc.;
- iv. Employment opportunities at all stages of the project – from construction, operation and marketing of the services; this leads to increased skills transfers to the community;
- v. Increased revenue to the local authority and the country in general through the collection of taxes.

4.1.4 CONCLUSION ON THE “NO PROJECT” OPTION

Water access rates in Buyende District vary from 37% in Kagulu Sub County to 38% in Buyende Town Council. Buyende District has 576 domestic water points which serve a total of 163,068 people – 146,688 in rural areas. 44 water points have been non-functional for over 5 years and are considered abandoned (Water Atlas, 2022). The existing water supply system is operating below demand and communities still collect water from open surface water sources, implying continued trends of water-related diseases. The current sanitation systems are unreliable, sub-standard and dilapidated. If this

is allowed to continue, not only will the residents be exposed to public health risks but development opportunities will continue to be stifled and curtailed. The direct or indirect employment opportunities associated with the project will also cease.

In conclusion, the benefits to be obtained on implementing the Igwaya RGC Water Supply and Sanitation Project will overwhelm the farfetched benefits of the No-Project option.

4.2 DESIGN ALTERNATIVES

4.2.1 WATER SOURCE ALTERNATIVES

In the design, the system will be sized on the basis of the maximum day water demand of 239.53 m³/day. Two sources of the water have been considered, namely, boreholes and Lake Kyoga.

The Surface Water Option (utilizing Lake Kyoga) can meet the 2041 maximum day demand and the infrastructure will be sized as such. The Ground Water Option (DWD 60898) can only satisfy 14.5% of the 2041 maximum day demand. The project area boundaries will be reduced to the population that can be served by the existing water source.

4.2.1.1 SURFACE WATER FROM LAKE KYOGA

The average day demand for Igwaya RGC is 848.68m³/day (0.0098m³/s), compared to change in storage for Lake Kyoga of 1420m³/s. This represents 0.0007% of the total storage. Therefore, Lake Kyoga can be used a potential water source for the piped water supply system.

However, there are three challenges in utilizing Lake Kyoga as a water source for Igwaya RGC piped water supply system. These are:

- i. Lake Kyoga is swampy and characterized by floating islands. These can damage the intake structure and affect the water quality.
- ii. There are large variations in Lake level, presenting a challenge in designing an intake that can continue operating efficiently.
- iii. The water treatment would require a conventional water treatment plant and this would lead to high capital and maintenance costs in comparison to the population to be served.

This water source option was therefore not assessed due to the prohibitive costs associated therein.

4.2.1.2 GROUND WATER FROM DRILLED BOREHOLES

Based on the maximum day demand, the current borehole (DWD 60898) has potential to serve the current needs and the project need until 2031. Beyond 2031, additional boreholes will be required to effectively meet the ultimate year 2041 as indicated in table 4-1 below.

Table 4-1: Borehole Requirement

IGWAYA	MAXIMUM DAY DEMAND AT 83/- PER 20LITRES (M ³ /DAY)
Demand- m ³ /d	1,103.30
Demand- m ³ /hr	68.96
1 No Borehole	68.96
2 No Boreholes	34.48

3 No Boreholes	22.99
4 No Boreholes	17.24
Source: DED	

The proposed project borehole DWD 60898 detailed data is shown in Table 4-2 below.

Table 4-2: DWD 60898 Borehole Data

PARAMETER	VALUE
Airlift Yield (m ³ /hr)	9.4
Static Water Level (m)	3.90
Dynamic Water Level (m)	43.62
Draw Down (m)	41.72
Discharge (m ³ /hr)	10.00
Test Duration (hr)	72
Source: Buyende District Water Office	

The safe yield of the drilled well (DWD 60898) is 10.0m³/hr. From the required borehole yield in Table 4-1, there is a deficit of 58.96m³/hr of a 16-hour pumping regime.

An analysis was carried out to compare the demand and supply from the drilled borehole. The borehole requirement for the project area is 68.96m³/hr as compared to the current supply which is 10.0m³/hr over a 16hour pumping period. The drilled borehole provides only 33.7% of the maximum day demand in the initial year (2021) and 14.5% of the maximum day demand for the ultimate year 2041 over a 16-hour pumping period. Analysis increased pumping regime has also been done as shown in demand- supply analysis in Table 4-3 overleaf.

Table 4-3: Demand – Supply Analysis for DWD 60898

Borehole No.	Borehole Yield (m ³ /hr)	Pumping Duration (hours)	Groundwater Supply (m ³ /day)	Groundwater Supply Vs. Maximum Day Demand					
				2019	2021	2026	2031	2036	2041
				Water Demand (m ³ /day) per year					
				89	117	122	153	191	240
Supply vs Demand									
DWD 60898	10.0	16	160.00	180.1%	136.6%	130.7%	104.5%	83.6%	66.8%
Total for production Wells	10.0		160.00	180.08%	136.63%	130.69%	104.51%	83.56%	66.80%
<i>Supply Shortfall (m³/day)</i>				-71	-43	-38	-7	31	80
<i>Supply Shortfall (m³/hr)</i>				-4.45	-2.68	-2.35	-0.43	1.97	4.97
Alternative Pumping Durations									
DWD 60898	10.0	18	180.00	202.6%	153.7%	147.0%	117.6%	94.0%	75.1%
Total for production Wells	10.0		180.00	202.59%	153.71%	147.02%	117.57%	94.00%	75.15%
<i>Supply Shortfall (m³/day)</i>				-91	-63	-58	-27	11	60
<i>Supply Shortfall (m³/hr)</i>				-5.06	-3.49	-3.20	-1.49	0.64	3.31
DWD 60898	10.0	20	200.00	225.1%	170.8%	163.4%	130.6%	104.4%	83.5%
Total for production Wells	10.0		200.00	225.10%	170.78%	163.36%	130.64%	104.45%	83.50%
<i>Supply Shortfall (m³/day)</i>				-111	-83	-78	-47	-9	40
<i>Supply Shortfall (m³/hr)</i>				-5.56	-4.14	-3.88	-2.35	-0.43	1.98
DWD 60898	10.0	22	220.00	247.6%	187.9%	179.7%	143.7%	114.9%	91.8%
Total for production Wells	10.0		220.00	247.61%	187.86%	179.70%	143.70%	114.89%	91.85%
<i>Supply Shortfall (m³/day)</i>				-131	-103	-98	-67	-29	20
<i>Supply Shortfall (m³/hr)</i>				-5.96	-4.68	-4.44	-3.04	-1.30	0.89
Source: Field Study Estimates									

There is a deficit of 58.96 m³/hr of a 16-hour pumping regime. At least 6No. additional wells of borehole yield of 9.8 m³/hr are required to meet the maximum day demand in the ultimate year. An analysis was carried out to compare the demand and supply from the drilled borehole and proposed additional production wells.

The project area boundaries were reduced to the population that can be served by the existing water source. The drilled borehole source has a safe yield of 10 m³/hr. The villages to be served are Nakawolo LCI, Mailo, Butemera LCI B, Butemera LCI A and Busubo Mpanga with a total population of 8,076 people by 2041 and a maximum demand of **239.53 m³/day** as shown Table 4-4 below. The borehole source (DWD 60898) can meet 67% of the 2041 maximum day demand over 16-hour pumping regime and 75% over 18-hour pumping regime.

Table 4-4: Maximum day demand for Igwaya RGC

PARISH	VILLAGE	MAXIMUM DAY DEMAND (M ³ /DAY)					
		2019	2021	2026	2031	2036	2041
Bumogoli	Nakawolo LCI	21.37	31.94	29.30	36.54	45.57	56.86
	Mailo	16.03	17.71	22.20	27.85	34.93	43.84
Parish Total		37.40	49.65	51.50	64.38	80.50	100.70
Kagulu	Butemera LCI B	18.75	20.72	26.00	32.61	40.91	51.35
	Butemera LCI A	16.32	18.03	22.62	28.38	35.62	44.68
	Busubo Mpanga	16.39	28.71	22.31	27.72	34.45	42.81
Parish Total		51.45	67.45	70.92	88.71	110.98	138.84
Igwaya Phase I Total		88.85	117.11	122.43	153.10	191.48	239.53

4.2.1.3 COST IMPLICATIONS FOR SURFACE AND GROUND WATER SCENARIOS

- 1) The project has capital investment costs of US\$ 2,228,605,813/= for the Ground Water Scenario and US\$ 10,151,521,958/= for the Surface Water Scenario.
- 2) The Dynamic Prime Cost (DPC) covering the Operation & Maintenance costs at the discounted rate of 5% is higher for the Ground Water Scenario (US\$ 6,039 per m³) compared to the Surface Water Scenario (US\$ 2,653 per m³). If the proposed tariff of US\$ 4,150 per m³ is charged, the Ground Water Scenario will not meet its O & M costs while the Surface Water Scenario will cover its O & M costs and generate a surplus.
- 3) The best Internal Rate of Return (IRR) is for the Surface Water Scenario (+1.3%) compared to the Ground Water Scenario (-10.7%). This means that at the tariff of US\$ 4,150 per m³, the Ground Water Scenario is not profitable therefore will not break even.
- 4) As with all DWD implementation projects, investment and re-investment cost recovery is not considered. If the investment and re-investment costs are to be recovered, the tariffs, at the discounted rate of 5%, would have to be at least US\$ 8,729 per m³ for the Ground Water Scenario and US\$ 5,376 per m³ for the Surface Water Scenario

- 5) The ultimate year 2041 per capita investment cost is US\$ 58 for the Ground Water Scenario and US\$ 59 for the Surface Water Scenario. According to the 2013 MWE manual, the average per capita investment cost for 12 towns implemented during the FY 2010/11 by MWE was US\$ 40. The usually accepted MWE per capita investment costs range is US\$ 60 - 120.

4.2.1.4 CONCLUSIONS AND RECOMMENDATIONS

The proposed suitable water source for the piped water supply system for Igwaya RGC was surface water from Lake Kyoga. However, due to financial constraints, a ground water source was considered. The system components will include a borehole pump house, transmission mains, reservoir tank, distribution network and service connections. On identification of additional water sources, the investment costs would cover the head works, increase in the storage capacity, extension of the distribution network and service connections. The preliminary capital investment cost for the Ground water source determined for Phase I of the proposed water supply and sanitation is US\$ 2,228,605,813/= (VAT Inclusive)

4.3 OTHER ALTERNATIVE DESIGN CONSIDERATIONS

4.3.1 WATER TREATMENT TECHNOLOGY SELECTION ALTERNATIVES

The type of treatment operation performed and the treatment chemicals used depend largely on the contaminants present in the source water (EPA, 2011). An analysis of water samples collected from existing boreholes in the project area indicated satisfactory water quality for drinking for both physiochemical and bacteriological quality. To ensure the adherence to Uganda Drinking Water Standards disinfection was integrated in the water supply system in form of a chlorine dosing unit at the reservoir. The following is the analysis of the key technologies that could be adopted in disinfection process.

4.3.1.1 DISINFECTION

Historically, chlorine was the disinfectant used, but more recently other chemicals such as chlorine dioxide, chloramines, and ozone have been used to purify water. Non-chemical methods of disinfection include heat and radiation (e.g., ultraviolet light (UV)). **Table 4-5 Error! Reference source not found.** below is an analysis of the key options that could be employed in the project. The application of UV disinfection for source water treatment is limited because turbidity and suspended solids that can render it ineffective (EPA, 1999). Thus, UV has not been analysed for the project.

As can be seen from Table 4-5, ozone, the most efficient disinfectant, is not a persistent disinfectant, thus unsafe water consumption can occur in case of recontamination along transmission/distribution lines and reservoirs. It is also difficult to fulfil the legal limit for the formation of bromate during the process of ozonation, thus most water treatment processes tend not to employ ozonation. Chlorine and chloramines are more effective in secondary disinfection in comparison to chlorine dioxide (Less persistent chemical). Thus, chlorine dioxide may not be suitable for the project given the extent of piping systems. Lastly, though the combined residual from chloramines lasts longer than chlorine residuals, chloramines are not as effective as other germicidal agents.

In general, chlorine is the key form of disinfectant employed in Uganda. This is similar to the US, a developed country, with up to 80% of water treatment plants employing free chlorine (EPA, 2011).

Table 4-5: Technology analysis of disinfection types

Criteria	Disinfectant			
	Chlorine	Chloramines	Chlorine dioxide	Ozone
Persistency	Persistent chemical (used locally and for transport across long distances to the final consumers).	Persistent chemical (used locally and for transport across long distances).	Less persistent chemical (used locally and for transport across long distances).	Non-persistent chemical (used locally at production plants).
Oxidant demand rate	Chloramine > Chlorine > Chlorine dioxide > Ozone			
Disinfection efficiency	Ozone > Chlorine dioxide > Chlorine > Chloramine NB: efficiency order can be changed by local conditions e.g. disinfectant consumption rate, biofilm protection, etc.			
Disinfection by-products	More than 500 by-products identified that are formed by reaction with organic matter; most products are halogenated (Cl, Br, I) organics; most relevant organic halogenated by-products are Trihalomethanes, Haloacetic acids, Haloacetonitriles, Haloketones, and Haloaldehydes; Trihalomethanes are regulated in Europe; Both Trihalomethanes and Haloacetic Acids are regulated in the US.	Nearly no halogenated organic by-products formed; negligible reaction with organic matter, except halogen transfer to nitrogen amines; some halogenated organic by-products formed with trace of chlorine or chlorine in excess; Ammonia is formed if used in excess, thus nitrite formed from bacterial oxidation of ammonia.	Nearly no halogenated organic by-products; significant reaction with organic matter leading to no halogen transfer; some halogenated organic by-products formed with excess of chlorine used or chlorine formed in-situ.	Nearly no halogenated organic by-products; significant reaction with organic matter leading to no halogen transfer; some halogenated by-products formed with excess of chlorine used or chlorine formed in-situ; main halogen by-product is bromate; it's difficult to fulfil the legal limit for its formation, thus many WTPs have replaced the ozonation step.

4.3.2 SANITATION FACILITIES

4.3.2.1 ALTERNATIVE TYPES OF SANITATION FACILITIES

There are many types of sanitation systems used in the country, each with numerous variations. Selection of the variant to be used is dependent on income which determines water consumption patterns. High income residents in medium or high-income group housing may be served by off-site sanitation and septic tanks but the majority rely on onsite sanitation technologies. The following section discusses the onsite options for the project.

4.3.2.2 PIT LATRINE

A pit latrine is one of the most common and simple forms of excreta disposal. Pit latrines consist of a slab over a pit which may be from 2 m to 12 m in depth depending on soil suitability and owner preference. Slabs should be firmly supported on all sides and raised above the surrounding ground to prevent surface water ingress. If the sides of the pit are liable to collapse, they can be lined – particularly if it is proposed to empty them in the future. A squat hole in the slab or (less often) a seat is provided so that the excreta fall directly into the pit. These facilities are however deficient as they produce odour and attract flies and mosquitos. Additionally, there are chances of ground water contamination from pits which do not have a proper lining. Therefore, this option was not preferred.

4.3.2.3 VENTILATED IMPROVED PIT LATRINE

Similar construction to the simple pit latrine but in order to reduce the fly and odour nuisance the pit is ventilated using a pipe extending from the pit to above the latrine roof with fly proof netting across the top. Furthermore, the inside of the superstructure should be kept dark although vents are provided to enable fresh air to flow into the latrine through the pit and out of the vent. These facilities too pose a great risk of contaminating ground water. This option too, was not preferred.

4.3.2.4 VAULTS AND CESSPITS

Watertight tanks called vaults are built under or close to latrines to store excreta until they are removed by hand or vacuum tanker. Similarly, household sewage may be stored in large tanks called cesspits, which are usually emptied by vacuum tankers.

Vaults or cesspits can be emptied when they are nearly full or on a regular basis. They can be cheaper than sewerage especially if waste water is disposed of separately. This form of on-site sanitation is not available in the Town.

Given the need for periodic emptying of the vaults and cesspits, this option was not chosen due to the high cost of maintenance and low potential for faecal sludge treatment in the project area as the nearest Faecal Sludge Treatment facility is located in Kamuli District.

4.3.2.5 ECOLOGICAL SANITATION (ECO-SAN) TOILET

Ecological Sanitation (or “Eco-San”) is the name given to a group of latrine types the common feature of which is that human excreta is treated as a resource. Human excreta are processed on site and then, if necessary, further processed off site until they are completely free of disease organisms. The nutrients contained in the excreta are then recycled by using them in agriculture.

There are three ways to recover the resources in urine - diversion, separation and combined processing.

- Diversion is when urine is diverted away from faeces - they are never mixed with each other and the faeces are dehydrated.
- Separation is when urine and faeces are initially mixed together then separated from each other for re-use.
- Combined Processing is when urine and faeces are mixed together, processed together and their resource value is captured together.

Based on experience in other parts of the country the most common form of Eco-San is the urine diversion type.

As Eco-Sans do not require a pit they can therefore be cheaper and more suitable than pit latrines in areas of the Town where pit excavation is difficult; e.g. areas with poor soils, high groundwater or rocky ground.

Despite the fact that the initial cost of an Ecosan toilet is lower compared to pit latrines, its operation & maintenance requires additives while its proper use requires behavioural change to maintain sanitation of excreta especially that the proposed facility is for public use. This option was also dropped.

4.3.2.6 WATER-FLUSHED TOILETS WITH SEPTIC TANKS

All of the latrine technologies described so far are dry systems. These are the most appropriate systems for places where there is limited water supply. If water is piped into the premises or is otherwise easily available, then a water-flushed system can be used. Water-flushed toilets, can be connected to a pit, septic tank or sewer.

A septic tank is an underground watertight settling chamber into which raw sewage is delivered through a pipe from plumbing fixtures inside a house or other building. The sewage is partially treated in the tank by separation of solids to form sludge and scum. Effluent from the tanks infiltrates into the ground through drains or a soak pit. The system works well provided:

- The soil is permeable and not liable to flooding or water-logging;
- The sludge is removed at appropriate intervals to ensure that it does not occupy too great a proportion of the tank capacity.

In Uganda, the predominant type is reported to be a two-chamber tank for water closet waste only (waste water goes to a separate pit) which is a reasonably efficient arrangement

The flush toilets are capable of cleaning the bowl surface with less than a gallon of water, which not only means you save a considerable amount of money on water bills, but also positively contribute towards conservation of available water source. Thus, this was the most preferred alternative for the project.

4.3.2.7 CONCLUSION ON SELECTED SANITATION FACILITY

There were two major alternatives namely dry (Pit latrine, VIP, Eco-san, & Vault and Cesspit) and water borne system (flush toilet). The best choice is one that promotes total sanitation and hygiene to the

users and the neighbouring communities, is able to utilize and promote the objective of water supply facilities provided under the project. The selected option of water borne facility will potentially work as a model for the public and households. The option poses minimal risks to ground water contamination.

5 POLICY LEGAL AND INSTITUTIONAL FRAMEWORK

This chapter presents an overview of the key policies, laws, regulatory and institutional framework relevant to the environmental and social aspects of the proposed solar powered piped water supply system and sanitation facilities. It also identifies relevant agencies, departments, and institutions responsible for the monitoring and enforcement of legal requirements specified therein.

5.1 NATIONAL LEGISLATIONS AND REGULATIONS

The following is a summary of key policy, legal and regulatory requirements governing the proposed project:

Table 5-1: Summary of policies and plans applicable to the proposed project

Policies or Plans	Brief description and its key provisions	Relevance in the Project
The National Environment Management Policy, 1994	The overall policy goal is sustainable development, which maintains and promotes environmental quality and resource productivity for socio-economic transformation. One of the key principles guiding policy development and implementation include the need to conduct and ESIA for projects that are likely to have potential impacts on the environment.	As a commitment, the developer has undertaken this E&S Impact Assessment for the proposed project, for which this ESIS has been prepared.
The National Policy on Conservation and Management of Wetland resources 1995	The overall goal of this policy is to maintain an optimum and sustainable diversity of uses and users and consideration of other stakeholders when using wetland resources. The objectives of this policy include establishing the principles by which wetland resources can be optimally used now and in future; to end practices, which reduce wetland productivity; maintaining the biological diversity of natural or semi natural wetlands; maintaining wetlands functions and values; and integrating wetlands concerns into the planning and decision making of other sectors. This policy outlines guidelines for wetland resource developers.	The borehole or water source for this project is situated in a wetland. Therefore, all proposed project implementation activities have to adhere to this policy requirements and undertake proper impact assessment to ensure adverse impacts on the wetland ecosystems are adequately mitigated.
The National Water Policy, 1999	The objective of the policy is to provide guidance on 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 Contractor under the supervision of the project management team (DWD and District local government) will undertake routine monitoring of all water sources to prevent their contamination by project activities in line with this policy.
National Policy on Elimination of Gender Based violence, 2016	The policy emphasizes early intervention to prevent re-victimization of and long-term effects for girls, including interpersonal violence, sexual coercion, alcohol and drug abuse and mental health problems, reporting cases of violence against children immediately.	The Contractor in liaison with Local government officials (especially Subcounty Community Development Officers) will undertake initiatives to do away curb GBV that may arise from project implementation activities.
The Uganda National Land Policy, 2013	The land policy addresses the contemporary land issues and conflicts facing the Country. The vision of the policy is: “Sustainable and optimal use of land and land-based resources for transformation of Ugandan society and the economy”	In this project land will be required for establishment of project components from water source, transmission line, reservoir tank and distribution lines. While acquiring land

Policies or Plans	Brief description and its key provisions	Relevance in the Project
	<p>while the goal of the policy is: “to ensure efficient, equitable and sustainable utilization and management of Uganda’s land and land-based resources for poverty reduction, wealth creation and overall socio-economic development”.</p>	<p>from private owners, these people must be compensated following an approved schedule from RAP studies.</p>
<p>The National Equal Opportunities Policy 2006</p>	<p>The goal of the National Equal Opportunities policy is to provide avenues where individuals and groups’ potentials are put to maximum use by availing equal opportunities and affirmative action.</p> <p>The policy objectives amongst others are to:</p> <ul style="list-style-type: none"> ✚ Guide the planning processes, affirmative action, and implementation of programmes and allocation of resources to all stakeholders. ✚ Guide the establishment of legal, policy and institutional frameworks of all stakeholders. ✚ Provide a framework for assessing responsiveness of programmes and activities to equal opportunities, in redressing any imbalances therein. ✚ Empower marginalized and vulnerable groups for their full participation in all development processes. ✚ Enhance capacity of implementing agencies to provide quality services with a view to monitoring compliance with affirmative action and the constitutional provisions 	<p>Discrimination and stigmatization, which acts as a barrier for marginalized and other groups of people in the project area to accessing employment and support opportunities will be eliminated throughout all project implementation phases. This entails equitable access to services by workers employed at the project.</p>
<p>The National Environment Health Policy 2010</p>	<p>This policy establishes the environmental health priorities of the Government of Uganda and provides a framework for the development of services and programmes at national and local government levels. It has been developed in support of the National Health Policy and primarily concerns the role of the Ministry of Health. However, environmental health is a cross-cutting discipline, and the policy therefore has implications for other departments and agencies.</p>	<p>Environmental health encompasses a wide range of subjects but in the Ugandan context, it is concerned primarily with water supply, sanitation, and hygiene promotion. The implementation of Igwaya WSS project will contribute to the WSS and Hygiene promotion in the project area as provided for in the policy and during implementation the Environmental health requirements such as waste management, noise pollutions prevention and management, amongst others shall be complied with.</p>

Policies or Plans	Brief description and its key provisions	Relevance in the Project
National Policy on HIV/AIDS and the world of work, 2007	The policy obliges developing entities to mainstream HIV/AIDS interventions to their planned development interventions.	The Contractor will institute structures with human and financial capacity to undertake HIV/AIDS sensitization and prevention of new infections among the project workers and local community throughout all the project implementation phases in line with the provisions of this policy.
Uganda Gender Policy 2007	The Uganda Gender Policy mandates the Ministry of Gender, Labour and Social Development and other line Ministries to mainstream gender in all sectors.	The Contractor will be encouraged to adopt an equal opportunity employment policy and to incorporate gender aspects and considerations in the recruitment process for both skilled and non-skilled labour force as far as applicable during the project lifecycle.
The National HIV/AIDS Policy, 2004	The policy aims at guiding multi-sectoral approach to HIV/AIDS control in the country. Section 3.4 of the policy talks about Impact mitigation at individual to community level. The policy aims at providing psychosocial and economic support to all those infected and directly affected by HIV & AIDS. The epidemic has severe short- and long-term effects on various population categories on development efforts at household, community, sector, and national levels. The impact on the labour force in the various sectors in communities and households affects productivity, household income and savings. Objective of this section in the policy is to minimize the socio-economic consequences of HIV & AIDS on the population and promote involvement of the infected and affected in the development efforts. Subsection I under Policy Strategies it specifically requires workplace policies in both public and non-public formal and informal sectors to be appropriately reviewed to cater for HIV&AIDS prevention & care issues in the workplace.	<p>In line with this policy, the Contractor in liaison with different local council and Local government officials such as Community Development Officers and HIV/AIDS Focal Personnel among others will ensure mainstreaming HIV/AIDS interventions into project plans and implementation activities.</p> <p>The measures are aimed at stemming the new infections, curtailing their spread and stigmatization of victims of HIV/AIDS among the project workforce and neighbouring communities</p>
National Policy on Disability 2006	The National Policy on Disability in Uganda aims at promoting equal opportunities for enhanced empowerment, participation, and protection of rights of PWDs irrespective of gender, age and type of disability. This is in	With limited skills characteristic of most PWDs, accessing employment is a major challenge. Most potential employers do not give chance to PWDs to compete for

Policies or Plans	Brief description and its key provisions	Relevance in the Project
	<p>recognition that PWDs can perform to their full potential given the same conditions and opportunities irrespective of their social, economic, and cultural backgrounds. The Policy is to guide and inform the planning process, resource allocation, implementation, monitoring and evaluation of activities with respect to PWDs concerns at all levels.</p>	<p>employment even where they have the necessary qualifications and experience. During recruitment of workers to be employed to undertake construction activities, some PWDs will apply for some jobs and the contactor should give consideration to the PWDs applicants who qualify for such jobs</p>
<p>The Uganda National Culture Policy 2006</p>	<p>It provides strategies to enhance the integration of culture into development. These strategies include advocating for culture, ensuring capacity building, ensuring research and documentation, promoting collaboration with stakeholders, and mobilizing resources for culture. These strategies are an integral part of the Social Development Sector Strategic Investment Plan (SDIP) whose mission is to create an enabling environment for social protection and social transformation of communities.</p>	<p>Cultural leaders and local leaders need to be involved and consulted during the ESIA process for the proposed project activities so that they can help guide the process especially on which natural-historical and traditional collections could be preserved based on their cultural importance or historical relevance in the project implementation process.</p>
<p>National Climate Change Policy, 2012</p>	<p>The goal of the policy is to ensure a harmonized and coordinated approach towards a climate-resilient and low-carbon development path for sustainable development in Uganda. 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.</p>	<p>The policy obliges the Developer to conduct an ESIA to ensure the project activities do not lead to adverse impacts that trigger climate change risks in the project areas and beyond.</p>
<p>Uganda Vision 2040</p>	<p>Uganda’s Vision is to have “A transformed Ugandan society from a peasant to a modern and prosperous Country within 30 years”, from 2010. For the country to achieve its Vision 2040, it is necessary to increase access to appropriate and adequate sanitation as well clean and safe water.</p>	<p>More water and sanitation facilities and sensitizations are going to be promoted in the project area while complying with environment and social requirements thereby contributing to the aspirations of the Vision 2040.</p>
<p>The National Development Plan III</p>	<p>The plan provides guidance to the nation in delivering the aspirations articulated in Uganda Vision 2040 for the period 2020/21 – 2024/25. The Goal of NDPIII is attaining Increased Household Incomes and Improved Quality of Life of Ugandans, under the theme: “Sustainable Industrialization for inclusive</p>	<p>The project implementation will follow the ESMP put forward in this ESIS to ensure sustainable utilisation of natural resources (water) and mitigation of likely impacts on the environment.</p>

Policies or Plans	Brief description and its key provisions	Relevance in the Project
	growth, employment and wealth creation”. NDPII aims to stop, reduce and reverse environmental degradation and the adverse effects of climate change as well as improve utilisation of natural resources for sustainable economic growth and livelihood security.	

Table 5-2: Summary of laws applicable to the proposed project

Laws	Brief description and its key provisions	Relevance in the Project
The Constitution of the Republic of Uganda, 1995	The Constitution requires that the project be implemented without endangering human health and the environment.	The implementation of project activities will be undertaken while ensuring respect of human rights like right to own property such Land, right to safe and healthy environment among others as provided for in the Constitution.
The National Environment Act 2019	Specifically, its Fifth Schedule lists projects that require mandatory ESIA to be done before implementation, hence the need for this ESIA to be prepared for the proposed project.	The proposed project falls under Schedule 5 for projects which require mandatory ESIA before implementation, as such, the need to conduct this study.
The Land Acquisition Act, 1965	This Act provides for acquisition of land after its valuation and along approved procedures which ensure adequate, fair, and timely compensation to the landowners. The Act requires that adequate, fair, and prompt compensation is paid before taking possession of land and property. Dispute arising from the compensation to be paid should be referred to the court for decision if the Land Tribunal cannot handle	The key consideration regarding this Act in the project is to ensure landowners affected by the project are adequately and timely compensated.
The Land Act, Cap 227, of 1998	The Land Act, Cap 227 of 1998 provides for the tenure, ownership, and management of land. Under Section 44 the Government or the local government shall hold land in trust for the people and protect natural lakes, ground water, natural streams, wetlands and any other land reserved for ecological purposes for the common good of Ugandans. The Act also requires a person who owns or occupies land to manage and utilize the land in accordance with the	Proposed project activities will be implemented with the footprint covering both private and public land. Therefore, the project will ensure sustainable management of ecological sensitive areas such as wetlands, water bodies etc for example through obtaining wetland use permits, water abstraction permit among others.

Laws	Brief description and its key provisions	Relevance in the Project
	environmental laws and other laws listed in Section 43 including the Water Act and National Environment Act.	
The Physical Planning Act 2010	<p>An Act to consolidate the provisions for the orderly and progressive development of land, towns, and other areas, whether urban or rural. In respect of every area declared to be a planning area under section 5, there shall be a planning committee or planning committees. This planning committee shall be the municipal council or shall consist of such persons as the board, after consultation with any local authority concerned, shall appoint for town areas and rural areas respectively.</p> <p>Section 2A of the Amendment provides a right to clean and health environment. And every Ugandan has a duty to create, maintain and enhance a well-planned environment. Any result of act or omission by any person likely to breach a physical development plan or physical planning standard report to relevant authorities or file a civil suit against any person whose act or omission has breached or likely to breach a physical development plan or physical planning standard.</p>	This is a relevant Act to the proposed project activities. Different provision of this act will be implemented during the different phases (construction and operation) of the proposed project. All the infrastructures involved will be subjected to the approval by relevant bodies, Physical planning committees, DLG, MoGLSD etc.
The Uganda Wildlife Act, 2019	<p>Section 15 of the Act states that any Developer desiring to undertake any project, which may have a significant effect on any wildlife species, or community, shall undertake an environmental impact assessment in accordance with the National Environmental Act</p> <p>In order to support sustainable utilization of wildlife for the benefit of the people of Uganda, the purpose of the Act among others is to provide for the conservation of wildlife throughout Uganda so that the abundance and diversity of their species are maintained at optimum levels commensurate with other forms of land use.</p>	This ESIA is carried out in line with this provision, considering that some of the water pipes will go through remote section of the countryside involving clearing of vegetation, and excavation of land to create holes etc, this Act is quite relevant, and relevant provisions shall be complied forthwith for project implementation.
The Historical Monuments Act, 1968	The Act provides for the preservation and protection of historical monuments and objects of archaeological, paleontological, ethnographical, and traditional interest and for other matters connected therewith. The Act requires that any chance finds	Some objects of cultural and/or historical significance might be encountered/affected during project implementation and their preservation is called for by this act. This ESIA

Laws	Brief description and its key provisions	Relevance in the Project
	encountered during project construction shall be preserved by the Department of Monuments and Museum in the Ministry of Tourism, Wildlife and Antiquities.	provided for chance find procedure which shall be followed during project implementation by contractor.
The Public Health Act, Cap 281	Under this Act, the Minister may cause to be made such inquiries as he or she may see fit in relation to any matters concerning the public health in any place. When such a directive is made, the person directed to make the inquiry shall have free access to all books, plans, maps, documents and other things relevant to the inquiry and shall have in relation to witnesses and their examination and the production of documents similar powers to those conferred upon commissioners by the Commissions of Inquiry Act, and may enter and inspect any building, premises or place, for the purpose of inquiry.	The provisions of this Act will be relevant for the project implementation activities such as construction civil works, establishment of ancillary facilities such as workers camps, material holding areas, equipment storage/parking yards as well as maintenance of project machinery to control incidences occupational health and safety accidents, among others. Construction activities will take all possible mitigations to make sure that, all impacts to human and environment are avoided and where not possible or in case of accident, there will be compensation.
The Water Act Cap, 152 1997	The Act provides for the use, protection and management of water resources and supply in Uganda. The Water Resources Regulations of 1998 established under this Act stipulates a requirement to apply for a permit to construct, own, occupy or control any works on or adjacent the land as per Regulation 10.	Abstraction of water for the project will follow the provisions of the Act including obtaining an abstraction permit from the DWRM. Any disposal of waste shall also need to be in line with the waste discharge regulations; proper management of fuel/oil spills is essential for minimizing chances of water contamination
The National Forestry and Tree Planting Act, 2003	The Act provides for the conservation, sustainable management and development of forests for the benefit of the people of Uganda. It also provides that the Central Government or local government shall hold in trust for the people and protect forest reserves for ecological, forestry and tourism purposes for the common good of the citizens of Uganda.	The project will encourage tree planting as part of its integrated catchment protection and management measures.
Traffic and Road Safety Act, Cap.361	Section 119 of the Traffic and Road Safety Act stipulates that every person who uses, parks or stands a motor vehicle, trailer or engineering plant on any road carelessly or without reasonable consideration for other persons using the road commits an offence.	The Contractor will ensure that all project machinery (construction equipment and material haulage fleet) observe traffic and road safety procedures including observing minimum speed limits, routine maintenance and observing road signs among others. Additionally, more

Laws	Brief description and its key provisions	Relevance in the Project
		safety measures such as traffic guides/controllers, humps and road signage will be adopted to ensure safety of all road users during project implementation activities as guided by this Act.
The Roads Act, 2019	The Act prohibits erection of any building or planting of any trees or placing of pipelines within the road reserve except with a written permission of an appointed road authority.	The project developer will apply to UNRA to carry out activity in the road reserve while also stipulating measures for restoration upon completion of project activity.
The Occupational Safety and Health Act, 2006	The Occupational Safety and Health Act of 2006 makes provisions for the health, safety, welfare, and appropriate training of persons employed in workplaces.	The employer (Contractor) must protect the health and safety of all project workforce by providing them with all requisite PPEs, safety training, clean and healthy work environment, sanitary conveniences, washing facilities, First Aid facilities, clean drinking water, and meals among others throughout the project implementation phases in accordance with this act.
The Workers' Compensation Act, Cap. 225	The Act outlines matters of compensation for injuries and accidents as well as the responsibility of employees to take care of their health and safety while on the project.	The employer (Contractor) must protect the health and safety of all project workforce by providing them with all requisite PPEs, safety training, clean and healthy work environment. The Act seeks to safeguard the workers and ensure that they are appropriately compensated in case of injuries resulting from project implementation activities.
The Local Government Act, Cap 243	The Act provides for the use, protection and management of water resources and supply in Uganda. The Water Resources Regulations of 1998 established under this Act stipulates a requirement to apply for a permit to construct, own, occupy or control any works on or adjacent the land as per Regulation 10.	The Act provides guidance for requirements of implementation of water supply projects especially on matters of water abstraction.
Access to Information Act, 2005	The Act aims to promote an efficient, effective, transparent and accountable Government; give effect to article 41 of the Constitution by providing the right to access to information held by organs of the State, other than exempt records and information; protect persons disclosing evidence of contravention	ESIA has disclosed part of the critical information of the project to the project stakeholders and has documented stakeholder concerns which have formed basis of further

Laws	Brief description and its key provisions	Relevance in the Project
	<p>of the law, maladministration or corruption in Government bodies; promote transparency and accountability in all organs of the State by providing the public with timely, accessible and accurate information; and empower the public to effectively scrutinise and participate in Government decisions that affect them.</p> <p>Section 5 of the Act highlights the right of access to information and records in the possession of the State or any public body, except where the release of the information is likely to prejudice the security or sovereignty of the State or interfere with the right to the privacy of any other person.</p>	<p>stakeholder engagement and disclosure strategy. Upon approval of this ESIA Study by NEMA and the World Bank, the report will have to be disclosed on NEMA and MWE's on websites including World Bank Info Shop to enable stakeholder's access to the pertinent information</p>
The Employment Act, 2006	<p>This Act is the governing legal statutory instrument for the recruitment, contracting, deployment, remuneration, management, and compensation of workers. It provides for matters governing individual employment relationships in terms of circumstances of provision of labour. It is quite explicit on matters of forced labour that, no one should be forced to work, there should be no discrimination with regard to recruitment process, and it prohibits sexual harassment in employment.</p>	<p>This Act is relevant in that, the project will involve provision of employment opportunities to workers. Hence it will be required that the contractor undertakes formal engagement of workers and their rights promoted while at work. The Contractor shall adhere to the provision of this Act for all project-related recruit of workforce.</p>
Children Act Cap 59	<p>The Act defines a child as a person below the age of 18. It lists the right for children to be with their parents, circumstances under which they should not, foster care and adoption procedures as well as mandates of local authorities and roles of community.</p>	<p>Child labour is to be prohibited during project implementation activities i.e., no employment of children below 18 years for all the project implementation activities. In addition all other child rights violations are prohibited on the project.</p>
Domestic Violence Act 2010	<p>The Act provides for the protection and relief of victims of domestic violence; provides for the punishment of perpetrators of domestic violence and spells out procedures and guidelines to be followed by the courts in relation to the protection and compensation of victims of domestic violence as well as matters relating to cases of domestic violence in general.</p>	<p>The contractor under the guidance of the client shall undertake measures to sensitize workers and communities on domestic violence and any cases that have been triggered by the project shall be investigated and managed in accordance with the Law and World Bank requirements.</p>
Penal Code Act, 1950, Cap	<p>The Act was enacted in 1950 and amended to include Amended by Anti-Terrorism Act, 2002 (Act 14 of 2002, Amended by Penal Code (Amendment) Act, 2007 (Act</p>	<p>Implementation of the proposed project (the contractor, MWE, consultants, etc) should follow provisions in the Penal</p>

Laws	Brief description and its key provisions	Relevance in the Project
120, Amended in 2007	8 of 2007), mended by Anti-Corruption Act, 2009 (Act 6 of 2009), mended by Trademarks Act, 2010 (Act 17 of 2010), and Amended by Anti-Pornography Act, 2014 (Act 1 of 2014). The Act establishes a code of criminal law.	Code Act to avoid committing offences in Igwaya RGC that require application of the Act. In cases where offences are committed, the Law should be allowed to take its course.
The Survey Act, 1964	Section 23 of the Act also points out compensation for injury done by clearance during the act of survey. For the purpose of the topographic survey of the project site this act will be relevant in this project.	In line with the project footprint and land requirements, it is necessary to undertake land survey for this project, as guided by the Act and conducted by a registered surveyor authorized by the commissioner for surveys in Ministry of Lands, Housing and Urban Development.

Table 5-3: Summary of regulations and standards applicable to the proposed project

Regulations or standards	Brief description and its key provisions	Relevance in the Project
The National Environment (Environmental and Social Assessment) Regulations, 2020	The Regulations provide a framework within which ESIA's for projects are to be undertaken. It also emphasises that an environmental and social impact study for relevant projects be undertaken in accordance with section 113 of the National Environment Act and Schedule 5 of the same Act.	The developer has undertaken this ESIA study with particular focus on the content specified within the First Schedule of these Regulations.
Water Resources Regulations, 1998	The Regulations apply to motorized water abstraction from boreholes or surface watercourses or diverting, impounding, or using more than 400m ³ of water within a period of 24 hours.	The project implementation will follow the conditions set out in the regulations. The Contractor will be required to abide by provisions of this law in regard to water usage and conservation during use for construction civil works and associated project facilities such material yards, workers' camps among others.
The National Environment (Wetlands, Riverbanks and Lakeshores)	These Regulations guide on the development procedures to be followed where developments are to be undertaken in wetlands, riverbanks, and lakeshores.	The some of the proposed project components will cross through wetlands. Likewise, the material source sites might be in or adjacent to wetlands.

Regulations or standards	Brief description and its key provisions	Relevance in the Project
Management) Regulations 2020.		All proposed project implementation activities have to adhere to these regulations requirements and undertake proper impact assessment to ensure adverse impacts on the wetland ecosystems are adequately mitigated.
Draft National Air Quality Standards, 2006	Considering that construction equipment and machinery are powered by diesel/ gasoline engines, pollutants such as CO ₂ , NO _x , SO _x , VOC, and particulates are expected to be emitted. The draft National air quality standards provide the following regulatory limits for these emissions.	A number of proposed project activities such as material haulage, material extraction of both murram and stones, construction works among others will likely impact on the local ambient air quality. Guided by provisions of these standards, the Contractor will adopt appropriate measures to minimize, mitigate and prevent air quality deterioration resulting from project implementation activities.
The National Environment (Waste Management) Regulations, 2020	These Regulations apply to all categories of hazardous and non-hazardous waste, storage and disposal of hazardous waste and their movement into and out of Uganda and to all waste disposal facilities, landfills, and sanitary fills and to incinerators.	Certainly, waste will be generated during project implementation activities especially from Contractor facilities such as camps, material yards, among others. The Contractor guided by these regulations will ensure that all generated wastes throughout all project implementation phases are appropriately managed/disposed of.
National Environment (Standards for Discharge of Effluent into Water or on Land) Regulations, 2020	These regulations provide standards for effluent discharge. Schedules 2, 3 and 4 detail maximum permissible limits for regulated contaminants, which must not be exceeded before effluent is discharged into water or on land.	Proposed project activities will certainly generate effluent waste. The Contractor should employ appropriate measures to manage effluent waste generated by project activities especially ancillary facilities such as workers' camps, material yards, mechanical workshops and construction site among others.
The National Environment (Noise Standards and	Part III Sec. (1) requires machinery operators to use the best practicable means to ensure that the emission of noise does not exceed the permissible levels.	Indisputably, implementation of proposed project activities and other associated activities will trigger noise generation. These standards shall however be applied to keep the noise levels in

Regulations or standards	Brief description and its key provisions	Relevance in the Project
Control) Regulations, 2003		permissible limits as well as mitigating noise generation at the source.
National Environment (Control of Smoking in Public Places) Regulations, 2004	<p>According to WHO, Second-hand smoke (SHS) is a human carcinogen for which there is no "safe" exposure level 1. To avoid public health risk from SHS, Uganda enacted this Regulations to regulate smoking in public places. Under this law, a public place is defined as, "any place to which members of the general public or segments of the general public ordinarily have access by express or implied invitation and includes any indoor part of a place specified in this schedule". These places include, office buildings, workplaces, eating areas, toilets and public service vehicles. The regulations task owners of such places to designate "NO SMOKING" and "SMOKING AREAS" in premises. In this project, these regulations will apply to areas communally used by construction workers such as site offices, eating areas in camps and workers transport vehicles.</p>	<p>Requirements of these regulations should be fulfilled by the Contractor through instituted structures especially within construction site and workers' facilities such as changing rooms, resting areas, dinning among others, to avoid exposure of workers to tobacco Second Hand Smoke and associated health risks.</p>

5.2 INTERNATIONAL PROTOCOLS AND CONVENTIONS

The relevant international protocols and conventions for which Uganda is a signatory to as presented in **Table 5-4** below.

Table 5-4: Summary of international protocols and conventions applicable to the proposed project

Protocol or Convention	Purpose
African Convention on the Conservation of Nature, 1968	Encourages individual and joint action for the conservation, utilisation and development of soil, water, flora and fauna for the present and future welfare of mankind, from an economic, nutritional, scientific, educational, cultural and aesthetic point of view. Considering the proximity of the water source of Igwaya project to the lake and the wetlands the ESIA will recommend conservation measures that are applicable to protection of wetland and the lake e.g., ensuring preservation of all Wetlands plants/trees/fauna in project area.
United Nations Framework Convention on Climate Change (UNFCCC), 1992	The Convention requires parties to avoid adverse effects on the environment and adopt measures and policies to control carbon dioxide emissions in technologies, considering their common, yet differentiated responsibilities, as well as their specific national and regional development priorities, objectives and circumstances. They are required to take climate change considerations into account, to the extent feasible, in their relevant social, economic and environmental policies and actions, and employ appropriate methods, for example impact assessments, formulated and determined nationally, with a view to minimising adverse effects on the economy, on public health and on the quality of the environment of projects or measures undertaken by them to mitigate or adapt to climate change. Therefore, all project works should maintain the ecological integrity of the habitat by avoiding activities that could enhance climate change especially massive tree cutting, Green House Gas Emissions, drainage of wetlands etc.
United Nations Convention to Combat Desertification (UNCCD), 1994	Binding international agreement linking environment and development to sustainable land management. The Convention addresses specifically the arid, semi-arid and dry sub-humid areas, known as the drylands, where some of the most vulnerable ecosystems and peoples can be found. In the 10-Year Strategy of the UNCCD (2008-2018) that was adopted in 2007 with a view to <i>forge a global partnership to reverse and prevent desertification/land degradation and to mitigate the effects of drought in affected areas to support poverty reduction and environmental sustainability</i> . The ESIA has recommended restoration and enhancement measures for revegetation and tree planting where applicable.
Montreal Protocol for the Protection of the Ozone Layer, 1987	The protocol was designed to protect the ozone layer by phasing out the production of numerous substances that are responsible for ozone depletion. All of the ozone depleting substances controlled by the Montreal Protocol contain either chlorine or bromine (substances containing only fluorine do not harm the ozone layer). The provisions of the Protocol include the requirement that the Parties to the Protocol base their future decisions on the current scientific, environmental, technical, and economic information that is assessed through panels drawn from the worldwide expert communities. The ESIA does not recommend use of ozone depleting substances on the project
Stockholm Convention	Protects human health and environment from Persistent Organic Pollutants that remain intact in the environment for long periods and can become widely distributed geographically and accumulate in the fatty tissue of humans and wildlife, which can lead to serious health effects. The ESIA, therefore,

Protocol or Convention	Purpose
Persistent Organic Pollutants, 2001	recommends reduction of intentionally released POPs through emission at source by promoting cleaner production methods and Best Available Techniques and Best Environmental Practices. Management of waste under the project will have to be undertaken in line with this requirement by avoiding burning of waste, among others.
Strategic Approach to International Chemicals Management, 2006	Fosters sound management of chemicals and to ensure that by the year 2020, chemicals are produced and used in ways that minimise significant adverse impacts on the environment and human health.
International Labour Organisation Convention, 1998	Sets out basic principles and labour rights at work, based on international best practise.

5.3 WORLD BANK OPERATIONAL POLICIES (OPS)

The large solar powered piped water supply system and sanitation facilities to be constructed under IWMDP interventions in Buyende will be funded by the World Bank, which has Environmental and Social Safeguard policies that are designed to avoid, mitigate, or minimize adverse environmental and social impacts of projects supported by the bank. The operational policies triggered in this project are summarized in **Table 5-5** below:

Table 5-5: Summary of how the planned project activities trigger WB OPs

Safeguard Policies	Triggered/ Not Triggered	Remarks
Environmental Assessment OP/BP 4.01	Triggered	The proposed project may have adverse environmental and social impacts through its infrastructure activities, particularly civil works for water supply and sanitation. The project alignment goes through rural growth centres with a number of activities and therefore potential impacts relating to influx of labour, drainage, traffic, noise generation among others are likely. In general, the project falls under Category B of the World Bank's classification of projects requiring an ESIA/ESMP given that its potential adverse environmental and social impacts will be site specific, few if any are irreversible, and in most cases mitigation measures can be readily designed.
Natural Habitats OP/BP 4.04	Triggered	There will potentially be potential loss or degradation of natural habitats including riparian and wetland habitats, due to the planned construction works for transmission and distribution lines in these ecologically sensitive areas.
Forests OP/BP 4.36	Not Triggered	The proposed site for project implementation and the immediate neighbourhood do not have any forest or land gazetted as forest reserve.

Safeguard Policies	Triggered/ Not Triggered	Remarks
Pest Management OP 4.09	Not Triggered	No application of pesticides is envisaged in the project.
Physical Cultural Resources OP/BP 4.11	Triggered	The project will involve excavations and there are chances of inadvertently finding PCRs. Chance Finds Procedure will be developed as part of the ESIA to guide in managing of PCRs should they be found during project implementation.
Indigenous Peoples OP/BP 4.10	Not triggered	No known Indigenous Peoples exist within the project area in Igwaya RGC.
Involuntary Resettlement OP/BP 4.12	Triggered	The project will involve land acquisitions for sites planned for the water sources, reservoirs and sump/ booster station. Therefore, the project-related land acquisition and restrictions on land use can have adverse impacts on communities and persons; and in particular, for this project, economic loss is possible. Acquisition of land should be through free, prior and informed consent; and the potentially affected persons should have the right to refuse land acquisition or restrictions on land use that can result into displacement.
Safety of Dams OP/BP 4.37	Not Triggered	This OP is not triggered because the project works do not involve dam related works.
Projects on International Waterways OP/BP .50	Not Triggered	The project does not affect international water ways.
Projects in Disputed Areas OP/BP 7.60	Not Triggered	There are no disputed areas along the project corridor.
World Bank Policy on Access to Information (2015)	Triggered	There is need for disclosure of information to all the project stakeholders through the sharing of information with stakeholders such as district technocrats, Sub County leaders, Local council leaders, and communities among others during the consultations process. Project information will remain accessible by them.

5.4 WORLD BANK EHS GUIDELINES

The World Bank has a number of sector-based EHS guidelines below, many of which are applicable to various components of the proposed project namely:

- Water and Sanitation
- Air emissions
- Hazardous waste management
- Noise
- Occupational health and safety.
- Community health and safety including traffic safety such as during project construction or disease prevention
- Construction and decommissioning.

While most of above WBG guidelines apply to the proposed project in one way or the other, in sections below are discussed five environmental, health and safety (EHS) guidelines that are of relevance to the proposed project, namely:

- EHS Guidelines - Water and Sanitation
- EHS Guidelines – Air Emissions and ambient air quality
- EHS Guidelines – Waste Management
- EHS Guidelines – Hazardous Materials Management
- EHS Guidelines – Construction and decommissioning

The study will explicitly and adequately evaluate all the occupational health and safety aspects of the proposed project activities for all implementation phases including health and safety aspects of project workforce and the general public (construction phase). Appropriate mitigation measures will be recommended for adoption at relevant stages of project implementation.

5.4.1 WBG EHS GUIDELINES: WATER AND SANITATION

The EHS Guidelines for Water and Sanitation include information relevant to the operation and maintenance of:

- ❖ Potable water treatment and distribution systems
- ❖ Collection of sewage in centralized systems (such as piped sewer collection networks) or decentralized systems (such as septic tanks subsequently serviced by pump trucks) and treatment of collected sewage at centralized facilities.

The EHS guidelines outline Industry specific-impacts and their management that comprise;

- (i) Environmental issues associated with water and sanitation projects may principally occur during the construction and operational phases, depending on project-specific characteristics and components
 - Drinking water – water withdrawal, water treatment, water distribution,
 - Sanitation – faecal sludge and septage collection, sewerage (Domestic wastewater discharges, Industrial wastewater discharges, Leaks and overflows), Wastewater and Sludge Treatment and Discharge (Liquid effluents, Solid waste, Air emissions and odours, Hazardous chemicals, Ecological impacts).
- (ii) Occupational Health and Safety during the construction and decommissioning of Water and Sanitation facilities. Occupational health and safety impacts associated with the operational phase of water and sanitation projects primarily include the following:
 - ❖ Accidents and injuries
 - ❖ Chemical exposure
 - ❖ Hazardous Atmosphere

- ❖ Exposure to pathogens and vectors
 - ❖ Noise
- (iii) Community health and safety impacts during the construction of water and sanitation projects are discussed including;
- Drinking Water - Water Intake (Water Supply Protection), Water Treatment (Drinking Water Quality and Supply, Hazardous Chemicals) and Water Distribution.
 - Sanitation - Wastewater and Septage Collection (Preventing sewerage system overflows, Preventing build-up of potentially toxic and explosive gases in the sewer), Wastewater and Sludge Treatment (Liquid effluents, Air emissions and odours, Physical hazards)

5.4.2 WBG EHS GUIDELINES: AIR EMISSIONS AND AMBIENT AIR QUALITY

5.4.2.1 GENERAL APPROACH

These guidelines require projects with “significant” sources of air emissions, and potential for significant impacts to ambient air quality to prevent or minimize impacts by ensuring that emissions do not result in pollutant concentrations that reach or exceed relevant ambient quality guidelines and standards by applying national legislated standards (or in their absence, the current WHO Air Quality Guidelines, or other internationally recognized sources). Uganda currently has (draft) national air quality standards applicable to this project.

In these guidelines “significant” refers to sources which can contribute a net emission increase of one or more of the following pollutants within a given air shed:

- Particulate matter of size 10 microns (PM10): 50 tons per year (tpy).
- Oxides of nitrogen (NOx): 500 tpy.
- Sulphur dioxide (SO₂): 500 tpy; or as established through national legislation.
- Equivalent heat input of 50 MWt or greater.

This ESIA study will exhaustively explore the air quality aspects relating to project implementation, most importantly, the major air pollutions sources (gaseous and dust emissions), receptors and elaborate on mitigation and monitoring measures to curb/prevent air quality impacts.

The study further recommends continuous monitoring to regularly track the deviations in air quality parameters and thus apply appropriate mitigation measures in a timely manner.

5.4.3 WBG EHS GUIDELINES: WASTE MANAGEMENT

5.4.3.1 GENERAL APPROACH

In relation to the proposed water supply and sanitation project works, this guideline provides for construction waste generated by and throughout all implementation phases. Large waste volumes will be generated especially at project/construction site, material holding/stockpile yards, site workshop and construction equipment parking lot, batching plant, temporarily Contractor workforce shelters among others. The guidelines advocate for waste management planning where waste should be characterized according to composition, source, types, and generation rates. These guidelines call for implementation of a waste management hierarchy that comprises prevention, recycling/reuse, treatment, and disposal. The guidelines require segregation of *conventional waste* from *hazardous*

waste streams. Examples of hazardous construction waste are waste oil from vehicles and machinery paint waste, thinners, and concrete wash water (e.g., from cleaning concrete mixers).

5.4.3.2 IMPLICATION FOR THIS PROJECT

Improper management of construction waste would pose environmental and public health impacts. The Contractor will have a contractual obligation to ensure proper construction waste management.

5.4.4 WBG EHS GUIDELINES: HAZARDOUS MATERIALS MANAGEMENT

5.4.4.1 APPLICATION AND APPROACH

These guidelines apply to projects that use, store, or handle any quantity of hazardous materials (Hazmats), defined as materials that represent a risk to human health, property, or the environment due to their physical or chemical characteristics. Hazmats can be classified according to the hazard as explosives; compressed gases, including toxic or flammable gases; flammable liquids; flammable solids; oxidizing substances; toxic materials; radioactive material; and corrosive substances.

5.4.4.2 GENERAL HAZARDOUS MATERIALS MANAGEMENT

Facilities which manufacture, handle, use, or store hazardous materials should establish management programs that are commensurate with the potential risks present. The main objectives of projects involving hazardous materials should be the protection of the workforce and the prevention and control of hazardous chemicals releases and accidents. These objectives should be addressed by integrating prevention and control measures, management actions, and procedures into day-to-day business activities. Implementation of the proposed project activities involves handling of hazardous materials such as fuel and lubricants, paint, compressed gas cylinders especially at the construction site, fuel storage area and mechanical workshop among others.

5.4.5 WBG EHS GUIDELINES: CONSTRUCTION AND DECOMMISSIONING

These provide guidance, specific guidance on prevention and control of community health and safety impacts that may occur during new project implementation activities. By thematic categories, they address three major aspects (environment, OHS and community health and safety) below.

- **Environment:**
 - **Noise and Vibration:** During construction and decommissioning activities, noise and vibration may be caused by the operation of material haulage fleet, earth moving and excavation equipment, concrete mixers, cranes and the transportation of equipment, materials, and people.
 - **Air Quality:** Project will involve excavations and handling of construction materials such as aggregates, sand, cement among others and this could generate fugitive dust affecting adjacent environs. A secondary source of emissions may include exhaust from diesel engines of earth moving equipment, as well as from open burning of construction waste.
 - **Solid Waste:** During project implementation, non-hazardous solid waste generated at construction sites including domestic waste and other wastes such as wood and metals.
 - **Hazardous Materials:** Fuel, lubricating oils and other forms of hazardous waste may be encountered.
- **Occupational Health and Safety**

Likely OHS risks during the proposed project include over-exertion, slips, and falls, work at heights, hot works (welding), and electrocution, being struck by objects, injury by moving machinery and dust from demolition and construction activities.

- **Community Health and Safety**

The guidelines recommend implementation of risk management strategies to protect the general community from physical, chemical, or other hazards associated with sites under demolition, construction, and decommissioning.

- **Traffic Safety**

Project activities may result in a significant increase in movement of heavy vehicles for the transport of construction materials and equipment increasing the risk of traffic-related accidents and injuries to workers, local communities and road users.

5.4.6 GAP ANALYSIS BETWEEN THE KEY WORLD BANK SAFEGUARD POLICIES AND GOVERNMENT OF UGANDA'S ENVIRONMENTAL AND SOCIAL REQUIREMENTS (AS ADOPTED AND UPDATED FROM THE IWMDP ESMF, 2018 AND UGANDA CLIMATE SMART AGRICULTURAL PROJECT ESMF, 2022)

The platform upon which Uganda's country system has been built is the Constitution, which commits government to protecting natural resources on behalf of the people. It explicitly encompasses the concept of sustainability, including meeting the needs of present and future generations. The State is also committed to preventing or minimising environmental damage and upholding the right of "every Ugandan to a clean and healthy environment". This represents the highest-level commitment to sustainability. The NEA 2019 is the key legislation for environmental (and to a lesser extent, social) risk management.

From an environmental perspective, Uganda's institutions have well-enough defined mandates and adequate enabling legislation, albeit with some gaps, overlaps and weaknesses. For the most part, policies, laws, regulations, and guidelines are adequately aligned with regards to the World Bank Environmental and Social Safeguards Policies, especially given that the National Environment Act 2019 (NEA 2019) has been revised and significantly improved, and that new Environmental and Social Impact Assessment (ESIA) regulations have been revised following Good International Industry Practice, with participation of the World Bank.

It is worth noting that environmental management in Uganda has been largely supported by the World Bank, right from the development of the National Environment Management Policy in 1994, the National Environment Act in 1995 (updated in 2019) and the accompanying Regulations, including the establishment of NEMA. Owing to this, most of the environmental requirements are largely influenced by the World Bank's Environmental and Social Safeguard Policies. Most of the provisions of OP 4.01 were adopted and as such the E&S screening and assessment methodology is virtually the same as seen in the Uganda's EIA Guidelines of 1997 and Regulations 2020. **Therefore, in cases where gaps are found between the WB E&S Safeguards Policies and the Government of Uganda Environmental requirements, the World Bank Safeguard Policies shall take precedence especially on matters which are not explicitly provided in the National Legislation requirements.**

Some of the differences include the following: first and foremost, the Ugandan Laws do not provide for Framework Approach (ESMF and RPF) but rather only specific instruments (ESIA, ESMP, Environmental Audits, RAPs). Whilst Uganda's ESIA systems are relatively strong on biophysical

considerations, they are weaker regarding assessment of social and related issues. Whereas the WB Policies provide for independent review mechanism (the Inspection Panel), there is no explicit requirement for independent review of ESIA reports under Uganda's laws, though the ESIA Regulations (2020) provide for a reference to relevant experts who may be consulted to provide specialist knowledge and to assist with understanding and interpreting technical aspects of the project. Furthermore, there is no applicable legislation on a minimum wage. Aspects of the Employment Act contradict other Ugandan laws, by allowing for the employment of children aged 14 for "light work" under adult supervision, in contradiction to Section 7 of the Children (Amendment) Act (2016) which sets the employment age at 16. The Employment Act does not clearly define hazardous employment. The legal framework also fails to provide penalties for the violation of laws prohibiting the employment of minors, contributing to high school drop-out rates, teenage pregnancies, and health issues as children find work on project sites.³

Under OP 4.04 Natural Resources, Uganda lacks Regulations to implement the National Forestry and Tree Planting Act and the Wildlife Act. Therefore, OP 4.04 and OP 4.36 on Forests shall be used to assess any impacts on natural habitats. On OP 4.11 Physical Cultural Resources, the Ugandan legal framework is limited in scope. For example, it does not cover certain aspects such as the intangible heritage. The other area is under OP 4.12 (Involuntary Resettlement) whereby Uganda's Land Act legal framework is restricted to fair, adequate and prompt compensation (cash), while the World Bank policy requires the need to provide alternative land, resettling the Project Affected Persons (PAPs) to levels or standards of livelihood similar to or better than before compensation. The Ugandan legislation also does not provide for restoration of livelihoods, resettlement assistance and compensation at replacement value. Under circumstances like these regarding short-comings in the Uganda law on compensation and ESMF process, the provisions of OP 4.12 shall be applied.

The existing gaps are summarized in Table 5-6 & Table 5-7 below:

³ *Uganda Social Risk Management (SRM) Technical Paper (2019)*

Table 5-6: Summary of Gap Analysis between Uganda and World Bank Safeguards Policies

World Bank's Safeguard Policies	Uganda's Legal and Regulatory Framework	Gaps identified in Uganda legal and regulatory framework	Inclusion in the ESIA
Environmental Assessment (OP 4.01)	<ul style="list-style-type: none"> • National Environment Management Policy, 1994. • National Environment Act No.5 of 2019. • National Environment (Environmental and Social Assessment) Regulations, 2020. 	<ul style="list-style-type: none"> • Independent review is not specifically provided for under ESIA Regulations of Uganda and as a result, the review of ESIA's is commonly reviewed by government agencies; • In the EIA review process, there is no specific legal/regulatory framework that caters for examination of the quality of the ESIA reports. Only conditions of approval/reasons for non-approval of ESIA's are provided by NEMA; • There are no administrative mechanisms for appealing a decision taken on an EIA. 	<p>The report has been Reviewed at MWE level. Further reviews are expected at WB level to ascertain the quality of the ESIA before submission to NEMA. (See Page (i) for Document Control).</p>
Natural Habitats (OP 4.04) and Forests (OP 4.36)	<ul style="list-style-type: none"> • The Constitution 1995 as amended; • the National Environment Act No.5 of 2019; • The National Forestry and Tree Planting Act, 2003; <ul style="list-style-type: none"> • The Uganda Wildlife Act 2019; • The Land Act Cap 227; • The Fish Act Cap 197; 	<p>There are general gaps which include lack of Regulations to implement the National Forestry and Tree Planting Act and the Wildlife Act.</p>	<p>The project is not located in an area with conservation status, however, the protection of wildlife encountered during project implementation has been recommended (Section Error! Reference source not found.).</p> <p>For trees likely to be affected by the project, recommendations on their management have been included in Section Error! Reference source not found., among which is obtaining a permit for tree cutting in case they fall within the project foot print.</p>

World Bank's Safeguard Policies	Uganda's Legal and Regulatory Framework	Gaps identified in Uganda legal and regulatory framework	Inclusion in the ESIA
	<ul style="list-style-type: none"> The Plant Protection Act Cap 31. 		
Physical Cultural Resources (OP 4.11)	<ul style="list-style-type: none"> The Constitution 1995 as amended The National Environment Act, 2019 The Historical Monuments Act, Cap 46 <ul style="list-style-type: none"> The Institution of Traditional or Cultural Leaders Act, 2011 	<ul style="list-style-type: none"> The legal framework is limited in scope. For example, it does not cover certain aspects such as the intangible heritage; There is no strong institution to regulate and manage heritage resources; The sites and monuments are not adequately maintained, documented and in addition, some of the antiquities are not collected; There is limited enforcement of the legal framework related to Physical Cultural Resources in Uganda because most developers and government officials do not understand the importance of conserving physical cultural resources. 	<p>This ESIA included the Chance Find Procedures (Section Error! Reference source not found.) to facilitate and assign responsibility for identification, handling and preservation of both tangible and intangible physical cultural resources during project implementation.</p>

World Bank's Safeguard Policies	Uganda's Legal and Regulatory Framework	Gaps identified in Uganda legal and regulatory framework	Inclusion in the ESIA
The current Historical Monuments Act is being reviewed to provide for an efficient law for the protection of the cultural resources of the country. The new law shall be inclusive of all aspects of culture, the tangible, intangible heritage of the country. The revised Environmental and Social Impact Assessment Regulations provide that risk assessment should include risks to cultural heritage.			

Table 5-7: Gaps between World Bank and Ugandan legislation applicable to OP 4.12 Involuntary Resettlement

Category of PAPs/ Type of Lost Assets/ Impact	Ugandan Law	OP 4.12	Gap Analysis	Provisions for this ESIA and ensuing RAPs
Land Owners	<p>The Constitution of Uganda, 1995 recognizes four distinct land tenure systems, Customary tenure, Freehold tenure, Leasehold tenure and Mailo land tenure.</p> <p>Land is valued at open market value and a 15% to 30% disturbance allowance must be paid if six months or less notice is given to the owner.</p> <p>Cash compensation is the recommended option.</p>	<p>World Bank Policy recognises the rights of those affected people:</p> <ul style="list-style-type: none"> • Who have formal legal rights to the land or assets they occupy or use. • Who do not have formal legal rights to land or assets, but have a claim to land that is recognized or recognizable under national law. • Who have no recognizable legal right or claim to the land or assets they occupy or use. <p>Compensation of lost assets at full replacement costs.</p> <p>Cash compensation is recommended where there are active land markets and livelihoods are not land based.</p>	<p>The Ugandan law does not compensate those without legal right or claim to the land.</p> <p>WB OP 4.12 does not consider disturbance allowance.</p> <p>Uganda laws and the WB OP 4.12 are consistent in compensation at full replacement cost and cash compensation.</p>	<p>Alternative land (wherever available) or Cash compensation at full replacement value or (based on market value + 15% to 30% disturbance allowance).</p> <p>All forms of tenancy based on formal or informal rights.</p> <p>In kind compensation should be offered as an option to the PAPs where (alternative land is available for the PAPs).</p>

Category of PAPs/ Type of Lost Assets/ Impact	Ugandan Law	OP 4.12	Gap Analysis	Provisions for this ESIA and ensuing RAPs
Land Tenants	Leasehold tenure is created either by contract or by operation of the law. The landlord grants the tenants or lease exclusive possession of the land, usually for a period defined and in return for a rent. The tenant has security of tenure and a proprietary interest in the land. Cash compensation is based upon market value of land and disturbance allowance (15-30%). Entitled to compensation based upon the amount of rights they hold upon land.	Must be compensated, whatever the legal recognition of their occupancy.	The Ugandan law does not compensate those without legal right or claim to the land.	Land owners Compensate for land and all assets at full replacement cost or replacement of land at equal/ greater value and compensate for other assets. World Bank OP 4.12 does not recognize depreciated value for replacement of assets (which should be replaced at market value). Additionally, 15% disturbance allowance will be given to the PAPs on top of the compensation.
Land squatters	Leasehold tenure is created either by contract or by operation of the law. The landlord grants the tenants or lease exclusive possession of the land, usually for a period defined and in return for a rent. The tenant has security of tenure and a proprietary interest in the land. Cash compensation is based upon market value of land and disturbance allowance (15-30%). Entitled to compensation based upon the amount of rights they hold upon land.	Must be compensated, whatever the legal recognition of their occupancy	The Ugandan law does not compensate those without legal right or claim to the land.	Squatters are only entitled to compensation for the development on the land and ample time will be given to the PAPs to harvest their crops. Additionally, 15% disturbance allowance will be given to the PAPs on top of the compensation.

Category of PAPs/ Type of Lost Assets/ Impact	Ugandan Law	OP 4.12	Gap Analysis	Provisions for this ESIA and ensuing RAPs
Owners of non-permanent buildings such as kiosks, butchery shops, wooden shacks for food vendors etc.	Cash compensation based upon rates per m2 established at District level, disturbance allowance (15% or 30%).	Recommends in-kind compensation or cash compensation at full replacement cost. Recommends resettlement assistance.	OP 4.12 does not provide for the disturbance allowance. Ugandan law does not provide for resettlement assistance.	District compensation rates + 15% disturbance allowance. Cash compensation. Livelihood restoration, including identification of alternative sites.
Owners of permanent buildings.	Valuation based on replacement value and guidance from CGV & disturbance allowance (15% or 30%).	Compensation at full replacement cost.	The Ugandan laws are consistent with OP 4.12 in regard to replacement cost.	Cash Compensation at replacement value + 15% disturbance allowance.
Perennial Crops	Cash compensation based upon rates per m2/bush/tree/plant established at District Level and disturbance allowance (15% or 30%).	Compensation at full replacement cost. Income restoration.	OP 4.12 does not provide for the disturbance allowance.	Cash compensation using affected District rates + disturbance allowance.
Seasonal crops	No compensation. 3-6 months' notice given to harvest crops.	No specific provision		No compensation is expected for crops to be harvested. However, in the event that livelihoods are lost compensation will be given.
Loss of income	No specific provision	Livelihoods and living standards are to be restored in real terms to pre-displacement levels or better	The Ugandan legislation does not provide for restoration of livelihoods.	In the context of this project, practical livelihood restoration measures have been proposed.
Vulnerable groups	The 1995 Uganda Constitution stipulates that: "the State shall take affirmative action in favour of groups marginalised on the basis of gender, age, disability or any other reason [...] for the purpose of redressing	Particular attention should be paid to the needs of vulnerable groups among those displaced such as those below the poverty line, landless, elderly; women and	Both the Ugandan Constitution and WB OP 4.12 favour vulnerable groups. However, the Ugandan law, vulnerable groups are not fully	Special attention will be paid to vulnerable persons affected and necessary measures will be provided in the entitlement matrix of the RAP.

Category of PAPs/ Type of Lost Assets/ Impact	Ugandan Law	OP 4.12	Gap Analysis	Provisions for this ESIA and ensuing RAPs
	imbalances which exist against them". This regulation is not fully described in the context of resettlement and land acquisition.	children and indigenous peoples and ethnic minorities.	described in the context of resettlement and land acquisition.	
Relocation and Resettlement	Both the Constitution, 1995 and The Land Act, 1998 give the government and local authorities, power to compulsorily acquire land. The Constitution states that "no person shall be compulsorily deprived of property or any interests in or any right over property of any description except" if the taking of the land is necessary "for public use or in the interest of defence, public safety, public order, public morality or public health."	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.	There is no requirement under the Ugandan law to minimize land acquisition.	Measures to minimize involuntary resettlement shall be considered in the RAP following a WB mitigation hierarchy.
Livelihood restoration and assistance	There are no explicit provisions under resettlement or relocation for livelihood assistance.	Livelihoods and living standards are to be restored in real terms to pre-displacement levels or better	Ugandan policy and legislation would need to be aligned with Bank policy to effectively guarantee rights of all affected persons of involuntary resettlement.	The project will provide transition allowance.
Consultation and disclosure	There are no explicit provisions for consultations and disclosure but there are guidelines issued by separate ministries (e.g. roads and energy). The Land Acquisition Act,	Consult project-affected persons, host communities and local NGOs, as appropriate. Provide them opportunities to participate in the planning, implementation, and	While the consultation requirement is inherent in the ESIA, it contains several differences with	No gap.

Category of PAPs/ Type of Lost Assets/ Impact	Ugandan Law	OP 4.12	Gap Analysis	Provisions for this ESIA and ensuing RAPs
	however, makes provision for an enquiry whereby the affected person can make formal written claim and the assessment officer is obliged to conduct a hearing before making his award.	monitoring of the resettlement program, especially in the process of developing and implementing the procedures for determining eligibility for compensation benefits and development assistance (as documented in a resettlement plan), and for establishing appropriate and accessible grievance mechanisms.	the requirements of Bank policy.	
Grievance mechanism and dispute resolution	The Land Act, 1998 states that land tribunals must be established at all districts. The Land Act empowers the Land Tribunals to determine disputes and it provides for appeal to higher ordinary courts. The Land Acquisition Act provides for the aggrieved person to appeal to the High Court.	Establish appropriate and accessible Grievance Redress Mechanism.	GRC structures exist within the Local Councils of Governance in Uganda, but in most cases, they are dysfunctional and ineffective given the limited projects knowledge.	Grievance committees to be instituted within the procedure and will not replace the existing legal process in Uganda; rather it seeks to resolve issues quickly so as to expedite receipt of entitlements and smooth resettlement without resorting to expensive and time-consuming legal action. If the grievance procedure fails to provide a settlement, complainants can still seek legal redress.
Calculation of compensation and valuation	According to the Land Act, Cap 227 (section 77), the value of Customary land shall be the open market value of the unimproved land.	Bank policy requires: (a) prompt compensation at full replacement cost for loss of assets attributable to the project; (b) if there is	There is no equivalent provisions on relocation assistance, transitional	Market value is based on recent transactions and thus if alternative property is purchased within a reasonable period of the

Category of PAPs/ Type of Lost Assets/ Impact	Ugandan Law	OP 4.12	Gap Analysis	Provisions for this ESIA and ensuing RAPs
	<p>Value of the buildings shall be at open market value for urban areas and depreciated replacement cost for rural areas.</p> <p>The crops and buildings of a non-permanent nature are compensated at rates set by District Land Boards</p>	<p>relocation, assistance during relocation, and residential housing, or housing sites, or agricultural sites of equivalent productive potential, as required; (c)transitional support and development assistance, such as land preparation, credit facilities, training or job opportunities as required, in addition to compensation measures; (d) cash compensation for land when the impact of land acquisition on livelihoods is minor; and (e) provision of civic infrastructure and community services as required.</p>	<p>support, or the provision of civic infrastructure.</p> <p>The basis of compensation assessment is not stated in the Land Acquisition Act (an old law due for review), although the Constitution provides for 'prompt, fair and adequate' compensation. (article 26).</p>	<p>payment of compensation, it is likely that market value will reflect full replacement value.</p> <p>However, local inflation in price land or construction materials can affect what is determined as replacement cost. If this is not reflected in recent transactions, market value may not reflect replacement value.</p>

5.5 INSTITUTIONAL FRAMEWORK

5.5.1 MINISTRY OF WATER AND ENVIRONMENT

The Ministry of Water and Environment (MWE) has the overall mission: to promote and ensure the rational and sustainable utilization, development and effective management of water and environment resources for socio-economic development of the country. The ministry has three directorates: Directorate of Water Resources Management (DWRM), Directorate of Water Development (DWD) and the Directorate of Environmental Affairs (DEA). MWE shall take lead on implementation of the project and shall ensure all recommendations contained in the mitigation plan are implemented.

5.5.2 DIRECTORATE OF WATER RESOURCES MANAGEMENT

The Directorate of Water Resources Management (DWRM) is responsible for developing and maintaining national water laws, policies and regulations; managing, monitoring and regulation of water resources through issuing water use, abstraction and wastewater discharge permits; Integrated Water Resources Management (IWRM) activities; coordinating Uganda's participation in joint management of transboundary water resources and peaceful cooperation with Nile Basin riparian countries.

5.5.3 NATIONAL WATER AND SEWERAGE CORPORATION

National Water and Sewerage Corporation (NWSC) has the overall mandate to operate and provide water and sewerage services in areas entrusted to it, on a sound, commercial and viable basis.

5.5.4 WETLANDS MANAGEMENT DEPARTMENT

Wetlands Management Department (WMD) is mandated to manage wetland resources and its goal is to sustain the biophysical and socio-economic values of the wetlands in Uganda for present and future generations.

5.5.5 NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY

National Environment Management Authority (NEMA) was designated under the National Environment Act No.5 of 2019 as the principal agency in Uganda charged with the responsibility of coordinating, monitoring, regulating and supervising environmental management in Uganda. In this context, NEMA will be responsible for review and approval of this environmental impact assessment, ensuring proposed mitigation measures are implemented, monitoring compliance with approval conditions, and ensuring any other impacts that may arise are mitigated.

5.5.6 NATIONAL FORESTRY AUTHORITY

The National Forestry Authority (NFA) is the Government statutory entity responsible for the management of Central Forest Reserves (CFRs) on a sustainable basis, as well as, to supply high quality forestry-related products and services in Uganda. NFA will be interested in ensuring tree clearance is minimised during project implementation and also to provide guidance on tree planting activities fostered by the project.

5.5.7 UGANDA WILDLIFE AUTHORITY

UWA is mandated to ensure sustainable management of wildlife resources and supervise wildlife activities in Uganda both within and outside the protected areas.

5.5.8 THE MINISTRY OF FINANCE, PLANNING AND ECONOMIC DEVELOPMENT

The mandate of the Ministry is to:

- Formulate policies that enhance stability and development
- To mobilize local and external financial resources for public expenditure
- To regulate financial management and ensure efficiency in public expenditure.
- To oversee national planning and strategic development initiatives for economic growth

5.5.9 MINISTRY OF LANDS, HOUSING AND URBAN DEVELOPMENT

The Mandate is “To ensure a rational: sustainable and effective use and management of land and orderly development of urban and rural areas as well as safe, planned and adequate housing for socioeconomic development”. The MoLHUD, through the Office of the Chief Government Valuer, and the District Land Boards, will provide guidance on land acquisition and property valuation, where required.

5.5.10 UGANDA NATIONAL ROADS AUTHORITY

The mandate of UNRA is to develop and maintain the national roads network, advise Government on general roads policy and contribute to addressing of transport concerns, among others. Some of UNRA responsibilities include: management of the National Roads Network; maintenance and development of the national roads network; and establishing and maintaining road reserves among others. UNRA is a key stakeholder under the project because the distribution line components largely run along the road reserves.

5.5.11 MINISTRY OF GENDER, LABOUR AND SOCIAL DEVELOPMENT

Ministry of Gender Labour and Social Development is a Government Ministry with a responsibility to empower communities in diverse areas. The Ministry came into being by a constitutional requirement of the 1995 Constitution, Chapters 4 and 16 which mandates government to: “empower communities to harness their potential through skills development, labour productivity and cultural growth. The Ministry promotes cultural growth, skills development and labour productivity while promoting gender equality, labour administration, social protection and transformation of communities. This Ministry has one of its major tasks to ensure that all Ugandans enjoy better standards of living, especially the disadvantaged and vulnerable groups.”

5.5.12 THE EQUAL OPPORTUNITIES COMMISSION (EOC)

The Equal Opportunities Commission (EOC) was established by the Equal Opportunities Act 2007. The Commission is mandated to provide a framework for redressing imbalances, which exist among the marginalized groups while promoting equality and fairness to all. The Commission was established pursuant to article 32 (3 – 4) of the Constitution and is a body corporate with perpetual succession and a common seal and may sue or be sued in its corporate name and, may do, enjoy or suffer anything that bodies corporate lawfully do, enjoy or suffer. The Commission gives effect to the State’s constitutional mandate to eliminate discrimination and inequalities against any individual or group of persons on the ground of sex, age, race, colour, ethnic origin, tribe, birth, creed or religion, health status, social or economic standing, political opinion or disability, and take affirmative action in favour of groups marginalized on the basis of gender, age, disability or any other reason created by history, tradition or custom for the purpose of redressing imbalances which exist against them; and to provide for other related matters.

5.5.13 MINISTRY OF LOCAL GOVERNMENT

The 1997 Local Government Act provides for decentralization and devolution of government functions, powers and services from the central to Local Governments and sets up the political and administrative functions of local governments. The Local Governments are responsible for the protection of the environment in their respective areas of jurisdiction. Local Governments shall be consulted on projects to be located within their jurisdiction and on matters that affect their environment. At the District Level, the District Environmental Officers, District Engineer and Community Development Officers in the respective areas of project implementation will participate in monitoring the projects to ensure that mitigation measures are adequate and advice or point out additional compliance requirements following their inspections. The District Land Boards and Lands Officers will provide guidance on issues of compensation or land acquisition.

5.5.14 BUYENDE DISTRICT LOCAL GOVERNMENT

The district local government is mandated under the Local Government Act and the National Environmental Act to ensure that all project activities are implemented in accordance with the national legal and policy framework. The district is responsible for major functions and services previously carried out by the central government i.e. land administration and surveying; the construction and maintenance of feeder roads, and; the provision and maintenance of water supplies. Therefore, Buyende District Local Government is a key stakeholder for the project.

5.5.15 MINISTRY OF WORKS AND TRANSPORT (MOWT)

The mandate of MoWT is to develop and maintain the national roads network, advise Government on general roads policy and contribute to addressing of transport concerns, among others. Some of MoWT responsibilities include: management of the National Roads Network; maintenance and development of the national roads network; and establishing and maintaining road reserves among others. The project transmission line and distribution lines run along the road reserve of community access roads in Villages within Igwaya RGC which are considered District roads under road categorization. Buyende District will authorize construction of project components in the road reserve as well as provide guidance and supervision for the project contractor in constructing service ducts for the pipe crossing on roads.

5.5.16 UGANDA POLICE

The mandate of Uganda Police Force as provided in the Constitution of the Republic of Uganda, and Uganda Police Force Act Cap 303, is protection of life and property, prevention and detection of crime, keeping law and order, and maintenance of overall Security and Public Safety in Uganda. The police force has different department, namely; Traffic and road safety, human rights and legal services, fire prevention and rescue services, criminal investigations, criminal intelligence among others.

The project will be implemented in Kagulu Parish, Kagulu Sub County, Buyende District. The police post at Kagulu Sub county will handle all security and safety matters arising from the project. Depending on level of management, cases can be referred to Buyende District and/or further to national level for management. Grievances, however, will be management through a project/community grievance redress mechanism unless, unresolved at these levels.

6 ENVIRONMENTAL AND SOCIAL BASELINE

6.1 PHYSICAL ENVIRONMENT

6.1.1 CLIMATE

Buyende district in the Eastern Region of Uganda has a Tropical monsoon climate which corresponds to the Köppen climate classification category "Am" (Beck et al., 2018). Tropical monsoon climates have monthly mean temperatures above 18 °C in every month of the year and a dry season. Over the course of the year, the temperature typically varies from 16.7 °C to 32.2 °C and is rarely below 15 °C or above 35.6 °C⁴. The hot season lasts for about 2 months, from late January to late March, with an average daily high temperature above 31 °C. The hottest month of the year around this site is March, with an average high of 31.7 °C and a low of 18.3°C. The cool season lasts for about 5 months, from late April to late September, with an average daily high temperature below 28.3 °C. It is coldest in August, with an average low of 16.7 °C and a high of 27.2 °C.

The Igwaya project area receives rainfall throughout the year. It rains the most in April, with an average rainfall of 167.6 mm and the least in January, with an average rainfall of 33.0 mm. Igwaya experiences extreme seasonal variation in monthly rainfall.

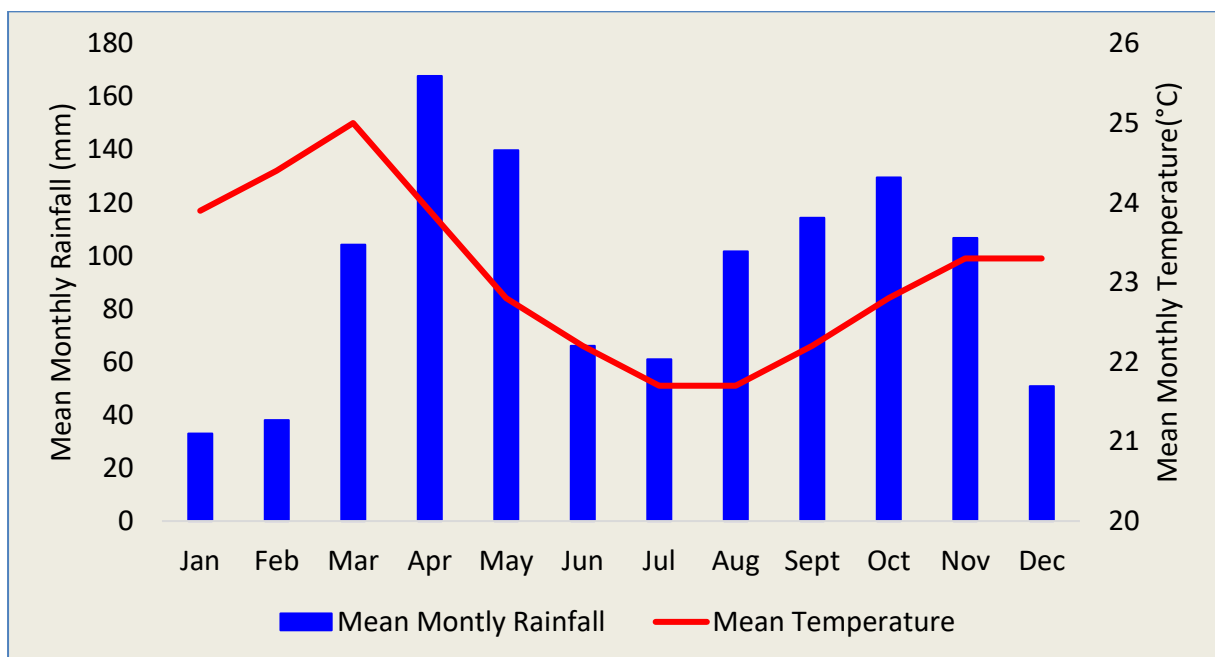


Figure 6-1: Mean monthly rainfall and temperature in Igwaya project area

Relation of baseline to the project: Igwaya experiences a conducive climate for implementation of the project both construction and operation phases. During the construction phase, works sensitive to climate, such as excavation and earth works are conducive in no or moderate rainy days and sunny days or months to reduce on the impact of soil erosion (silting and sedimentation), dust and air quality nuisance from the sites.

⁴ <https://weatherspark.com/y/97615/Average-Weather-in-Buyende-Uganda-Year-Round>

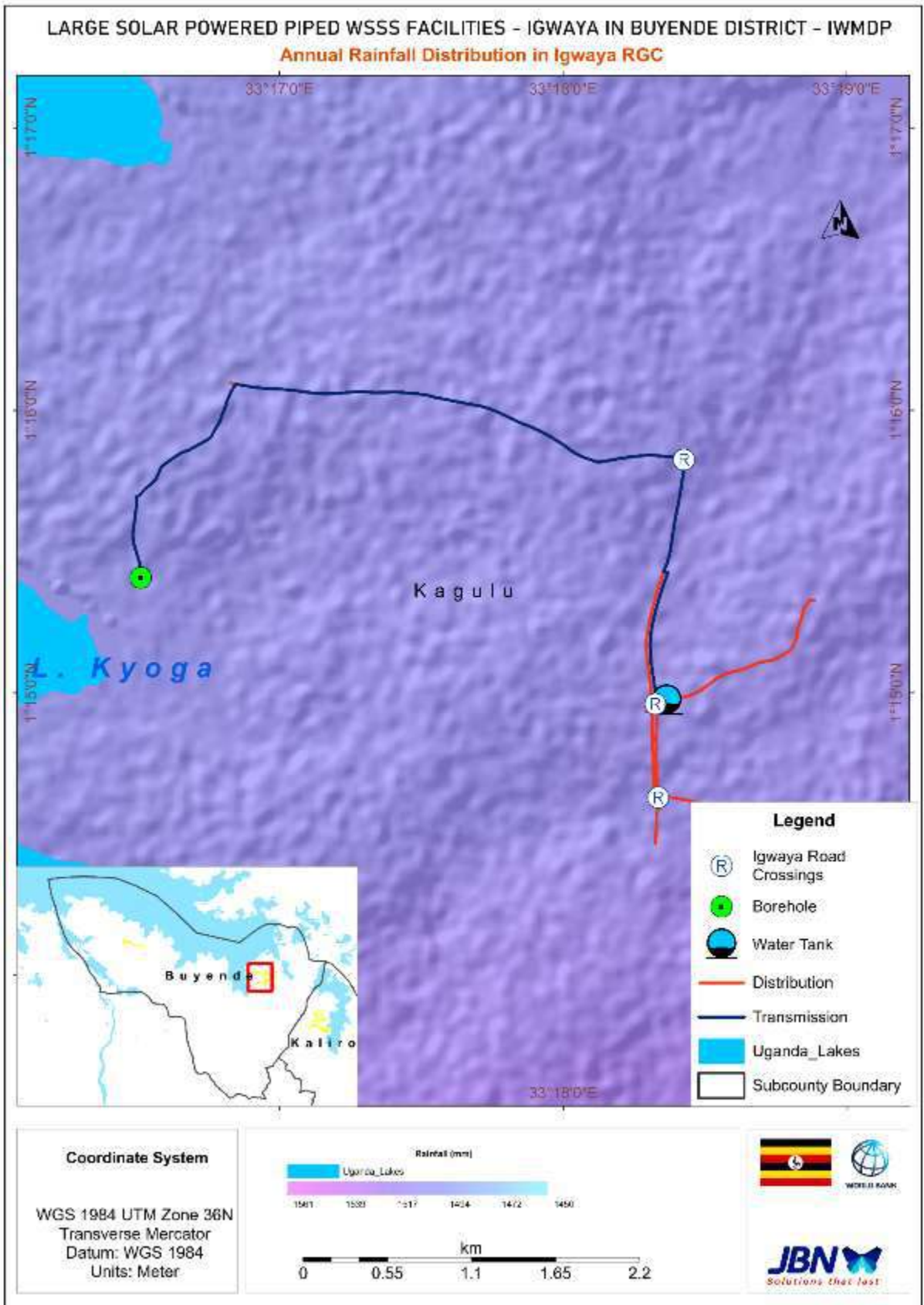


Figure 6-2: Annual rainfall distribution in Buyende

6.1.2 TOPOGRAPHY

Buyende district is a relatively flat district with a few undulating hills and valleys. The biggest part of the district forms the lake shoreline. The area has high ridges and isolated hills and undulating lowlands due to its location along the shores of L. Kyoga. This renders most parts of the project area flat since the whole northern and part of the west form lakeshore and wetland landscapes (*Figure 6-3*).

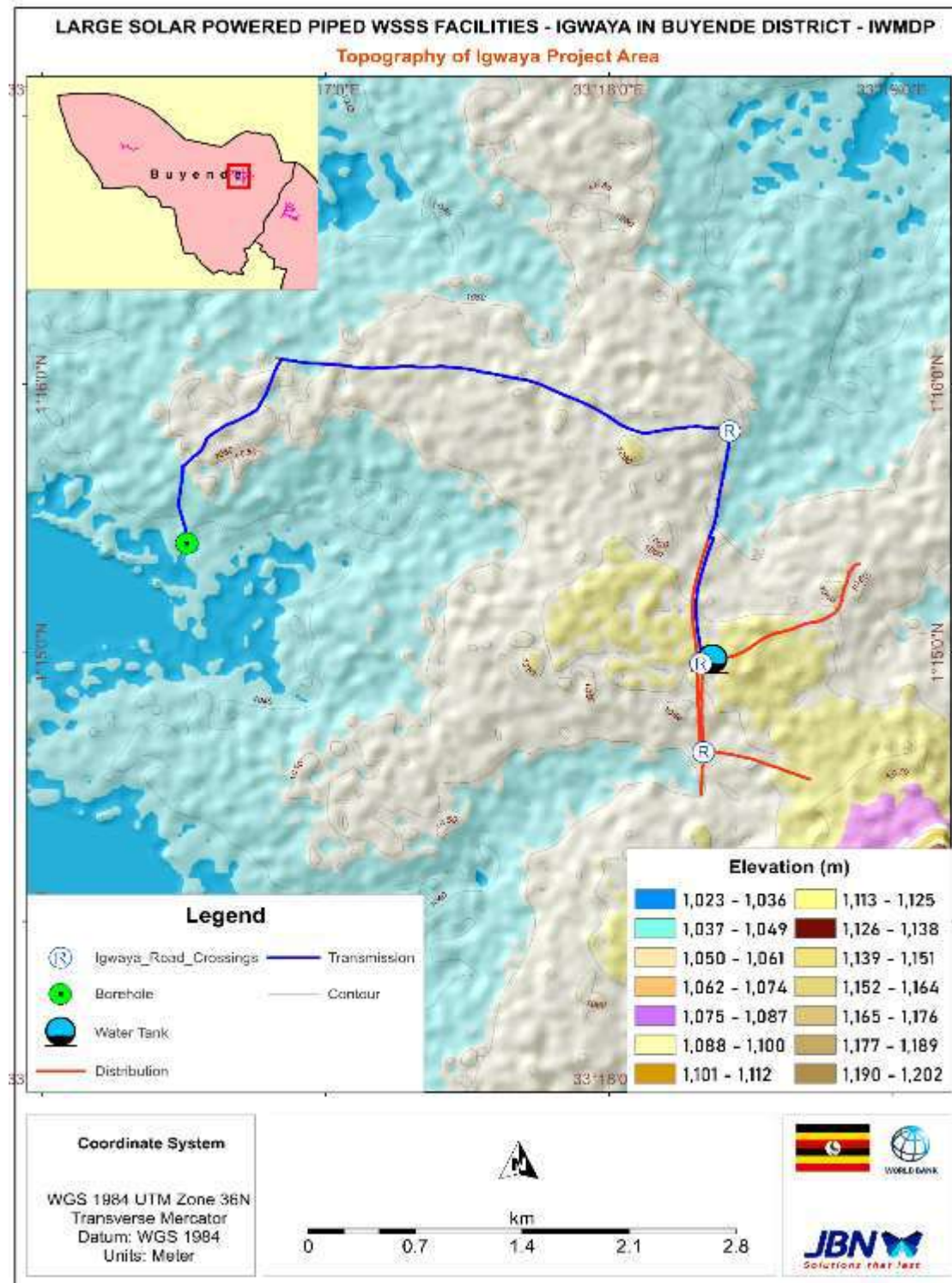


Figure 6-3: Topography of Project Area

The lowest and highest points in the project area are 1020 to about 1270 m ASL with a mean elevation of 1145 m ASL. The entire slope of the project area drains towards the L. Nawampasa, which is part of L. Kyoga, the largest water body. The borehole and reservoir for the project is located at an elevation of 1037 and 1151 respectively. Therefore, water will be pumped to the reservoir tank by using power (solar and augmented with HEP) and the elevation will aid gravitational flow of water to the distribution network.

6.1.3 WATER RESOURCES

6.1.3.1 HYDROLOGY

Uganda has four (4) main Water Management Zones (WMZs) (Upper Nile, Kyoga, Victoria and Albert) and eight (8) river basins (Albert Nile, Aswa, Kidepo, L. Kyoga, L. Victoria, L. Edward, L. Albert, and Victoria Nile). Buyende district is located in the Kyoga basin with its northern boundary within Lake Kyoga with its biggest portion lying along the L. Kyoga shoreline swamps (Figure 6-6).

Igwaya RGC project area is drained by mainly drained over a gentle slope into L. Kyoga - the largest surface water source in the district (**Figure 6-4, Error! Reference source not found. & Figure 6-5**). There also a number of wetlands in form of Riverine vegetation and swamps along the waterbodies which severely face floods. This is evident with the Igwaya borehole which was swallowed by the floods in after it was drilled. *The Igwaya RGC production well is located within the 200m protection zone allocated to the Lakeshores as prescribed by the National Environment (Wetlands, Riverbanks and Lake Shores Management) Regulations, No. 3/2000 (Figure 6-6).*



Figure 6-4: Google Earth location of the Igwaya borehole in the floodplain



Figure 6-5: Igwaya borehole (DWD 60898) in the floodplain

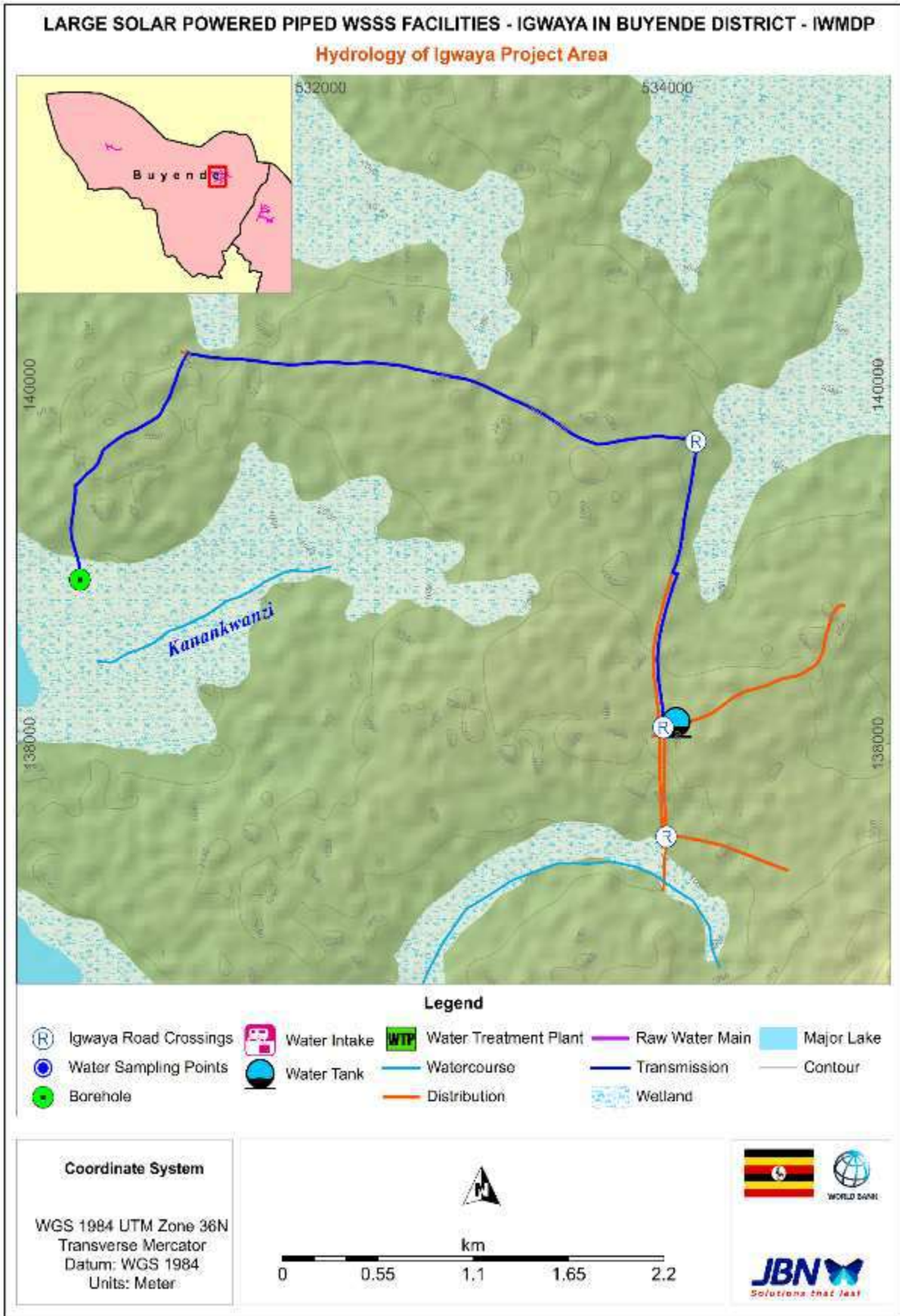


Figure 6-6: Hydrology of the Project Area

6.1.3.2 HYDROGEOLOGY ASSESSMENT

The hydrogeology of Uganda and a large part of the east African region in the tropics is characterized by crystalline bedrocks which usually contain water in fractures and fissures and are able to sustain groundwater supply especially in rural areas. The wells yields are usually less than 1 l/s. Groundwater abstraction in these aquifers provides vital rural and urban water supplies. The weathered regolith overlying the crystalline bedrock is also an important source of groundwater that provides water for rural communities and has been shown to have better yields than the fractured aquifers.

Drilling data obtained from the groundwater database in Entebbe shows that the Igwaya RGC is underlain by Precambrian basement of undifferentiated granite rocks at the depth of about 28 m onwards. Two types of semi-confined aquifers exist in the centre (a) fractures in the basement rock (from 28 m onwards) and (b) the overburden weathered regolith (< 28 m). Hence, most wells are constructed either in the regolith or fractured zones. The hard basement is about 58m deep. The water strikes occur in both the regolith and the fractured rocks.

The yields based on well (WDD 60898) suggest that well yields of 10 m³/hr and the type of aquifer present is the bedrock aquifer up to a depth of about 55 m. The static water level is about 24 m.

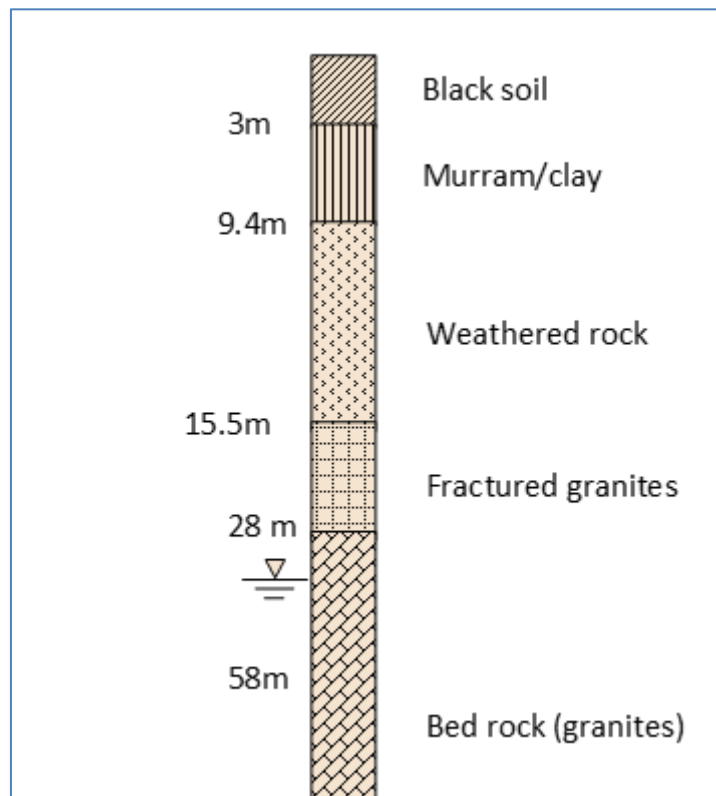


Figure 6-7: Lithology of Wells in Igwaya RGC

The groundwater flow analysis involved estimating the aquifer hydraulic properties namely the Storage coefficient (S), transmissivity (T) and hydraulic conductivity. These were used to estimate the safe yields and the sustainable amount of groundwater available for abstraction for water supply system in the RGC for the present and the future periods.

Data available for this analysis included:

- Testing pumping and drilling data

- Groundwater monitoring water levels for Kamuli monitoring station
- Rainfall data

6.1.3.2.1 AQUIFER OPTIMUM YIELDS

Testing pumping of the new proposed production well at Bumogoli parish in Igwaya RGC was carried out by the Ministry of Water and Environment. The results of test pumping are shown in **Table 6-1**.

Table 6-1: Test Pumping Results

Well No. DWD	Village		Static water Level (m)	Dynamic Water level (m)	Draw Down (m)	Discharge (m ³ /hr.)	Test Duration (hrs)
60898	Bumogoli	Step 1	1.90	8.46	6.56	6.0	1.5
		Step 2	8.46	19.31	17.41	9.0	1.5
		Step 3	19.31	30.36	28.46	12.0	1.5
		Step 4	30.36	77.85	75.95	15.0	1.5
		Constant Discharge	3.90	43.62	41.72	10.0	72

Pumping test data was analyzed using Bierschenk graphical solution of the Jacob's method (**Figure 6-8**) in which the well loss and aquifer formations constants were obtained as follows: B = aquifer coefficient = -1.71 hr/m^2 and C = well loss coefficient = 0.4116 hr/m^2 . The optimum pumping rate was obtained as $10.9 \text{ m}^3/\text{hr}$. Time series of drawdown for estimating the aquifer hydraulic properties were not available.

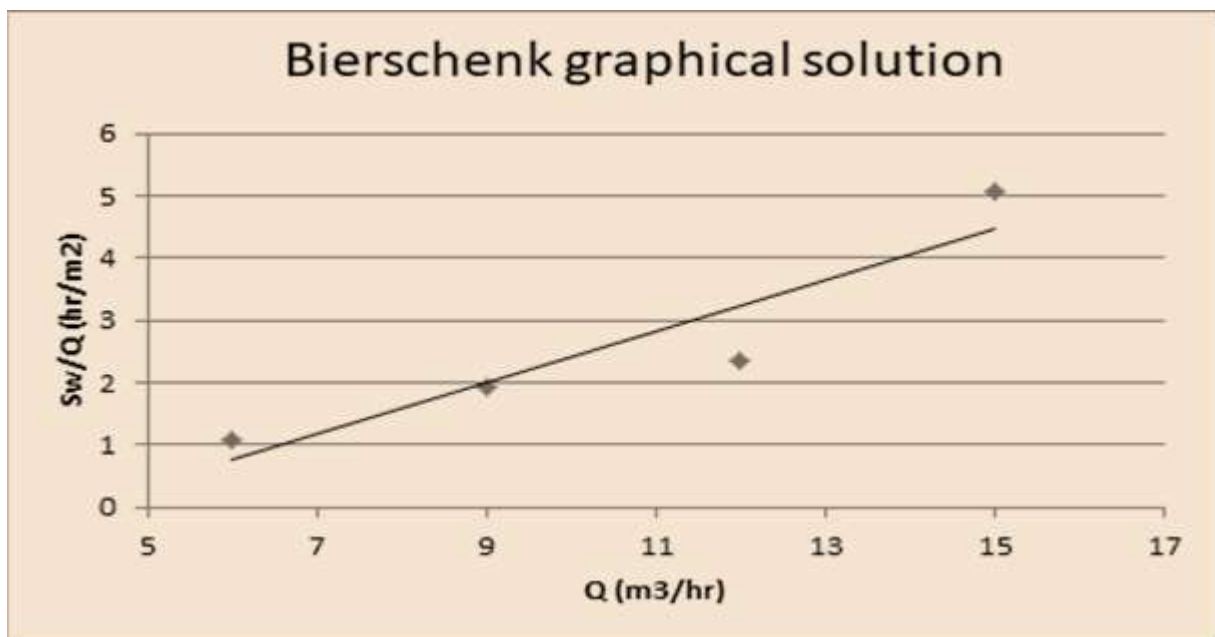


Figure 6-8: Jacob's Solution for Test Pumping Data

6.1.3.2.2 ESTIMATING GROUND WATER STORAGE AND USABLE GROUND WATER

Static water levels are monitored at Kamuli town monitoring well. This well was used to understand water level fluctuations and recharge mechanisms in the project area. The water levels were modeled using the Water Table Fluctuation method. **Figure 6-9** shows a plot of groundwater level and modeling results for Kamuli. The modeling results suggest that data collected from mid-2012 onwards appear to have errors in the recordings.

Recharge and the storage coefficient were estimated from the model as summarized in **Table 6-2**.

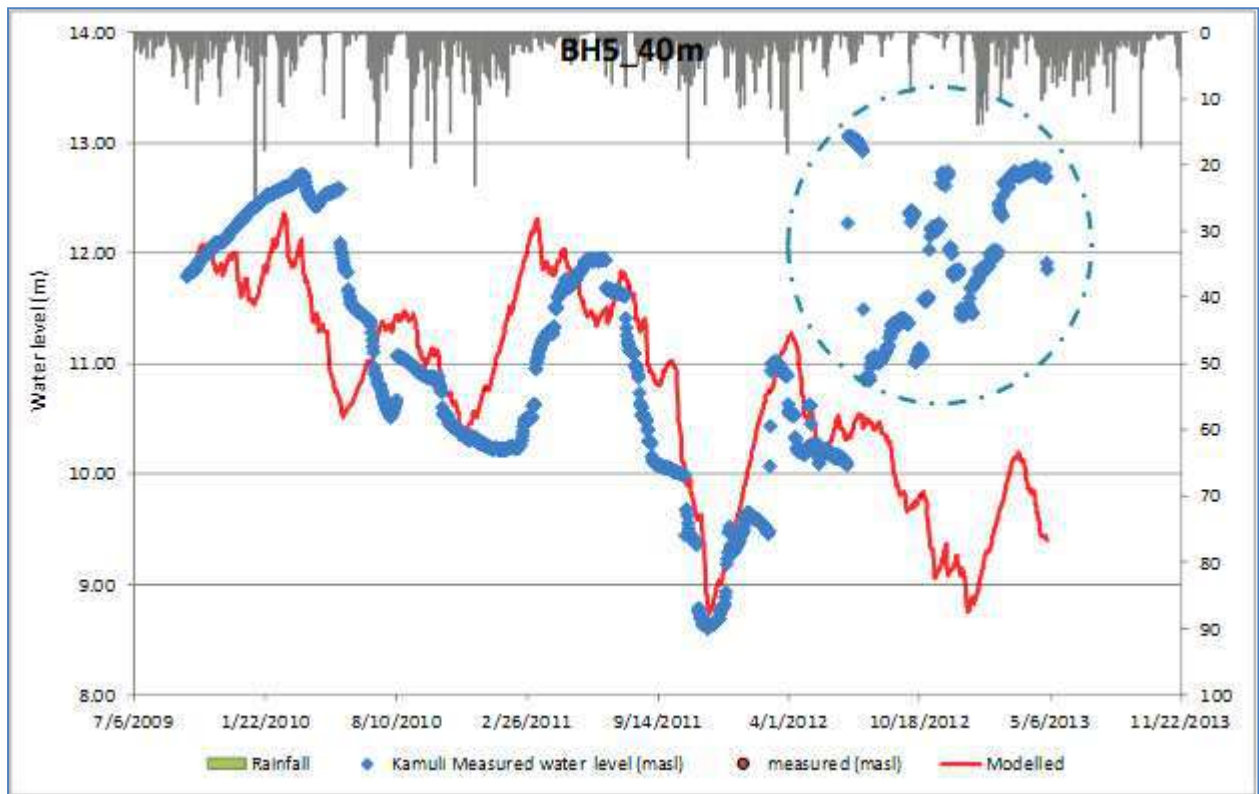


Figure 6-9: Water Level Fluctuation at Kamuli Station and Modeling Results

From the pumping tests, the thickness of the aquifer was estimated to be about 23 m (considering the regolith aquifer). The groundwater amount available can be estimated from the aquifer thickness multiplied with the area (about 50 km²) and the storage coefficient. For Igwaya RGC, the groundwater amount available has therefore been estimated as 759,400 m³.

Of course, not all the groundwater available can be used for abstraction. The maximum groundwater abstraction should not exceed the recharge for sustainable abstraction. The total annual recharge was estimated as 25 mm/day corresponding to 8,250 m³/year volume of water as the usable amount of groundwater without depleting the aquifer. The results are summarized in **Table 6-2**.

Table 6-2: Estimated Storage and Recharge from the Ground Water Model

Aquifer type	Storage coefficient	Recharge (mm/year)	Discharge to L. Kyoga (mm/year)	Groundwater amount (m ³)	Usable groundwater amount (m ³ /year)
Bed rock (granite-gneiss)	0.00066	25	23.6	759,400	8,250

Considering the regolith aquifer as the sustainable source of groundwater for the centre, the available groundwater in the project area is about 759,400 m³ of which about 8,250 m³/year can be abstracted sustainably per year without depleting the aquifer.

6.1.3.2.3 DRILLED BOREHOLE

The drilled borehole in the project area as a potential water source for the piped water supply system. The borehole data for DWD 60898 is shown in **Table 6-3** below.

Table 6-3: DWD 60898 Borehole Data

PARAMETER	VALUE
Airlift Yield (m ³ /hr)	9.4
Static Water Level (m)	3.90
Dynamic Water Level (m)	43.62
Draw Down (m)	41.72
Discharge (m ³ /hr)	10.00
Test Duration (hr)	72

Source: Buyende District Water Office

The safe yield of the drilled well (DWD 60898) is 10.0 m³/hr from the required borehole yield in **Table 6-1**. The maximum day demand in the Ultimate Year for the project is 239.53 m³/day. The borehole source (DWD 60898) can meet 67% of the 2041 maximum day demand over 16-hour pumping regime and 75% over 18-hour pumping regime.

6.1.3.3 FLOOD RISK ASSESSMENT

Flooding is a common risk within the micro catchment. In 2020, water levels in Lake Kyoga rose, submerging shorelines, swamps, and flood plains and displacing over 2000 households. Lake Kyoga is estimated to have exceeded the highest historical water level of 13.2 meters and as such shorelines, swamps, and flood plains experienced high water levels.

Between 2020 and 2021 floods displaced over 40 homesteads who had encroached the wetland buffer zone in the Igwaya RGC. During a community meeting, it was revealed that floods destroyed property including crops for instance; millet, cassava, sweet potatoes. At the time of the assessment, flooding had covered the project water source.

A GIS analysis on flood risk on site (Figure 6-10) indicates that the borehole site is prone to flooding (50% risk), and 95% risk of being cover with flood water from high rainy events from the general Kyoga catchment.

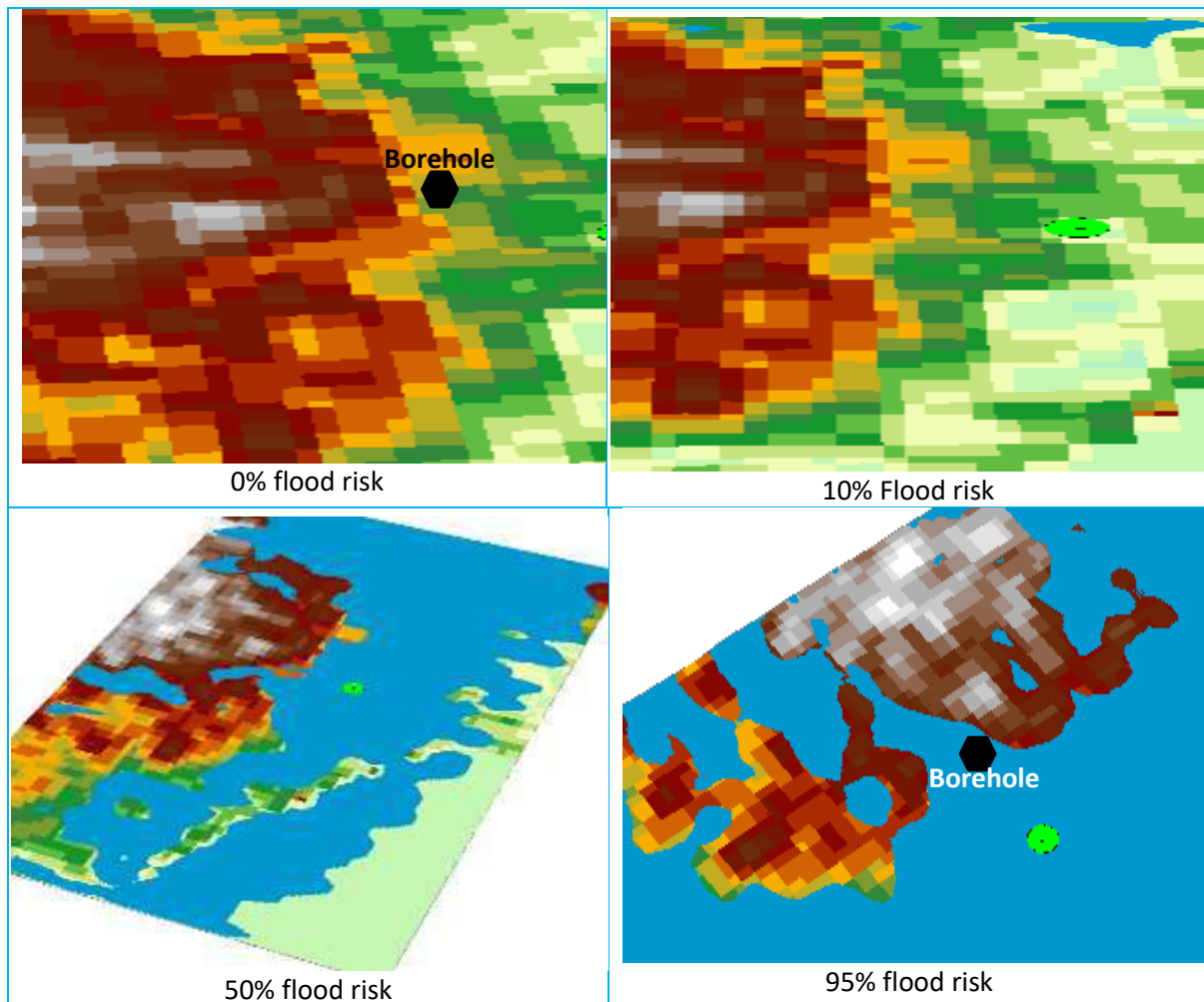


Figure 6-10: GIS Flood risk analysis at the borehole site

6.1.4 WATER QUALITY ANALYSIS

6.1.4.1 IDENTIFICATION OF THE SAMPLING POINTS

A reconnaissance survey of the project area to appreciate the existing water resources, their location in view of the proposed project components, and how they may be affected by the project was undertaken. The reconnaissance survey further involved the identification and delineation of the potential pollution sources that are likely to impact on the water resources. From the findings of the reconnaissance survey, it was identified that the water source (borehole) was the potential area of focus for water quality assessment, and thus, a detailed water quality assessment was carried out on groundwater. The selection of sampling underground water source targeted the nearest community borehole to drilled borehole.

6.1.4.2 FIELD AND LABORATORY WATER QUALITY MEASUREMENT/ANALYSES

According detailed engineering design, the water quality of the drilled borehole (DWD60898) meets the national standard for natural portable water as indicate in **Annex E**.

However, the ESIA team carried out water quality assessment from nearby lake Nawampasa (Lake Kyoga) which is a potential recharge for underground water. The results are presented in **Table 6-4**. And it was found that all the parameters tested for water quality were within drinking water standards (IDEAS 12 2018 Maximum permissible for natural potable water) except the E.coli. as in Annex E.

Table 6-4: Water quality of the intake in L. Kyoga

Parameter (unit)	Test results	Uganda National Bureau of Standards - (DUS ISO 24510:2007 - Maximum permissible limits for potable Drinking water
Turbidity (NTU)	5.2	25
pH (Units)	7.15	5.5-9.5
Electrical Conductivity (μ S/cm)	330	2500
Total dissolved solids (mg/L)	231	1500
Total Hardness as CaCO ₃ (mg/L)	92	600
Fluoride (mg/L)	0.07	1.5
Sulphate (mg/L)	12	400
Chlorides (mg/L)	21	250
Nitrates as N (mg/L)	0.17	10
Nitrites as N (mg/L)	<0.002	0.003
Manganese (mg/L)	<0.001	0.001
Total Iron (mg/L)	0.07	0.5
<i>E. coli</i> (CFU/100 mL)	23	<1

6.1.5 GEOLOGY, GEOMORPHOLOGY AND SOILS

6.1.5.1 GEOLOGY AND GEOMORPHOLOGY

Uganda is composed predominantly of Archaean basement rocks formed mainly between >3.08 Ga and 2.55 Ga. The West Tanzania Terrane (WTT) covers several districts including Buyende. This is a vast granite-gneissic-migmatitic terrane in Central - Southern Uganda. The WTT is divided into 3 major map units: (1) Tonalite-trondhjemite-granodiorite (TTG) gneisses, (2) Tororo Suite (with no project activities) and (3) Kampala Suite (**Figure 6-11**). Geologically, Buyende like most of Uganda exists of “wholly changed rocks”, a kind of Precambrian rocks”. These are mainly gneisses and sediments rock types and around the Igwaya site, is undifferentiated gneiss. These are formed by the metamorphosis of granite or sedimentary rock. Only on the lakesides of Lake Kyoga one finds quaternary sedimentary rocks. The undifferentiated gneiss rock of the basement complex which is a high-grade metamorphic rock, formed by the metamorphosis of granite (**Figure 6-12**). These are the variable gneissic granitoid (2591 \pm 27 Ma; 2652 \pm 8 Ma) (**Figure 6-12**).

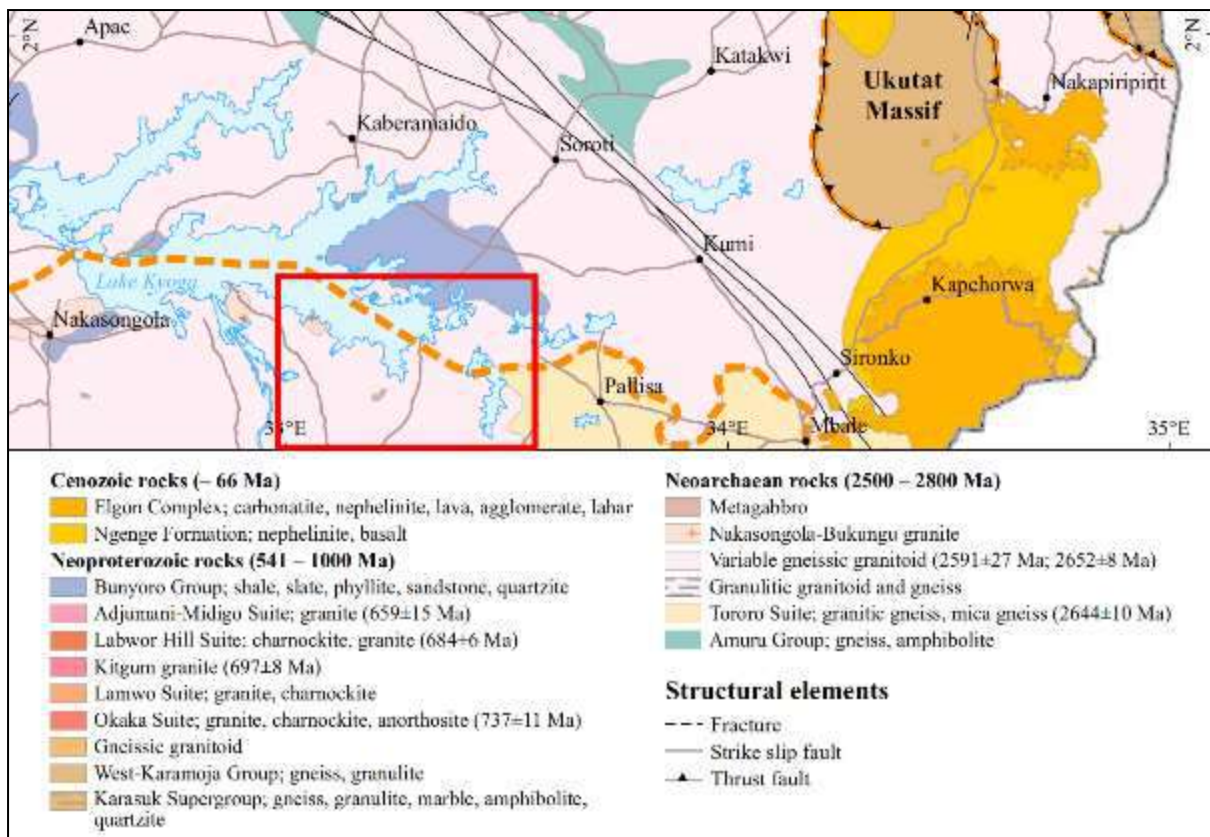


Figure 6-11: Geological map of Buyende District in the West Tanzania Terrane (WTT)

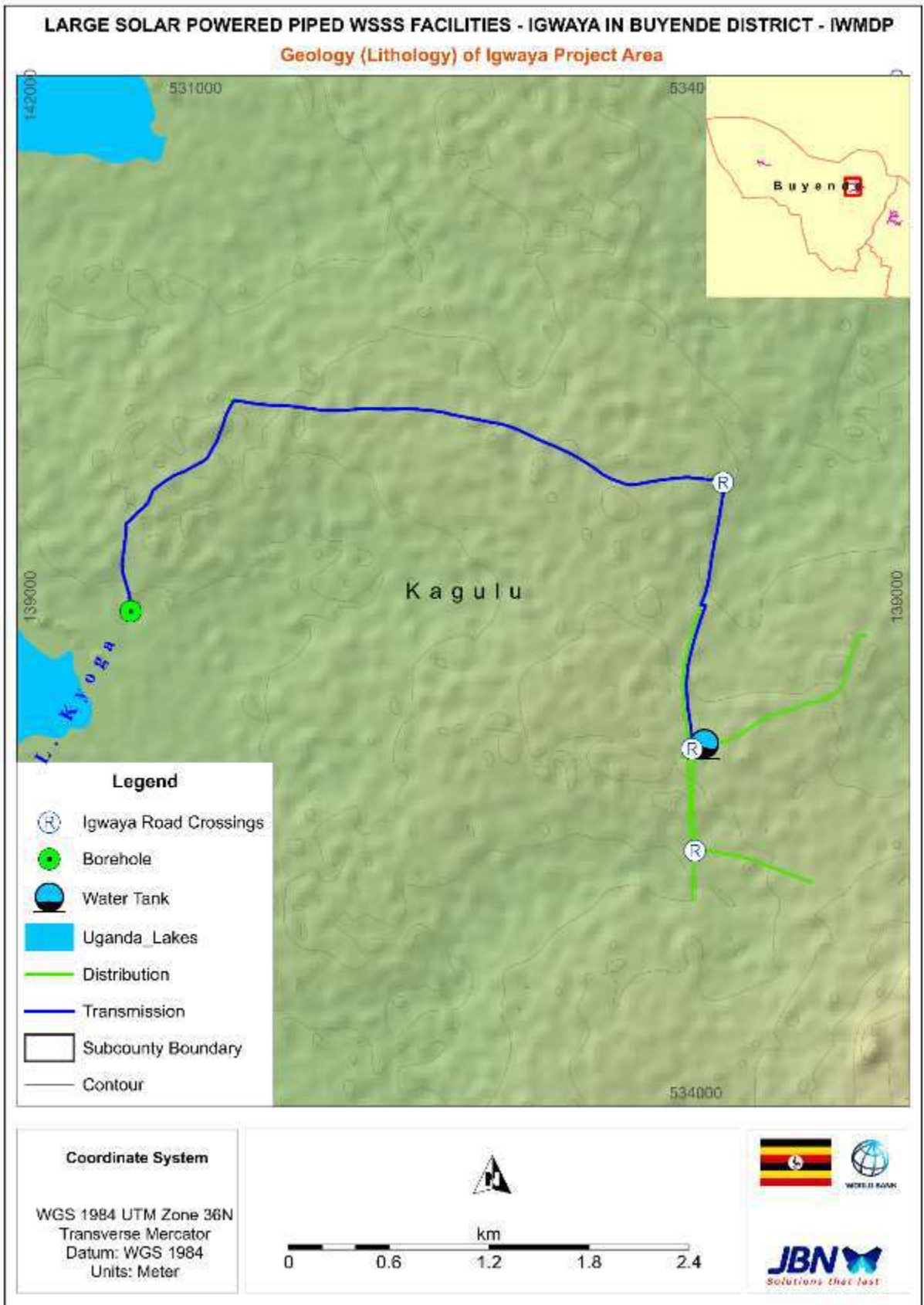


Figure 6-12: Geology (Lithology) of Project Area

6.1.5.2 SOILS

Buyende district is predominantly covered by Grey-brown and brown sandy loams over laterite, black and grey clays, and red and brown sandy loams. In and around the project area, the dominant soil type is greyish and yellowish-brown sands which covers the biggest area of the pipeline (both transmission and distribution) - **Figure 6-13 below**.

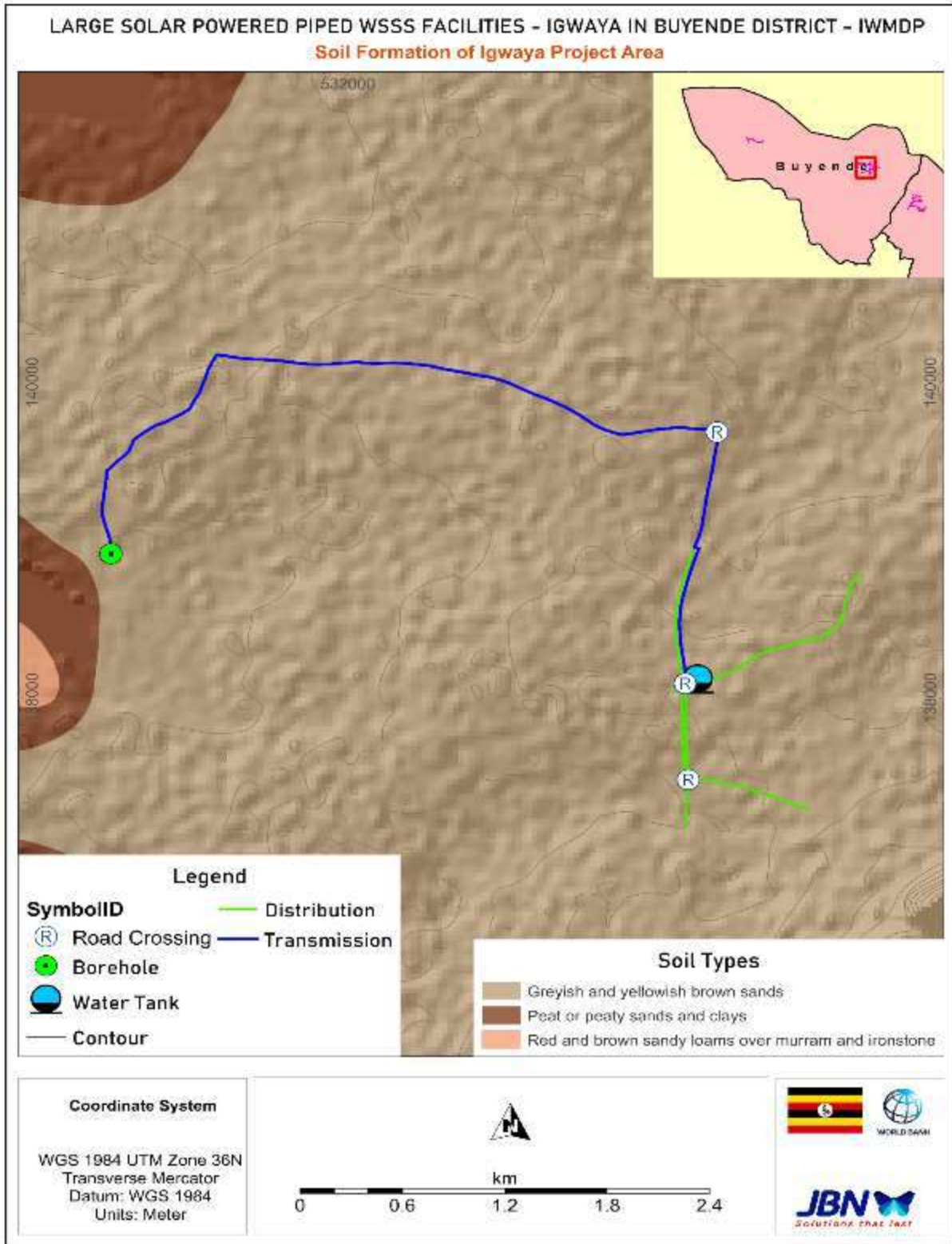


Figure 6-13: Soil in Project Area

These are pleistocene beach deposits derived from basement complex rocks of Lwampanga Series categorized known as Petric Plinthosols (Acric) by FAO. The water source area (borehole) and the first few kilometres of the transmission line are dominated by peat or peaty sands and clays. These are papyrus residues and river alluvium of Papyrus Peat categorised as Histosols.

The sandy soil particles are big in size and resemble tiny stones formed from Lake deposits derived from Basement complex granites, gneisses, among others. Being predominantly rich in sand, loam soils are coarse in texture. These soils are granular in shape and don't have a firm texture therefore they fall apart easily. These soils being more alkaline and less acidic, they don't provide a conducive environment for bacteria to produce carbonic acid hence there will be minimum corrosion on the pipes when installed on this site. Therefore, based on the soil features around the project area, the pipes installed will have minimal chances of corrosion hence we commend that the project will be a success.

6.2 AIR QUALITY, NOISE AND VIBRATION BASELINE

Using a portable Aeroqual S500 monitor mounted on a tripod stand of about 1.4m above ground, ambient air quality monitoring for particulate matter (PM₁₀ and PM_{2.5}) and other potential pollutant gases including; CO, NO₂, SO₂ and VOC was undertaken. The Aeroqual S500 monitor was switched on, the sensors were allowed 3 minutes of warming up and 7 minutes to stabilize readings at each site. The monitor was then set to start data logging at a frequency of five (5) minutes for a given period of time. Sensitive receptors (**Figure 6-14**) were selected using purposive sampling to ascertain the levels of selected gas parameters in relation to the anticipated impacts of the project footprints to the receptors.

All ambient air quality measurements as presented in the following sections, were benchmarked against the World Health Organisation Air Quality Guidelines (WHO AQG), 2021 and the International Finance Corporation of the World Bank Group (IFC) Environmental, Health, and Safety Guidelines: Environmental Air Emissions and Ambient Air Quality (2007).



Figure 6-14: Selected receptors for air quality sampling in Igwaya RGC

6.2.1 PARTICULATE MATTER

Exposure to inhalable and respiratory particulate matter may result in a variety of health effects depending on the magnitude, duration and frequency of exposure. A number of sites (Igwaya TC, Kagulu Health Centre III, Kagulu Hills College, Kagulu market, Kagulu Sub County, and St. Joseph Kagulu

Primary & Secondary Schools) were identified as sensitive receptors to potential impacts of the project footprints. However, Kagulu Health Centre III and Igwaya TC were considered for benchmark assessments as representative sensitive receptors to institution and communities in Igwaya RGC as shown in **Table 6-5** below.

Table 6-5: Summary of Baseline Particulate Matter for Igwaya RGC

Location	Date and Time	Coordinates 36N	PM ₁₀ (mg/m ³)			PM _{2.5} (mg/m ³)		
			Min	Aver	Max	Min	Aver	Max
Igwaya Trading Centre	Date: 16/02/2022 Start time: 7:43 am End time: 9:12 am	0533978 E, 0138040 N	0.119	0.332	0.668	0.053	0.097	0.237
Kagulu Health Centre III	Date: 16/02/2022 Start time: 11:11 am End time: 12:40 pm	0533930 E, 0136545 N	0.055	0.131	0.309	0.034	0.041	0.055
WHO AQG (2021)			<i>0.025 mg/m³ (24hr averaging)</i>			<i>0.05 mg/m³ (24hr averaging)</i>		

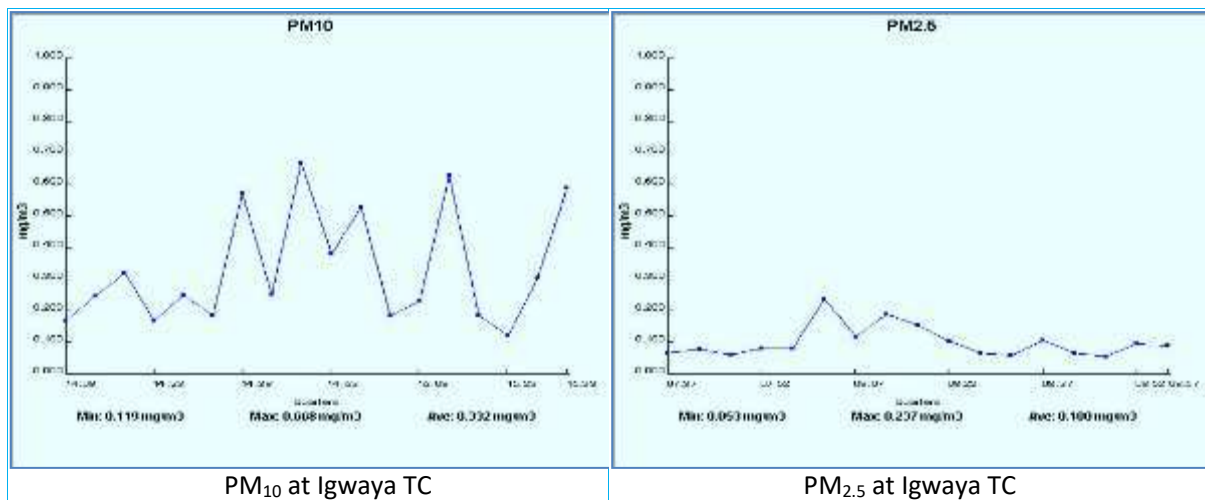


Figure 6-15: Variation of particulate matter with time of day at Igwaya TC

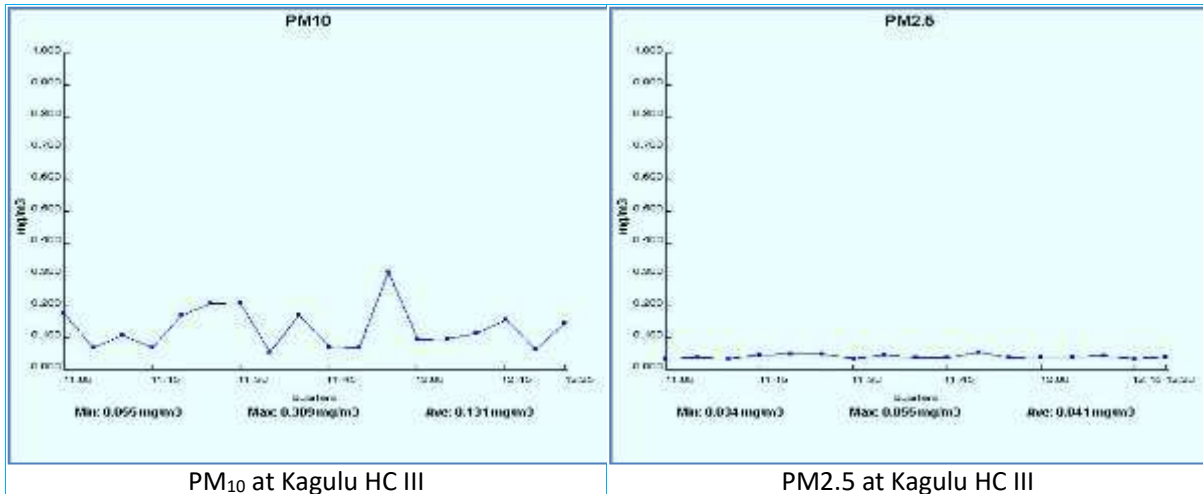


Figure 6-16: Variation of particulate matter with time of day at Kagulu Health Centre III

The ambient average levels of PM_{2.5} ranged from 0.041mg/m³ to 0.097mg/m³ whilst the average levels of PM₁₀ ranged from 0.131mg/m³ to 0.331mg/m³. The values recorded at the two (2) sites were above the WHO Air quality limits for particulate matter (**Figure 6-15** and **Figure 6-16**). At the time of assessment, manifestation of dust particles accrued from movement of hauler trucks, public transport (taxis and motorcycles) and vendors to and from the marketplace in close proximity to the selected receptors (Igwaya TC and Kagulu HC III). The high values of particulate matter were also attributed to the strong winds of the area. However, besides the market day (Wednesday), other days in the week have limited road users, which leaves a conducive environment with minimal dust particles.

6.2.1.1 GAS EMISSIONS BASELINE

Of the total volume of air in the atmosphere, 78.09% is Nitrogen, 20.95% Oxygen and the remaining 1% consists of a mixture of other gases including considered gases for assessment. Four potential gaseous air pollutants including; CO, NO₂, SO₂ and VOC were considered during the assessment.

SO₂ a colourless gas with a sharp odour and NO₂ are produced from burning fossil fuels (coal and oil). Above ambient levels, SO₂ and NO₂ can affect the respiratory systems and cause irritation of the eyes. On the other hand, CO, an odourless and colourless gas is formed by incomplete combustion fossil fuels. VOC are emitted by vehicles, solvents and industries. VOCs can also come from personal care products such as perfume and hair spray, cleaning agents, dry cleaning fluid, paints, lacquers, varnishes, and from photocopying and printing machines.

Table 6-6: Summary of Baseline Gas Emissions Readings for Igwaya RGC

Location	Date & Run time	Readings			
		CO (ppm)	NO ₂ (ppm)	SO ₂ (ppm)	VOCs (ppm)
Igwaya TC	Date: 16/02/2022	Min: 0.00	Min: 0.079	Min: 0.10	Min: 0.04
	Start time: 07:23 am	Ave: 0.00	Ave: 0.096	Ave: 0.15	Ave: 0.07
	End time: 10:23 am	Max: 0.00	Max: 0.108	Max: 0.20	Max: 0.14
Kagulu HC III	Date: 16/02/2022	Min: 0.00	Min: 0.105	Min: 0.00	Min: 0.02

	Start time: 10:44 pm End time: 3:44 pm	Ave: 0.96 Max: 4.94	Ave: 0.125 Max: 0.141	Ave: 0.05 Max: 0.11	Ave: 0.04 Max: 0.06
WHO AQG		9ppm (8-hr average)	0.106ppm (1-hr average)	0.2ppm (10-min average)	None

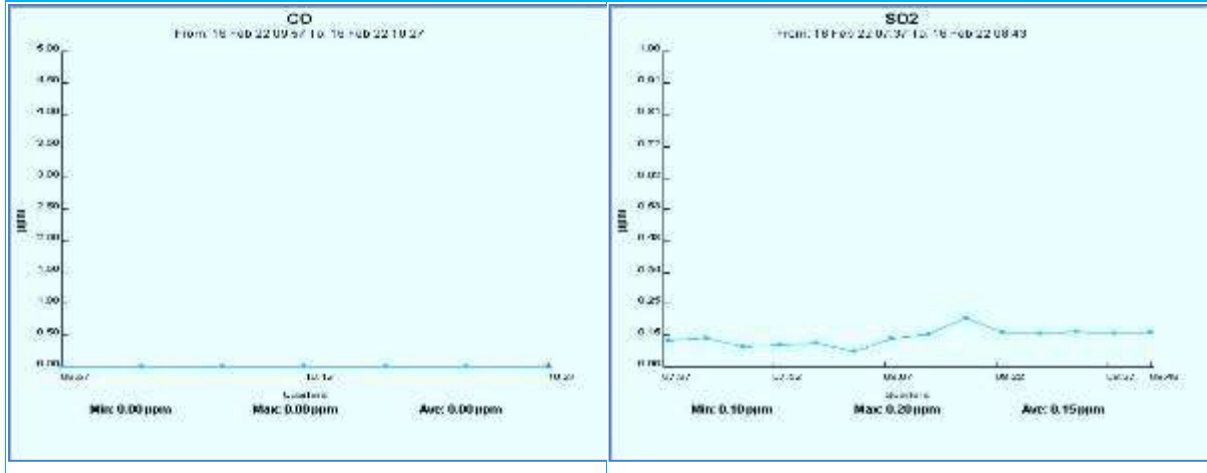


Figure 6-17: Variation of CO and SO₂ levels with time of day at Igwaya TC

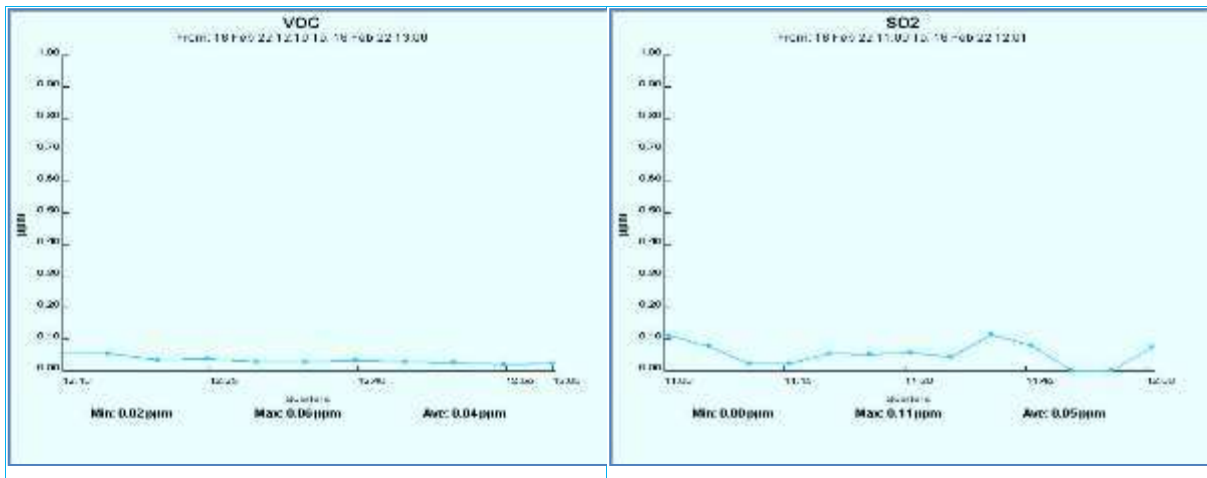


Figure 6-18: Variation of VOC and SO₂ levels with time of day at Kagulu HC III

The average values monitored at the two (2) sites ranged from 0.096ppm – 0.125ppm for NO₂, 0.00ppm – 0.96ppm for CO, 0.005ppm – 0.15ppm for SO₂ and 0.04ppm – 0.07ppm for VOC.

All average values of gases were in conformity with WHO Air quality Standards during the assessment except for NO₂ levels recorded at Kagulu HC III. This was mainly attributed to movement of vehicles in and out of the health centre premises. However, there were no clear or set standards for VOC. The low levels of gases in the selected receptors were as a result of limited economic activities as indicated in **Figure 6-14** above.

6.2.2 NOISE MEASUREMENTS

Sensitive receptors such as Igwaya trading centre, Kagulu Health Centre III, Kagulu Hills College, Kagulu market, Kagulu Sub County, and St. Joseph Kagulu Primary and Secondary Schools were identified as

potential recipients to noise impacts. Baseline ambient noise measurements were however undertaken at two (2) receptors (Igwaya Trading Centre and Kagulu health centre III) by purposive sampling, to ascertain the levels of noise permitted during daytime in the selected receptors. The measurements were recorded against the first schedule of the National Noise Standards and Control regulation, 2003. A duly calibrated Casella CEL-633B (CEL-63X) Environmental & Occupational Noise Meter was used for the assessment. The instrument was first calibrated using Acoustic sound level calibrator type CEL-251 for sound level meter at 114.0 dB (A) at every point measured. Placing the equipment on a tripod stand of about 1.4m high above ground, it was switched on to set up the run mode. The meter was set up to log noise readings at an interval of 30 minutes for three (3) hours at every site. The equipment does simultaneous recordings for all noise functions it completes and also makes periodic or cumulative data measurements, and the results were later downloaded to a computer for further analysis using the Casella Insight software.



Figure 6-19: Ambient Noise monitoring at receptors around the project footprint

Table 6-7: Summary of noise results at measured receptors

Location	GPS Coordinates	LAFmin (dB)	LAFmax (dB)	LAeq (dB)	Maximum Permissible Noise Limits Day (dBA) ⁵
Igwaya TC	0533978 E 0138040 N	44.7	91.3	63.9	55
Kagulu HC III	0533930 E 0136545 N	35.4	94.9	54.0	45

Continuous noise levels (LAeq) for the monitored sites ranged from 54.0 dBA at Kagulu HC III, in a hospital area) to 63.9 dBA at Igwaya TC representing a Mixed residential setup. The noise levels recorded at these different sampled receptors varied depending on the noise sources at a specific monitoring time of the day. The baseline noise levels measured were slightly above the maximum permissible noise limits. These emanated from a range of activities for example in Igwaya TC; high volume music from bars, and speeding vehicular traffic (hauler trucks and boda bodas) as well as noise generated by trading centre dwellers especially from the Boda boda stage. For Kagulu HC III noise

⁵ Applicable Noise limits are derived from the First Schedule of National Noise Standards and Control Regulations, 2003

levels were attributed to vehicles and public address systems used during a family planning sensitisation programme within the health centre premises as indicated in **Figure 6-19** above.

6.2.3 VIBRATIONS

Ground vibration monitoring to measure the seismic movements of soil and rock particles at a frequency range of 10Hz to 1Hz was undertaken using an EXTECH SDL800 Vibration Meter and Data logger mounted on a tripod stand of about 3 inches in length. Using a cable of about 1.2m, the meter was attached to a remote vibration sensor with a magnetic adaptor reinforced to the ground by a 4inch stainless steel nail. The vibration meter was then switched on to set up mode and allow data logging of readings to an SD card inserted into the SD slot at the bottom of the meter

In absence of Uganda standards for vibrations, the ground vibrations standards are adopted from Ireland (**Table 6-8**).

Table 6-8: Adopted Vibration Standards

Allowable Vibration Velocity (Peak Particle Velocity) at the Closest Part of Any Sensitive Property to the Source of Vibration, at a Frequency of		
Less than 10Hz	10 to 50Hz	50 to 100Hz (and above)
8 mm/s	12.5 mm/s	20 mm/s
(Source: Guidelines for the Treatment of Noise and Vibration in National Road Schemes for Ireland)		

Typical vibration from transportation and construction sources falls in the range of 10-30 Hz and usually centres around 15 Hz. Therefore, the limit of 12.5 mm/s for construction equipment was adopted.

Results of vibration measurements recorded at Igwaya TC and Kagulu HC III averaged at a velocity of 0.1mm/s and 1.79mm/s respectively (**Table 6-9**). The vibration values at Igwaya TC and kagulu HC III were way below the adopted standard for transportation and construction activities (12.5mm/s) and have no severity to cause damage.

Table 6-9: Summary of vibration results at measured receptors

Location	Date and Time	Coordinates 36N	Velocity (mm/s)			
			Min	Aver	Max	Adopted standard
Igwaya TC	Date: 16/02/2022	0533978 E 0138040 N	0.0	0.1	0.4	12.5
	End time: 07:46 am End time: 10:31 am					
Kagulu HC IV	Date: 16/02/2022 Start time: 10:57 am End time: 13:40 pm	0533930 E 0136545 N	0.2	1.79	4.3	

6.3 HEALTH AND SAFETY BASELINE CONDITIONS

6.3.1 SECURITY ISSUES AROUND THE PROJECT AREA

The police station that serves Igwaya TC is located at the Sub County Offices in Kagulu. The most common crimes in this area are; defilement, theft, assaults, domestic violence, land issues due to ownership technicalities, and sometimes murder by mob. The main cause of assaults and domestic violence is alcohol consumption. From the records accessed for the period between November 2021 to April 2022, 46 assault cases were recorded, 37 theft, 19 domestic violence, 20 Malicious Damage, 8 cattle theft, 3 murders, 6 criminal trespass, 18 defilement, and 11 RTAs (**Figure 6-20**). The police station does not have enough resources, for example, they have only one motorcycle and they use personal phones for communication.

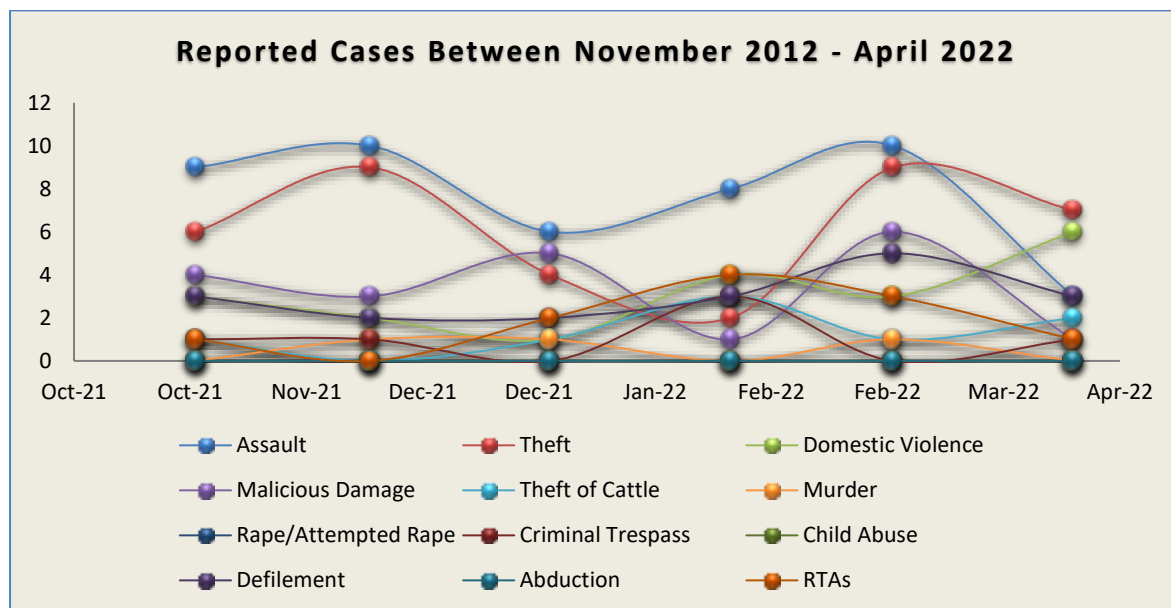


Figure 6-20: Crime and accident statistics for Igwaya RGC

(Source: Kagulu Police Post records November 2021 – April 2022)

6.3.2 FIRE EMERGENCY READINESS

Buyende District does not have a fire station of its own and they depend on the Kamuli fire station. Kagulu Police Station does not have a fire engine and water tanker of its own, the police officers attached to Kagulu Police Station do not have firefighting training and hence do not offer firefighting training. Therefore, in case of a fire, the affected person can call the OC of Kagulu Police Station, who will in turn coordinate with the fire services. There were no records of fire calls from Kagulu Subcounty for the period between November 2021 and April 2022.

6.3.3 TRAFFIC SAFETY SITUATION

According to the OC Kagulu Police Station, the common accidents are caused by motorcycles. All the roads along the project area are marram roads. It is also estimated that the average volume of traffic per day is 300 motorcycles and 30 cars. The common traffic on the roads are pedestrians, cyclists, passenger cars, and a few trucks. 11 road traffic accidents were recorded between November 2021 and April 2022.

6.3.4 STATE OF THE HEALTH FACILITIES AROUND THE PROJECT AREA

There are about 21 health facilities in Buyende, 1 health center IV, 6 health centers III of which 2 are not-for-profit. The entire district does not have a hospital and all referrals are made to Kamuli General Hospital. The common diseases in Igwaya are Malaria and Diarrhoea. Kagulu H/C III is the only health facility serving Igwaya RGC and serves a population of about 21,742 people, they do not have an emergency unit and only provide first aid to accident patients, no blood transfusion, and no theatre. The health facility does not have an ambulance. The health facility provides VCT services, HIV/AIDS treatment, reproductive health education, antenatal services, first aid training, and blood group tests. The health facility is run by only 5 staff (assistant nursing officer, 2 midwives, nursing assistant, and security guard).

6.4 BIOLOGICAL ENVIRONMENT

6.4.1 LANDCOVER AND LAND USE

Deforestation and forest degradation are rampant in Uganda, as the country loses 250,000 Hectares representing 1% annually. Igwaya RGC in Kagulu sub-county is one of these places in the former greater Kamuli District which has lost most of its natural forests due to plethora factors such as; - infrastructure development, expansion of commercial and subsistence agriculture into forest lands and bushlands, and unsustainable harvesting of tree products, mainly for charcoal, firewood and timber (**Figure 6-21**). Therefore, cropland, wetland cover, water and vegetation cover (grassland and forest) are the major land cover in the project area. Whereas agriculture (crop farming/animal grazing), settlement, fishing, small scale business are the main land use patterns in Igwaya RGC.

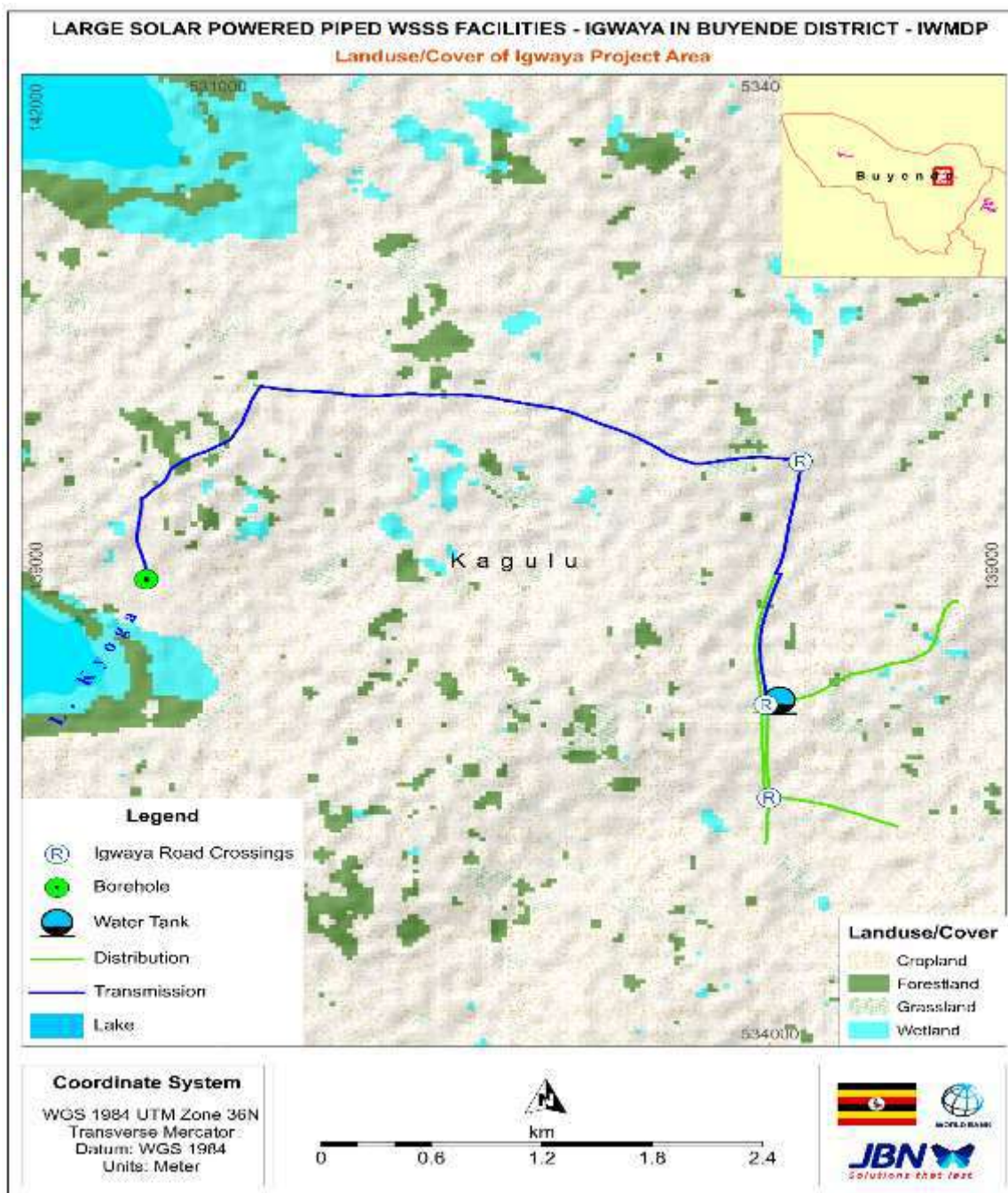


Figure 6-21: Land use/ Land cover in Igwaya RGC

The terrestrial habitats in Igwaya RGC water supply system and sanitation project footprint holds several vegetation mosaics despite of the fact that the district is well known for subsistence agriculture and shifting cultivation and livestock keeping. There were three (3) Major categories of vegetation classes in Kagulu and these include: The various land uses encountered within the project footprints, such as: lakeshore wetlands, Savannah open woodland, Open fallow and crop gardens.

- 1) **The lake shore wetland:** The proposed borehole site is located at the edge of the wetland. The wetland consists of three major categories of vegetation stratum namely;
 - (i) The region of shallow water depth, which can be categorized as swamp edge characterized by herbaceous species such as; - *Typha domingensis* Contributing 15%, *Leersia hexandri* 45%, *Cynodon dactylon* 20%, *Paspalum scrobiculatum* 5% and *Cayratia ibuensis* 10%, all herbaceous associated *Phoenix reclinata* palm tree.



Figure 6-22: Location of the Igwaya RGC Borehole at the edge of the wetland

- (ii) The region of floating rhizomatous mat, dominated by colonies of *Echinochloa pyramidalis* 20%, *Cyperus papyrus* 60%, and *Cyperus dives* mixed with species vine *Cayratia ibuensis* and;
 - (iii) The region of free open water covered with *Nymphaea muculata* and *Eichhornia crassipes* (Water Hyacinth).



Figure 6-23: Nymphaea, Typha domingensis, Echinichloa ssp and Cyperus papyrus

- 2) **Savannah open woodland;** The open wood consists of three major vegetation stratum.
 - (i) Upper canopy trees with species composition of; - *Milicia excelsa* (Mvule), *Albizia coriaria*, *Ficus sycamorus*, *Ficus thonningia*, *Borassus aethiopum*, *Ficus glumosa*, and *Antiaris toxicaria*.
 - (ii) The second stratum also known as the middle canopy, which is composed of *Combretum molle*, *Combretum collinum*, *Piliostigma thonningii*, *Lonchocarpus laxiflorus*, *Acacia sieberiana* and *Acacia polycantha* growing in seasonal swamps, associated with medium height climbers such as *Cissus oliveri* and *Cissus rotundifolia*.
 - (iii) The ground cover or the floor; this consists of the herbaceous plants such as *Hyparrhenia ssp*, *Panicum maximum*, *Imperata cylindrica*, and *Brachiaria distachya*.
- 3) **Open fallow and crop gardens.** The savanna woodland formerly dominated by the herbaceous plant communities, shrubs and remnant trees have been modified due to increasing pressure of the population increase resulting in forest or woods converted into agriculture land and this presents the open fallow or crop fields.



Figure 6-24: Proposed route for the transmission line from the borehole to the reservoir



Figure 6-25: Land use in Mailo

6.4.2 FLORA

6.4.2.1 VEGETATION DESCRIPTION

In Busoga, there are several varieties of vegetation types, those that exceed 100 kilometers, while others are confined to small localities of less than 100 meter. The vegetation range is basically described from the species available and is influenced by the prevailing environmental conditions. The description of the vegetation structure and physiognomy of the study area in Buyende, can be described as secondary and primary. The vegetation, is typically savanna woodland with grassland and remnant trees, wooded grass, wetlands, and seasonal swamps. The current status of these natural habitats was depleted and replaced by farmlands, commercial centers, and homesteads. The area has very few clumps of natural vegetation which is the Kagulu hill and lake Kyoga wetland. The physiognomic structure is composed of the native tree species. Trees and shrubs were present, partially distributed along the distribution routes and the physiognomic classification of an area depends on the woody plant species. As observed, Large trees of ≥ 50 cm of Dbh were very few within the proposed project area. Tree diameter at breast height (Dbh) ranged from 40-120cm. Large trees observed included; *Milicia excelsa* (Mvule tree), *Ficus sycomorus*, *Borassus aethiopum*, *Albizia coriaria*, and *Ficus natalensis*. The herbaceous plants were at a height of about 0,5cm – 3.0 meters tall. Common weeds considered to be the shortest were; -*Brachiaria documbens*, *Cynodon dactylon*, and *Panicum maximum* with maximum height of 60cm. *Typha domingensis* and, *Cyperus papyrus* were considered to be the tallest ranging between 2 and 3.2 meters.

In terms of the vertical structure, the savanna of the study area in the Igwaya RGC is a less complex type of vegetation since the natural habitats of the proposed project footprint are less complex, natural habitats remain in clumps of bushes or in terms remnant trees. The profile shows a tree stratum of 4-35m high for the natural trees. Canopy cover was 80%. The proposed project area recorded very few large trees, which were *Milicia excelsa*, *Ficus sycomorus*, and *Ficus thonningii* at Kagulu health center/sub-county.

6.4.2.2 FLORISTIC COMPOSITION, DISTRIBUTION, DENSITY, AND DIVERSITY

From the surveyed borehole site, and the transmission routes, a total of ninety-one (91) individual species were recorded from thirty-six (36) families and species of orchidaceous were registered from the study sites. Herbs or grasses recorded the highest individuals with forty-five (45) contributing 40%, followed by trees/shrubs with thirty-six (36) representing 24%, and lastly liana with only ten (10) species contributing only 11% of the species composition. All the study areas were not rich in terms of plant species diversity due to the seasonality factor and the number of species recorded in any geographical location depends more on the time factor, sample size than other factors such as; ecological and anthropogenic. All the proposed project transmission lines differed in length a factor that determined the number of sampling units. One tree (*Milicia excelsa* (Mvule) was recorded along transmission lines from the borehole to the reservoir up to the Kagulu Sub County.

Figure 6-26 below Shows species richness in plots from the borehole site and transmission routes for the Igwaya RGC WSSS project. Accumulatively, species richness was low. The low relative species diversity is largely based on agriculture intensity from all places. The proposed distribution and transmission will traverse through areas that have undergone several vegetation transformations. The entire project area is characterized by gaps in formerly cultivated areas with large proportions of bare ground on sandy soils.

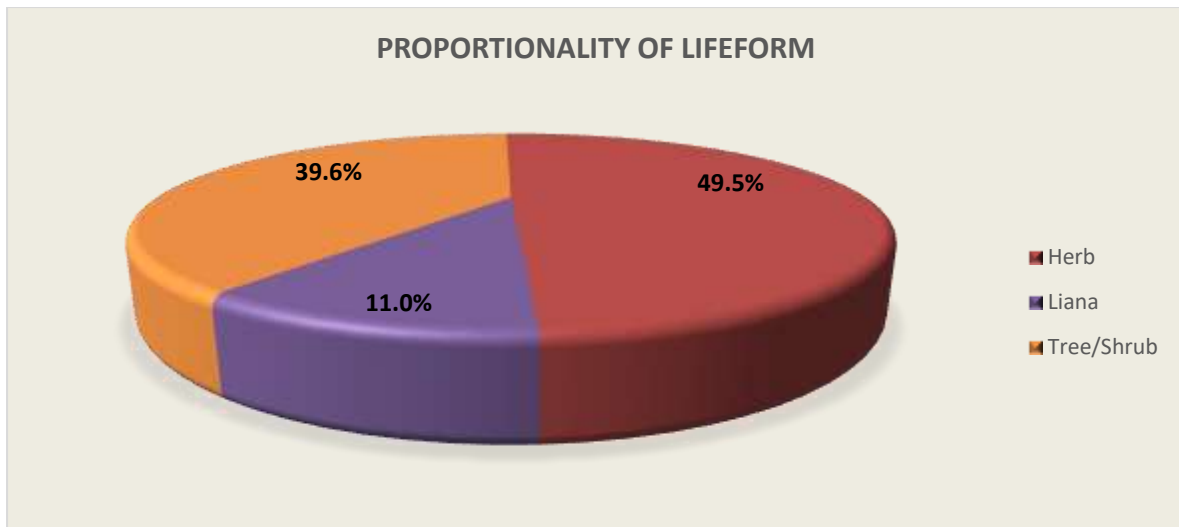


Figure 6-26: Species proportions per lifeform

The diversity of an area is considered to be the number of different species. From the field surveys conducted in Igwaya in Buyende, diversity was considered to be too low depending on the number of species recorded. From the borehole site and the routes, Fabaceae family registered the highest number of species with 10, followed by Poaceae (Gramineae) 9, Moraceae 8, Euphorbiaceae 7, Asteraceae (Compositae) 6, Amaranthaceae and Rubiaceae 4 each. the rest of the families registered 3 or less (Annex F).

6.4.2.3 CONSERVATION STATUS OF THE SPECIES

Using the IUCN Red List Categories and Criteria at Global, Regional and National Levels, out of the ninety-one (91) plant species encountered from the project sites and routes, only one (1) species was listed under the IUCN Red List of Uganda of 2018. *Milicia excelsa* (Mvule) (*Moraceae*), globally listed as Near-threatened and nationally as (EN A2acd,) the species are therefore critically threatened and they deserve protection wherever it occurs. The trees (*Milicia excelsa* (Mvule) were recorded along transmission lines from the borehole to the reservoir up to the Kagulu Sub County (**Figure 6-27**).



Figure 6-27: IUCN threatened species along the transmission line near Kagulu SC and kagulu HC III

Although, the species raises a great conservation concern in the country and in the region, the tree is widely distributed in the Busoga region and it was observed planted on private land with community user rights on its management.

6.4.2.4 INVASIVE ALIEN PLANTS

The term invasive has been defined differently. Cronk and Fuller (1995) refer to natural area weeds as invasive plants and nonnative plants as aliens. Mosango et al (1999) refer to weeds as invasive and any plant growing where it is not wanted and interfering with human activity is a weed. Aliens (exotics) are non-endemic plants spreading naturally without the direct assistance of man in natural or semi-natural habitats, to produce a significant change in terms of composition, structure, or ecosystem processes.

Invasive species may be used to mean an alien species which becomes established in natural or semi-natural ecosystems or habitats, is an agent of change and threatens native biological diversity (IUCN, 1999). Invasive alien species are species introduced deliberately or unintentionally outside their natural habitats where they have the ability to establish themselves, invade, out-compete natives and take over new environments (CBD News, 2001). According to the above descriptions and IUCN, CBD, CABI compendium, and FOA, many of the recorded plant species have been categorized as invasive in some countries across all continents, but in Uganda, those species have not caused a major impact on the plant biodiversity and some of them are very useful to the communities where they occur. Only eight (8) species were selected and have records of impacts to the habitats of Uganda. These include; - *Amaranthus spinus*, *Acanthospermum hispidum*, *Bidens pilosa*, *Conyza sumatrensis*, *Senna spectabilis*, *Leonotis nepetifolia*, *Sida acuta*, *Eichhornia crassipes* (Pontederiaceae), and *Stachytarpheta indica* (Verbenaceae) (Table 6-10 & Error! Reference source not found.).

Table 6-10: A list of invasive species, their distribution and lifeform

Family	Species	Lifeform	Status	BH	TL
	<i>Amaranthus spinosus</i>	Herb	Invasive	1	0
Asteraceae	<i>Acanthospermum hispidum</i>	Herb	Invasive	1	0
	<i>Conyza sumatrensis</i>	Herb	Invasive	1	0
Fabaceae	<i>Senna spectabilis</i>	Tree	Invasive	1	0
Lamiaceae	<i>Leonotis nepetifolia</i>	Herb	Invasive	1	0
Malvaceae	<i>Sida acuta</i>	Herb	Invasive	1	1
Pontederiaceae	<i>Eichhornia crassipes</i>	Herb	Invasive	1	0
Verbenaceae	<i>Stachytarpheta indica</i>	Herb	Invasive	1	2

6.4.3 FAUNA

6.4.3.1 BUTTERFLIES

Fifteen species of butterflies belonging to 4 families and 12 genera were recorded during the survey (Table 6-11). Eight species were recorded at the Borehole Water Source, seven species recorded at

the water Reservoir Tank and ten species recorded at Distribution and Supply pipelines. Most of the butterflies recorded were of the Nymphalidae family. Ecological characterization of the recorded butterflies (Table 6-11) shows that One of the encountered species is a Forest-dependent, four species are Forest edge/woodland species, two are Open habitat species, four are Widespread species and can be encountered in a number of habitats; and four were migratory species moving from one place to another traversing through different habitats. The IUCN 2020 red list of threatened species and the National Red List for Uganda lists all the butterflies recorded during the survey as Least concern (LC).

Table 6-11: checklist of butterflies encountered around Igwaya Water Project Sites

Family	Species Scientific and Common Names	Red List Status	BH	RT	D&TL
Lycaenidae	<i>Cacyreus lingeus</i> Common Bush Blue - f	LC	1	1	0
Lycaenidae	<i>Euchrysops malathana</i> Smoky Bean Cupid - O	LC	1	0	1
Lycaenidae	<i>Euchrysops subpalidae</i> African Cupid - W	LC	1	1	1
Lycaenidae	<i>Tarucus theophrastus</i> African Pierrot - O	LC	0		3
Lycaenidae	<i>Zizeeria knysna</i> African Grass Blue - W	LC	0	1	1
Nymphalidae	<i>Acraea serena</i> Orange Acraea – W	LC	0	0	1
Nymphalidae	<i>Acraea uvui</i> Tiny Acraea – f	LC	1	1	1
Nymphalidae	<i>Belenois creona</i> African Caper - M	LC	1	0	0
Nymphalidae	<i>Danaus chrysippus</i> African Queen - M	LC	0	0	1
Nymphalidae	<i>Junonia oenone</i> Blue Pansy - W	LC	0	1	1
Nymphalidae	<i>Junonia westermanni</i> Blue Spot Pansy - F	LC	1	0	0
Nymphalidae	<i>Pseudacraea Lucretia</i> False Diadem - f	LC	0	0	3
Nymphalidae	<i>Vanessula milca</i> Lady's Maid - f	LC	0	1	0
Papilionidae	<i>Papilio demodocus</i> Citrus Swallowtail - M	LC	1	0	0
Pieridae	<i>Catopsilia florella</i> African Migrant - M	LC	1	1	1
Total species count			8	7	10

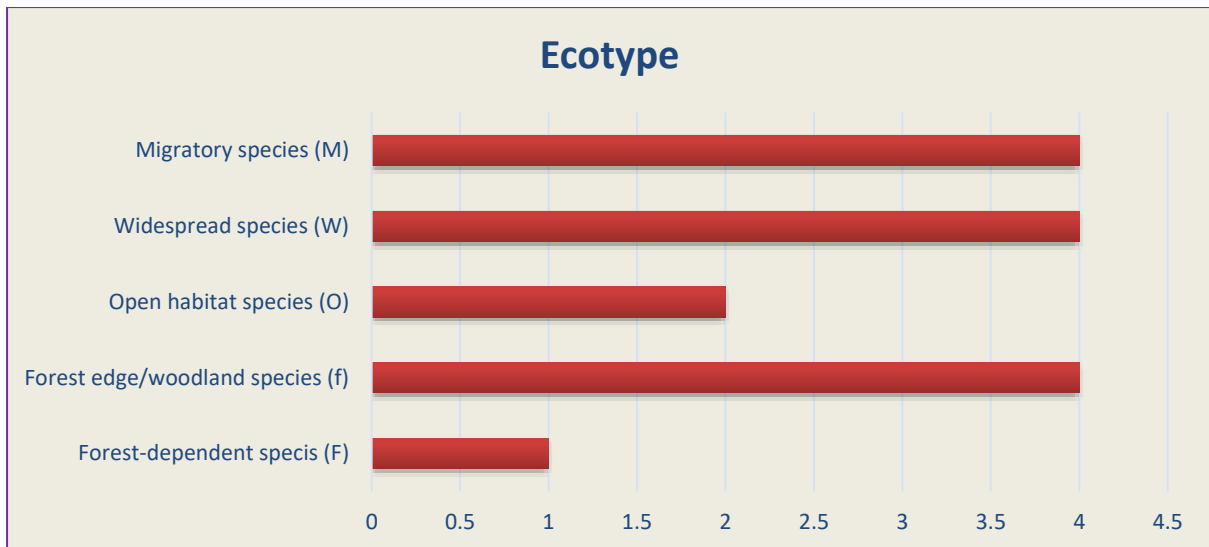


Figure 6-28: Ecological characterization of the butterflies encountered during the survey

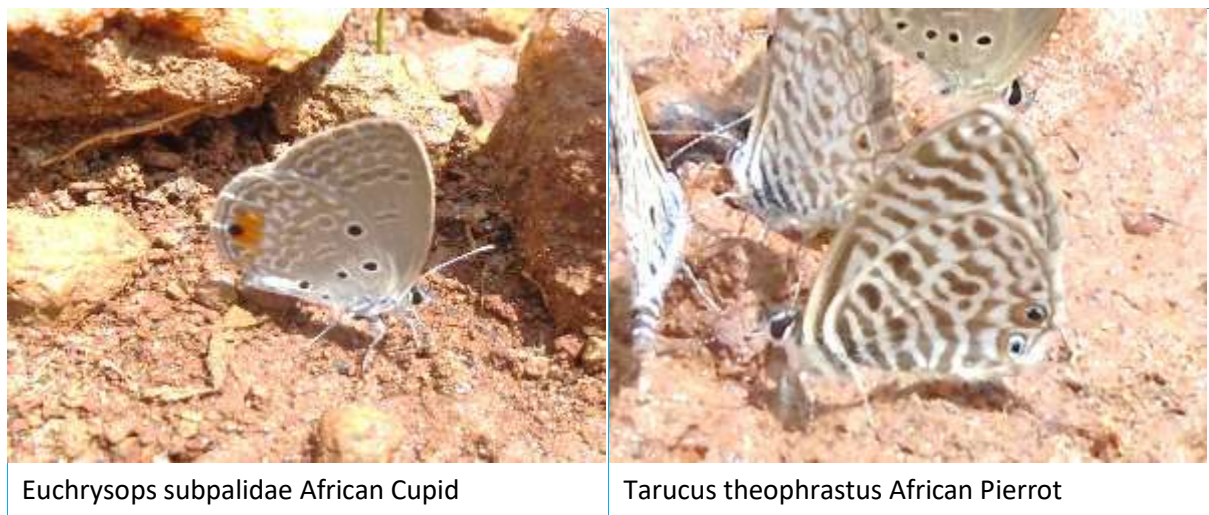


Figure 6-29: Butterflies

6.4.3.2 DRAGONFLIES

Only one species of dragonfly, the Southern Banded Groundling *Brachythemis leucosticta* was recorded. The *Brachythemis leucosticta* Southern Banded Groundling belongs to family Libellulidae. The dragonfly was recorded at the Borehole Water Source site.

Southern Banded Groundling *Brachythemis leucosticta* is highly engaging, they tend to follow people and animals in the grass around wetlands. They are gregarious and sometimes seen in very large numbers, they enjoy perching on bare ground close to water. The species is categorized as Least Concern by the 2020 IUCN Red List of threatened species. Modification of the natural landscape for settlement and agriculture, and the subsequent alteration of water bodies by erosion and siltation, are some of the main threats to Odonata in Africa.

6.4.3.3 AMPHIBIANS

Five species of amphibians were registered during the survey (**Table 6-12**). All the five were recorded at the Borehole water source site. No species were recorded at the Water Reservoir tank site and along the distribution and supply pipeline areas.

Species of genus *Ptychadena* are adaptive species that can adapt easily to modified environment. Eastern Groove-crowned Bullfrog *Hoplobatrachus occipitalis* is usually found near or in water (Rödel 2000). It is found practically in all freshwater habitats. The species tend to migrate during the dry season to the edges of rivers and in the wet season to surroundings of ponds (Spieler 1997).

No species of conservation significance was registered during the survey. All the species encountered are categorized as least concern according to 2020 IUCN Red List of threatened species. The IUCN regards the species as widespread and common over much of their range (Rödel. 2000). The Mascarene Rocket Frog *Ptychadena mascareniensis* is categorized as data deficient (DD) by the National Red List for Uganda (WCS 2016).

Table 6-12: Amphibian species recorded around Igwaya Water Project Sites

Family	Species Scientific and Common Names	Red List Status	BH	RT	T&DL
Dicroglossidae	<i>Hoplobatrachus occipitalis</i> Eastern Groove-crowned Bullfrog	LC	5		
Hyperoliidae	<i>Hyperolius kivuensis</i> Kivu Reed Frog	LC	4		
Hyperoliidae	<i>Hyperolius viridiflavus</i> Common Reed Frog	LC	6		
Ptychadenidae	<i>Ptychadena anchietae</i> Anchieta's Rocket Frog	LC	1		
Ptychadenidae	<i>Ptychadena mascareniensis</i> Mascarene Rocket Frog	LC - (U-DD)	3		



Figure 6-30: Photographs of two of the amphibian species encountered during the survey

6.4.3.4 REPTILES

Two lizards, One Chameleon, one crocodile and two snake species were recorded during the survey (**Table 6-13**). Three of the species were reported by the residents including the Nile Crocodile *Crocodylus niloticus*, Olive Marsh Snake *Natriciteres olivacea* and Nile Monitor *Varanus niloticus*. Other green snakes were reported but their identity could not be ascertained. Four species were recorded at the Borehole water source, one species at the reservoir tank site and four species along the distribution and supply pipeline areas.

Red-Headed Rock Agama *Agama agama* was the most common along the distribution and supply pipeline areas. A number of them were seen basking on rocky habitats, bricks, building walls and trees along the distribution and supply pipeline alignment. According to Harold (1992), most lizards have well-developed limbs; the head is normally held high off the ground, and they are agile predators. This increases their colonization success (Savage 1992).

None of the reptiles encountered and those reported by the community members are Red Listed. All the species are listed as least concern by IUCN 2020 Red List of threatened species. The Nile Monitor *Varanus niloticus* and Nile Crocodile *Crocodylus niloticus* was listed under the Endangered Species Decree in 1975. International trade of the species is prohibited. The Species is listed under CITES Appendix II (Branch 1998).

Table 6-13: Reptile species encountered in and around Igwaya Water Project sites

Family	Species Scientific and Common Names	Red List Status	BH	RT	T&DL
Agamidae	<i>Agama agama</i> Red-Headed Rock Agama	LC	0	1	9
Chamaeleonidae	<i>Chamaeleo dilepis</i> Flap-necked Chamaeleon	LC	0		1
Crocodylidae	<i>Crocodylus niloticus</i> Nile Crocodile	LC	Reported		
Elapidae	<i>Naja melanoleuca</i> Forest Cobra	LC	reported		1
Natricidae	<i>Natriciteres olivacea</i> Olive Marsh Snake	LC	reported		
Varanidae	<i>Varanus niloticus</i> Nile Monitor	LC	reported		1
CITES Appendix II Listed			4	1	4



Figure 6-31: *Chamaeleo dilepis* Flap-necked Chameleon along the Distribution line

6.4.3.5 BIRDS

A total of thirty-three bird species were registered in the water system project areas (Table 6-14). The registered species represent twenty-two families and thirty-one genera. The number of families and genera shows how diverse the bird fauna in the area is. Nineteen species were registered along at the Borehole Water Source site, seven species registered at the water Reservoir Tank site and fourteen species registered along the distribution and supply pipelines areas. Ecological characterization of the encountered birds shows that one bird was a forest specialist (Table 6-15), ten species were forest visitors, seven species are Water specialists, two species are water generalists, and ten species are open habitat or grassland specialists. Three species of Afrotropical migrants were also registered namely; Grey-Headed Kingfisher *Halcyon leucocephala*, Woodland Kingfisher *Halcyon senegalensis* and Red-Chested Cuckoo *Cuculus solitarius*. All species according to IUCN 2020 Red List of Threatened species are categorized as Least Concern (LC). However, one species is of conservation significance at the African regional level. The species (*Passer cordofanicus* Rufous Sparrow) is of categorized as R-RR. Its conservation is a regional responsibility.

Table 6-14: List of Birds recorded in Igwaya RGC sites

Family	Species Scientific and Common Names	Red List Status	BH	RT	T&DL
ACCIPITRIDAE	76 - <i>Haliaeetus vocifer</i> African Fish Eagle – W	LC	2	0	0
ALCEDINIDAE	373 - <i>Halcyon leucocephala</i> Grey-Headed Kingfisher - Afw	LC	0	1	0

Family	Species Scientific and Common Names	Red List Status	BH	RT	T&DL
ALCEDINIDAE	375 - <i>Halcyon senegalensis</i> Woodland Kingfisher - A	LC	4	0	1
ALCEDINIDAE	383 - <i>Ceryle rudis</i> Pied Kingfisher - W	LC	2	0	0
ANATIDAE	57 - <i>Anas undulata</i> Yellow-Billed Duck - W	LC	3	0	0
ANHINGIDAE	7 - <i>Anhinga rufa</i> African Darter – W	LC	1	0	0
APODIDAE	358 - <i>Cypsiurus parvus</i> African Palm Swift - G	LC	18	0	8
ARDEIDAE	14 - <i>Ardeola ralloides</i> Squacco Heron - W	LC	1	0	0
ARDEIDAE	17 - <i>Bubulcus ibis</i> Cattle Egret - G	LC		0	19
ARDEIDAE	26 - <i>Ardea melanocephala</i> Black-Headed Heron - w	LC	1	0	0
CISTICOLIDAE	645 - <i>Cisticola chiniana</i> Rattling Cisticola - f	LC	2	0	0
CISTICOLIDAE	677 - <i>Camaroptera brachyura</i> Grey-Backed Camaroptera - f	LC	0	0	1
COLUMBIDAE	281 - <i>Columba guinea</i> Speckled Pigeon - f	LC	2	0	0
COLUMBIDAE	284 - <i>Streptopelia decipiens</i> African Mourning Dove - O	LC	1	0	1
Columbidae	346 - <i>Streptopelia capicola</i> Ring-necked Dove - f	LC	0	0	1
CORVIDAE	858 - <i>Ptilostomus afer</i> Piapiac - G	LC	0	1	0
CUCULIDAE	309 - <i>Cuculus solitarius</i> Red-Chested Cuckoo - AF	LC	0	0	1
CUCULIDAE	323 - <i>Centropus superciliosus</i> White-Browed Coucal – O	LC	1	0	0
ESTRILIDIDAE	963 - <i>Lagonosticta rubricata</i> African Firefinch - O	LC	5	0	3
ESTRILIDIDAE	981 - <i>Spermestes bicolor</i> Black-and-White Mannikin - f	LC	0	0	7
HIRUNDINIDAE	507 - <i>Ptyonoprogne fuligula</i> Rock Martin – O	LC	0	1	0
JACANIDAE	193 - <i>Actophilornis africana</i> Jacana - W	LC	6	0	0
MALACONOTIDAE	843 - <i>Laniarius erythrogaster</i> Black-Headed Gonolek - f	LC	2	0	2

Family	Species Scientific and Common Names	Red List Status	BH	RT	T&DL
NECTARINIIDAE	784 - <i>Cyanomitra olivacea</i> Olive Sunbird - FF	LC		1	0
NECTARINIIDAE	787 - <i>Chalcomitra senegalensis</i> Scarlet-Chested Sunbird - f	LC	0	0	3
NECTARINIIDAE	802 - <i>Cinnyris mariquensis</i> Marico Sunbird - f	LC	0	3	0
PASSERIDAE	880 - <i>Passer cordofanicus</i> Rufous Sparrow – O	R-RR	3	4	0
PLOCEIDAE	908 - <i>Ploceus cucullatus</i> Black-Headed Weaver - O	LC	0	7	0
PYCNONOTIDAE	732 - <i>Pycnonotus barbatus</i> Common Bulbul - f	LC	1	0	3
RALLIDAE	178 - <i>Zapornia flavirostra</i> Black Crake - W	LC	3	0	0
STURNIDAE	872 - <i>Lamprotornis purpuroptera</i> Ruppell's Starling - O	LC	0	0	2
THRESKIORNITHIDAE	39 - <i>Bostrychia hagedash</i> Hadada Ibis - w	LC	2	0	0
TURDIDAE	612 - <i>Turdus pelios</i> African Thrush - f	LC	0	0	1
Total species count			19	7	14

Table 6-15: Ecological Characterization of birds encountered in and around Igwaya RGC

Ecological description	Numbers	Descriptions
Forest specialists (FF)	1	Forest interior birds
Forest visitors (f)	10	Non-forest birds
Water specialist (W)	7	Restricted to wetlands or open water
Water generalist (w)	2	Often found near water
Open habitat (O) and Grassland specialist (G)	10	Characteristic of open grasslands
Afrotropical (A)	3	Species migrating within Africa

6.4.3.6 MAMMALS

Four mammal species were recorded during the survey. They include Black Rat *Rattus rattus* East African epauletted fruit bat *Epomophorus minimus*, Marsh mongoose *Atilax paludinosus* and Striped ground squirrel *Xerus erythropus*. The four represent the mammal families of Muridae (mice, rats, voles, gerbils, hamsters, etc.), *Pteropodidae* (flying foxes, Old World fruit bats), *Herpestidae* (Mongooses) and *Sciuridae* (the squirrels) respectively. The mammals were recorded along the distribution and supply pipeline areas. None were recorded at the Borehole water source and the Water Reservoir tank.

Black Rat *Rattus rattus* mainly occur in people's houses and also in and around people's homes. It also occurs in wild habitats. This rat is of social economic importance. It is a pest and dangerous disease vector. It carries a flea which is the principal carrier of plague bacillus which killed 60,000 people in Uganda in the 1917 and 1942 (Kingdon J. 2015).

The four species are listed as Least Concern by the IUCN 2020 Red List of threatened species. The project area is in a highly modified environment. Keeping vegetation in the vicinity of borehole water source, Reservoir water tank and along the distribution and supply pipeline areas will go a long way in conserving the recorded mammal species.

6.5 SOCIO-ECONOMIC BASELINE

6.5.1 PROJECT AREA

Igwaya RGC – WSSS project is situated in Kagulu Sub County, Buyende District, Busoga Sub region, Eastern Uganda. The project is designed serve five (5) villages, namely; Nakawolo LCI, Mailo, Butemera LCI B, Butemera LCI A and Busubo Mpanga in Bumogoli and Kagulu Parishes respectively in Kagulu Sub County as indicated in **Figure 6-32** below.

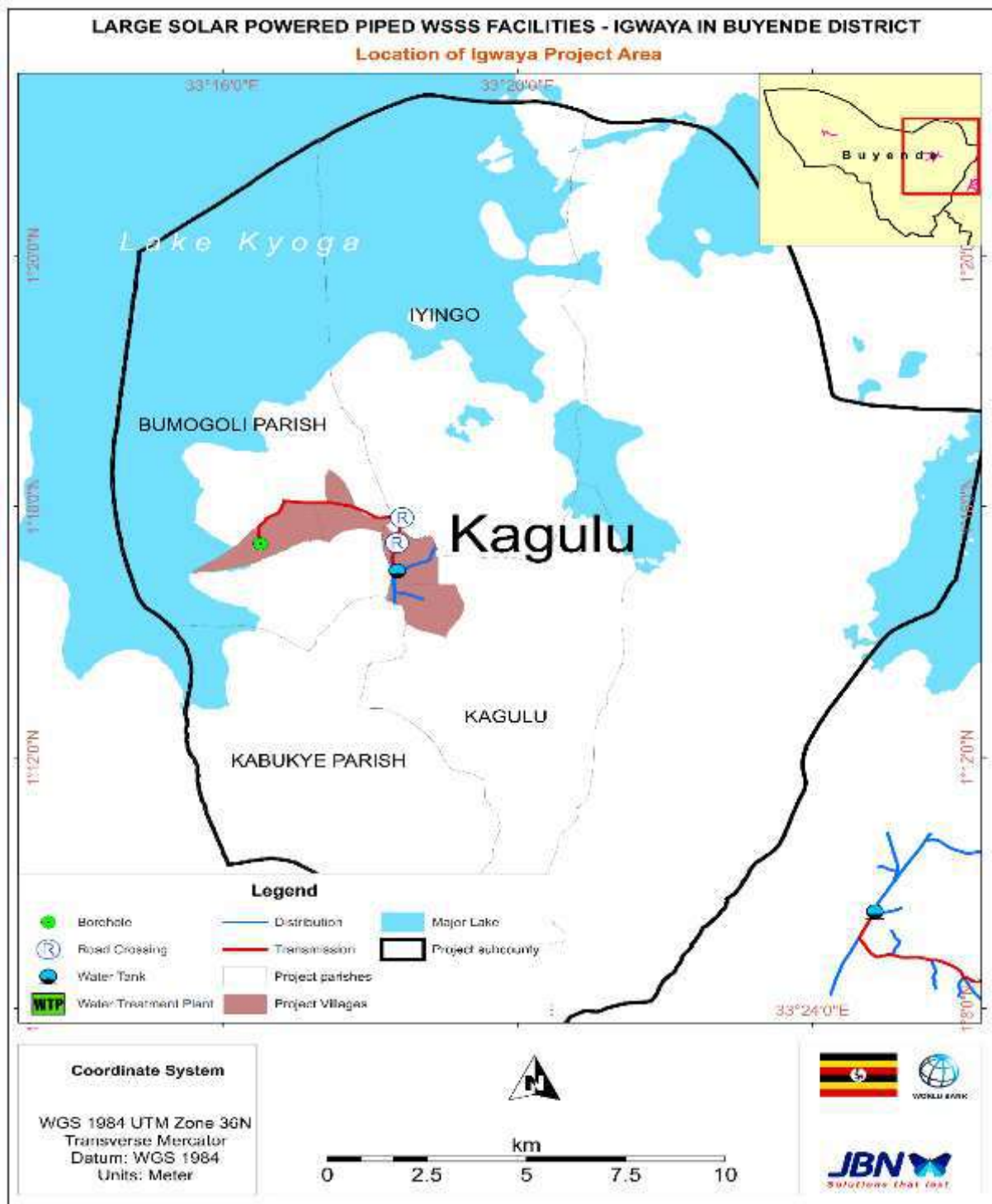


Figure 6-32: Igwaya RGC – WSSS Project villages

6.5.2 POPULATION

Buyende District has an estimated population of 410,599 people with 208,995 females (50.9%) and 201,604 males (49.1%) grouped in 67,838 households with the household size at 5.7 and population density of 224.7 people per Km² (UBOS, 2020). Of the total district population, 24% (98,400) live in Kagulu Sub County, 48,400 of whom are males and 50,000 females (UBOS, 2020). The Sub County has a population density of 237.9 persons per Km²(UBOS, 2020). The population growth rate of Buyende is high at 4.3 percent compared the national average of 2.88 percent.

A comparison between the 2022 Village Health Teams (VHT) population records and the UBOS (2014) projected population (4.3 growth rate) for the five targeted Igwaya RGC beneficiary villages is shown in **Figure 6-33** below.

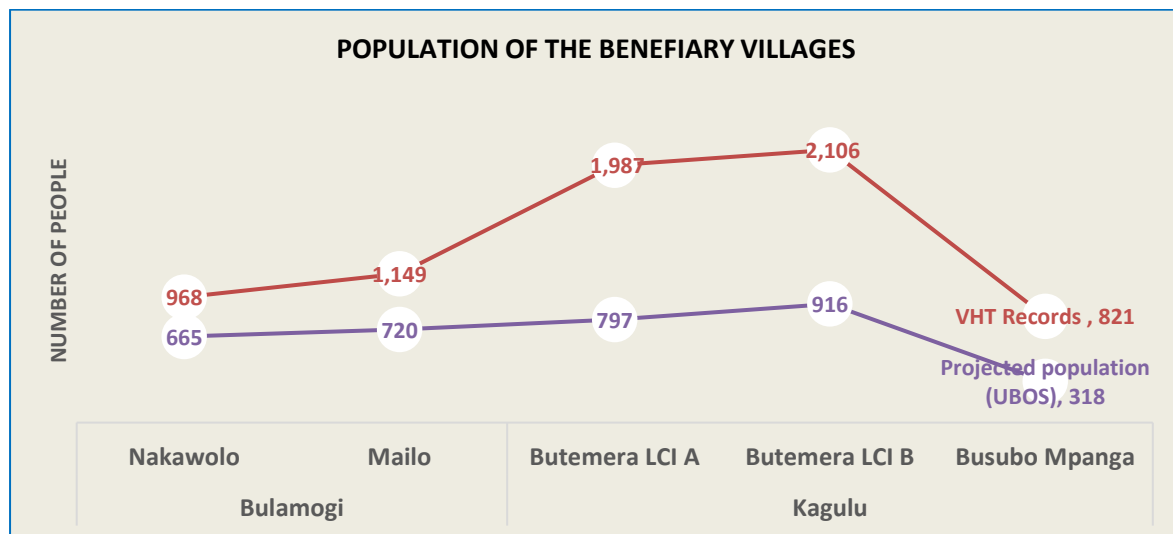


Figure 6-33: Population of beneficiary villages

(Source: UBOS 2014, VHT records)

Based on the VHT records (**Figure 6-33**) the population in 5 beneficiary villages of Igwaya RGC is 7,031. The projected population by UBOS from the 2014 population census records is lower than the actual count by VHTs in the RGC. The population is highest in Butemera A and Butemera B villages, located in the centre of Igwaya Trading Centre. Based on the VHT population records, the most populated is Butemera B villages with 369 Households (HH), followed by Butemera B (349 HHs), Mailo (202 HHs), Nakawolo (169 HHs) and Busubo Mpanga (144 HHs).

The socio-economic baseline on a selection of beneficiary villages can be used to measure and monitor positive and negative impacts. Therefore, a field socio-economic survey was conducted on sample size of 151 respondents out of the total population of 7,031 people in 1,234 households within Igwaya RGC. The sample was determined using Morgan and Krejcie (1970) Sample Size Determination included in **Annex C**. The results of the household survey are included in the sub sections that follow.

Implications: According to the design report (water demand assessment) for Igwaya RGC, the drilled borehole (DWD 60898) source has a safe yield of 10 m³/hr, which can serve the five villages of 8,076 people under phase 1 of the project with a maximum day demand in the Ultimate Year of 239.53 m³/day over 16-hour pumping regime.

6.5.3 AGE GROUP OF HOUSEHOLD MEMBERS

Age is one of the important factors in socio-economic analysis and mitigation of project impacts as it helps to measure the dependency ratio in affected households. This is consistent with the Uganda National Survey Report 2019/2020 UBOS which indicates that the population pyramid of Buyende District is generally bell-shaped (**Figure 6-34**), a structure typical of a developing country like Uganda whose population is largely young. As indicated in the pyramid, the highest percentage of the population is aged between 0 and 14 years (**Figure 6-35**) and steadily decreases with increasing age.

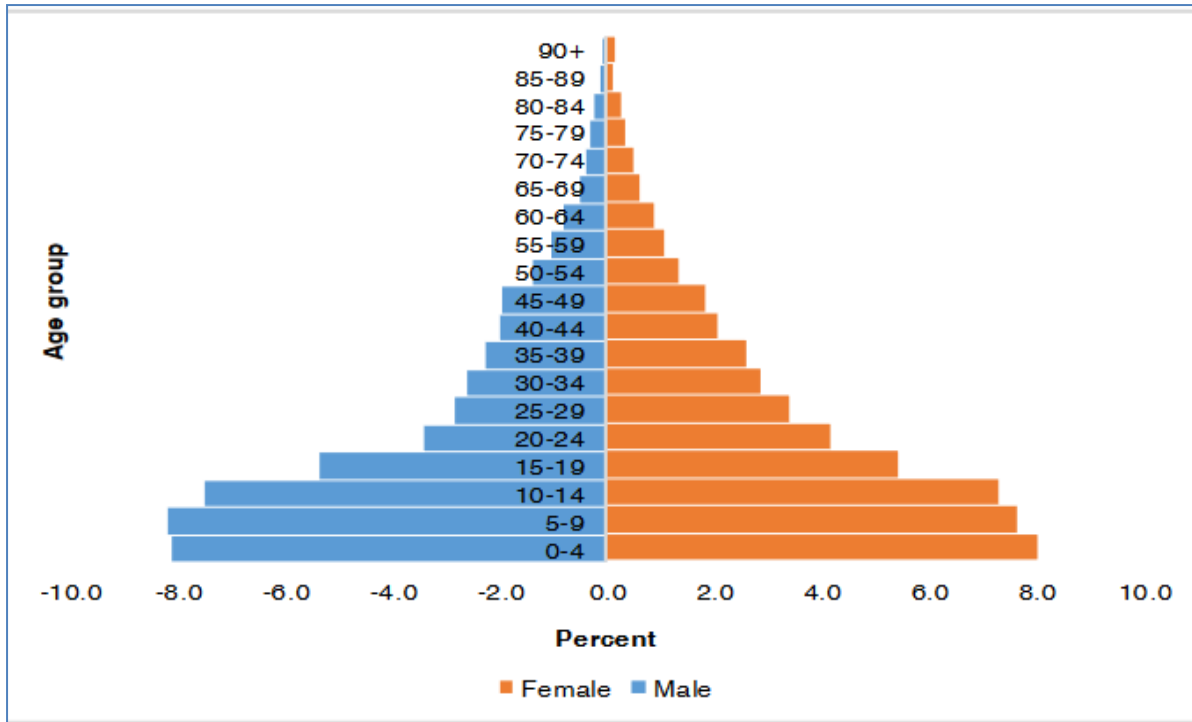


Figure 6-34: Bell-shaped pyramid for Buyende District population

(Source: UBOS, 2020)

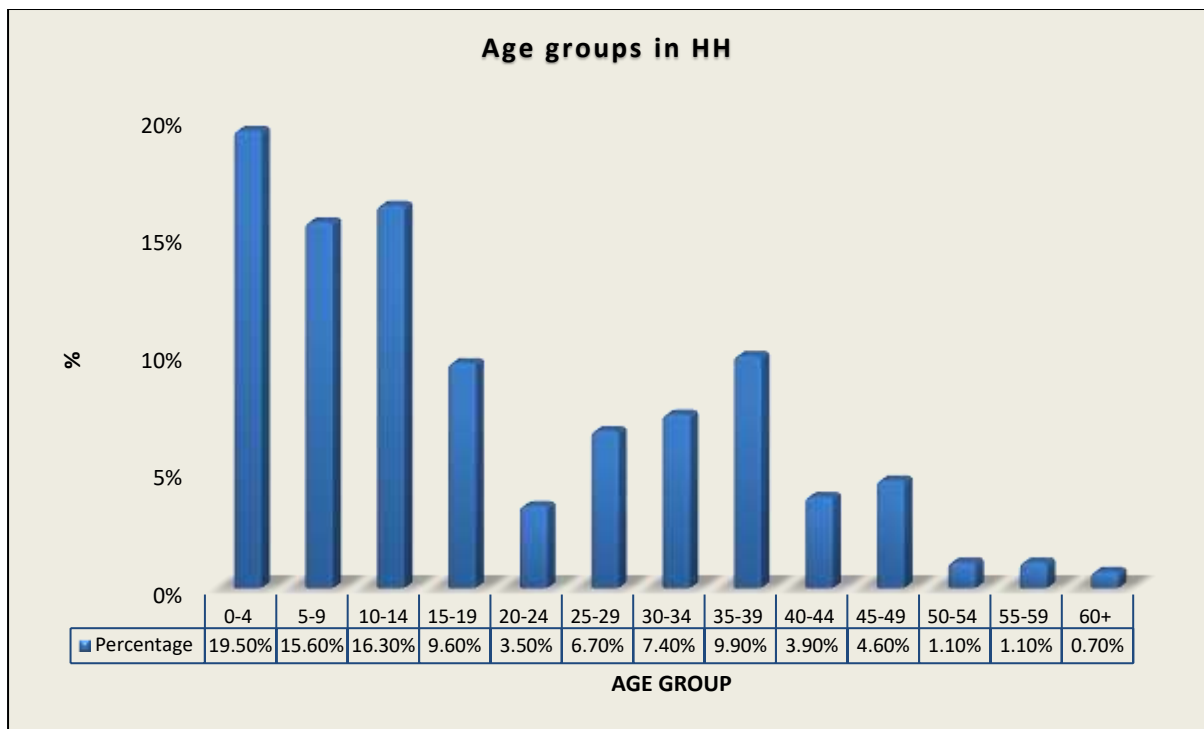


Figure 6-35: Age groups of members in households

(Source: Socio-economic study)

6.5.4 VULNERABILITY OF THE HOUSEHOLD HEAD

Vulnerability is the degree to which a population, individual or organization is unable to anticipate, cope with, resist and recover from the impacts of a project (WHO, 2005). Vulnerable groups according to IFC definition are people who by virtue of gender, ethnicity, age, physical or mental disability,

economic disadvantage, or social status may be more adversely affected by resettlement than others and who may be limited in their ability to claim or take advantage of resettlement assistance and related development benefits.

The vulnerable groups in the project area are elderly widowed, child headed households and handicapped. People living with HIV/AIDS also qualify to be categorized as a vulnerable group due to the stigma associated with the disease and discrimination, but due to lack of availability of data, the category was not studied. In the project affected villages, very few vulnerable people were identified as indicated in **Figure 6-36** below.

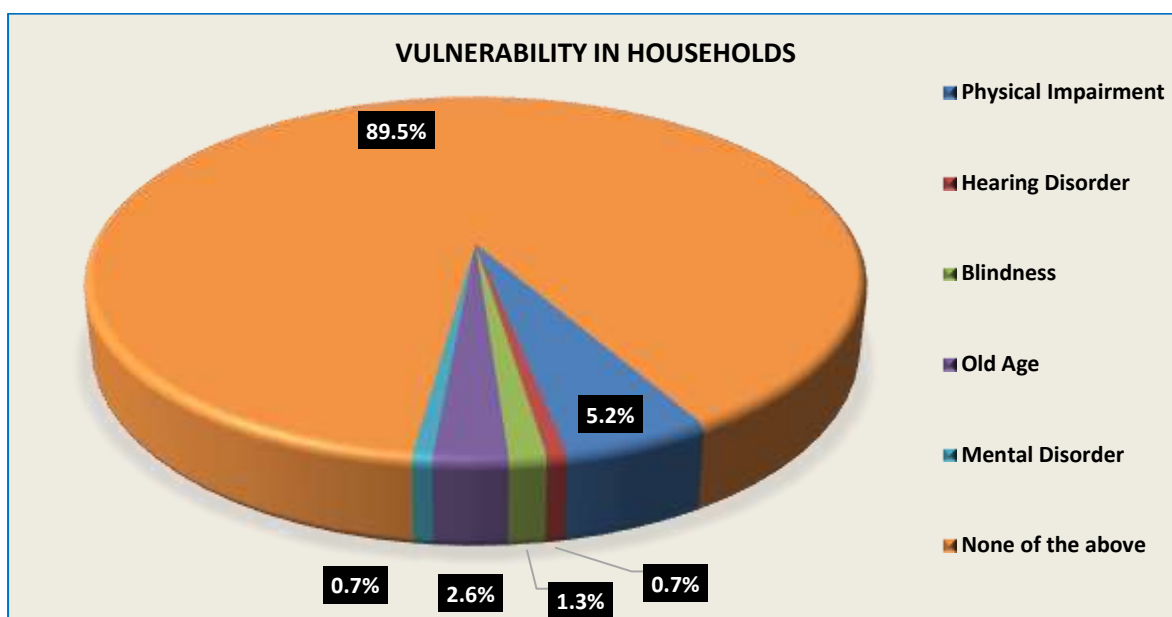


Figure 6-36: Vulnerabilities in Households
(Source: Socio-economic study)

6.5.5 ETHNICITY AND RELIGION

From the project area, 33.1% of the respondents were Muslims while a 24.5% and 25.8% were catholic and protestants of Christians denomination (**Table 6-16**). Other Christian denominations included Pentecostal/born again (13.2%) and SDA (3.3%). This can have a very profound effect on the way the project is implemented and more so on the behaviour and conduct of the Contractor team. During consultations with local leaders, there was already concern that external influence may affect their culture and religious following. The community also strongly proposed that the religious and local leaders be fully involved from the beginning to the end of the project.

Table 6-16: Religious affiliation

Religion	Frequency	%
Catholic	37	24.5
Protestant	39	25.8
Islam	50	33.1
Pentecostal/born again	20	13.2

Religion	Frequency	%
SDA	5	3.3
Total	151	100

(Source: Socio-economic study)

The project area was noted to have rich ethnic diversity comprising a mixture of several Ugandan tribes and cultures. Results from the field (

Table 6-17) indicate that Basoga (92.7%) were the most predominant tribes, followed by Banyole(2.6%), Itesot (2.6%), Bagisu(1.3%) and Bagwere(0.7%).

Table 6-17: Ethnicity

Ethnic group	Frequency	%
Basoga	140	92.7
Bagwere	1	0.7
Bagisu	2	1.3
Banyole	4	2.6
Itesot	4	2.6
Total	151	100

(Source: Socio-economic study)

6.5.6 GENDER

6.5.6.1 GENDER OF RESPONDENTS /HOUSEHOLD HEAD

According to the UBOS, 2020 Statistical projections Kagulu sub-county under which Igwaya falls has a population of 48,400 males and 50,000 females. From the field findings, it was revealed that the gender composition of the household heads in the sampled households was skewed with males recording 88.7% and 11.3% respectively.

Table 6-18: Gender of household heads

Gender of HHD	Frequency	Percentage (%)
Female headed	17	11.3
Male headed	134	88.7
Total	151	100

(Source: Socio-economic study)

In most surveys it is very crucial to capture the marital status of household members as marriage is one of the principal factors that influence the household size. Since a married respondent is highly exposed to the chance of bearing more children and hence also increasing the dependency burden to a certain household.

Table 6-19: Marital status of household heads

Type of house hold head		Single	Married	Divorced/ Separated	Widowed	Total
Female headed	Count	1	6	4	6	17
	%	0.7	4	2.6	4	11.3
Male headed	Count	6	125	2	1	134
	%	4	82.8	1.3	0.7	88.7
Total	Count	7	131	6	7	151
	%	4.6	86.8	4	4.6	100

(Source: Socio-economic study)

Results from the field indicate that the married were 86.8%, Divorced/Separated, single and widowed all registered a percentage of 4.6. There were more female household heads who were divorced (2.6%) and separated (4%) as compared to compared to the men (1.3%) and (0.7%).

6.5.6.2 INVOLVEMENT IN COLLECTING WATER LEVEL AND

Access to clean and safe water in Uganda is still low and this remains one of the developmental challenges. The water coverage in rural areas was estimated at 68% which was a decline from 69% as of June 2019. As such the burden of fetching water is normally lies with women as it is given as one of the gender roles at household level. Results from the project area show that 31.1% of the respondents revealed adult women to be involved in water collection, 27.8% adult male, 27.8 boy children and 13.2% girl children (*Figure 6-58*).

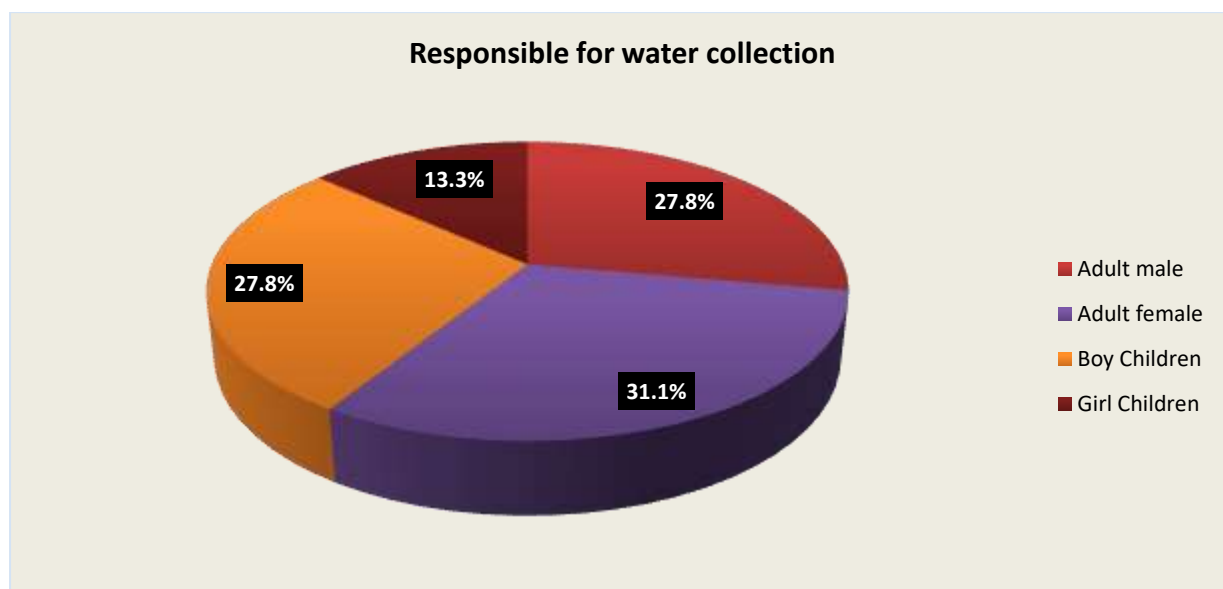


Figure 6-37: Gender roles in Water Collection

(Source: Socio-economic survey)

6.5.7 HOUSING AND SETTLEMENT

6.5.7.1 SETTLEMENT

Both the project components and human settlement patterns will impact on each other in various ways. While the proposed 5.8 Km distribution Network will serve all densely populated areas through fair distribution / construction of 55 service connections and 7 PSPs in all human settlements and the the 4 Km intensification network will likely to benefit Iyingo landing site (currently with non-functional mini-piped water system) located 2 Km away from end point of distribution line between Igwaya trading centre and Nakatwe village, the construction phase (borehole, production well, pump house, transmission mains, reservoir tank, access routes) will in some way affect traffic flow in short run, restrict resource use such as grazing through fencing off the site, and economic displacement (minor loss of land, assets, or access to assets leading to loss of income sources or other means of livelihood).

In Igwaya RGC, there are 3 major human settlement patterns (Figure 6-38), namely:

- Compact or Nucleated settlements commonly observed in Butemera A and B villages / Igwaya, characterized by congested dwellings constructed very close to each other.
- Dispersed or dotted settlements with dwelling located far apart and often within a village landscape, as observed in source area (Mailo village) and Linear settlements along roads
- Linear settlements along roads.

Informal settlements characterized by dwellings in restricted and/or prohibited areas as per National Environmental Act 2019 that states “a person shall not undertake activities in the protected zones along riverbanks, lakeshores and natural beaches”. The observable informal settlements include human dwellings within the 100 meters’ buffer zone for Lake Kyoga shoreline in Buyumba village.





Linear settlement along a road

Informal settlement within 100m from Lake Kyoga

Figure 6-38: Types of settlements in Igwaya RGC

6.5.7.2 HOUSING AND SHELTER

The majority of houses in the villages are semi-permanent and constructed from mud and wattle walls with iron roofs. Permanent structures are made of permanent brick, are roofed with iron sheets and are only found in the trading centres otherwise as one advance deep in the villages the structures are mostly of mud and wattle walls with grass thatched roofs. **Figure 6-39** below show the various types of structures in the project area with the majority being Mud and wattle (35.3%) and Mud block with plaster (23.5%).

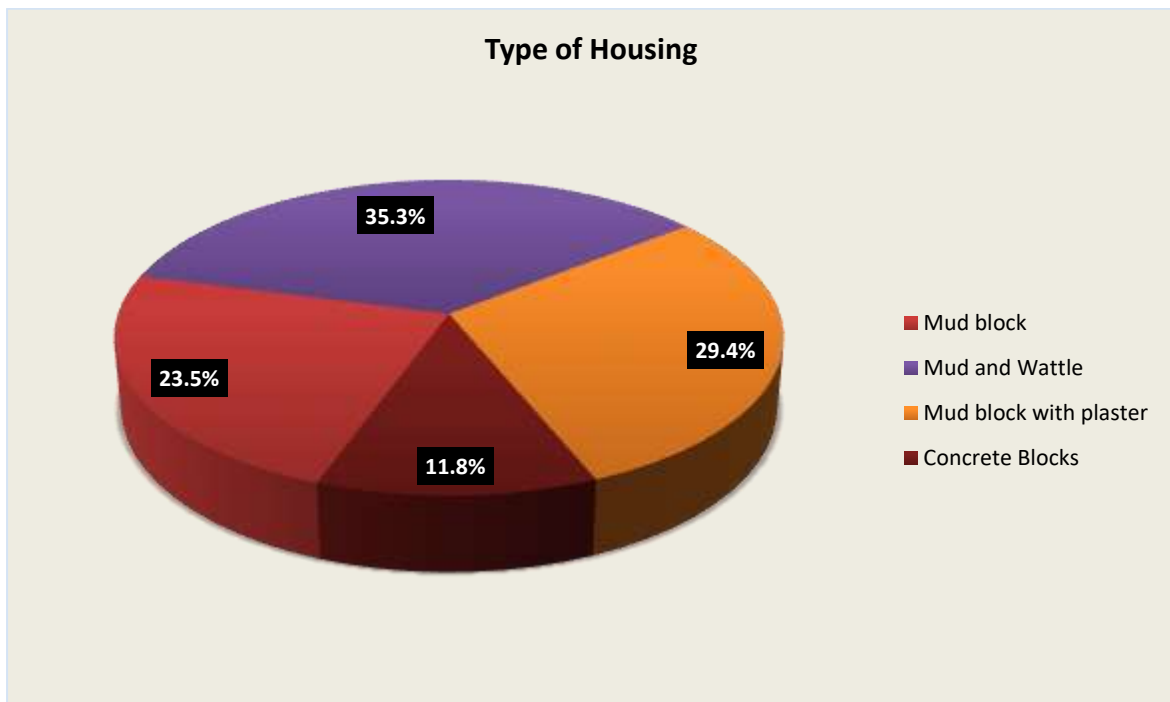


Figure 6-39: Type of Housing units

(Source: Socio-economic study)



Figure 6-40: Mud and wattle housing in Mailo Village

6.5.7.3 URBANISATION

There is increasing rural-urban migration evidenced through change in the expansion of villages into urban agglomerations formations. A Historical Trend analysis (

Table 6-20) of urbanization in Kagulu Sub County for the last 50 years indicates a changing urban morphology⁶ of Igwaya RGC. The area has over the years transformed from small human settlement (hamlet), into village and its now a growing town board with satellite entities such as Namuizukya (Fig. 6), Iyingo and Nabuku. There are observable characteristics of a slum on the lower side of town, evidenced through slightly overcrowded and congested neighborhood with limited access to basic services such as access to portable water and waste collection (Figure 6-41) among others.

Table 6-20: A Historical Trend analysis of Igwaya RGC

Period	Major events / projects that have led to local development and increasing urbanization
1986 - 1995	<ul style="list-style-type: none"> • Buyende was among the remotest areas in Uganda • Artisanal fishing and agriculture were the major activities • Extremely poor road network
1996 – 2001	<ul style="list-style-type: none"> • New small trading centers sprang up that included Igwaya, Irundu, Itunde • Small fishing villages expanded into modest landing sites, and these include Iyingo, Buyumba, Bumogoli, Ntogolo, Kaseke and Butipa • Commercial fishing started to increase in whole of Kagulu sub county
2001 - 2006	<ul style="list-style-type: none"> • Road network becomes fairly good • Sharp increase in population growth and human settlement as shown in Fig. 7 • Community sensitisation by government programmes especially NAADs about how to maximally utilise the fertile soils around Lake Kyoga • Promotion of good fishing methods
2006 - 2011	<ul style="list-style-type: none"> • Introduction of livestock and dairy markets – sale of dairy products (beef, milk) in small trading centres

⁶ Urban morphology refers to the process of their formation and transformation of human settlement

Period	Major events / projects that have led to local development and increasing urbanization
	<ul style="list-style-type: none"> • Igwaya and Iyingo trading centres expand with high influx of traders • Private schools were built, as well as clinics, small lodges • Government continues to provide farm inputs such as seeds to farmers
2011 – 2016	<ul style="list-style-type: none"> • Ban on illegal fishing • People resort to crop farming in wetlands, and animal rearing, petty trading, hand crafts, brick making, sand mining • Migration from fishing villages to trading centres e.g., Igwaya hence expansion in human settlement as shown in Fig. 8 • New satellite settlement to Igwaya expand such as Namuizukya located near Buyumba landing site.
2016- 2021	<ul style="list-style-type: none"> • Improved road networks connecting different villages • Increase in water transport e.g., from Iyingo landing site to Teso / Serere and Soroti • Increase in urban populations • New water system constructed in Iyingo landing site • People were educated in different skills • Kagulu Rock Hill eco-tourism site launched, and Iyingo cultural sites • Increase in commuter motorcycle operators (bodaboda) • Covid19 lockdown severally affecting human movement and traffic.
2021 - Current	<ul style="list-style-type: none"> • Expansion of local eco-tourism with better accommodation but no piped water • Increase in population, human settlement in Igwaya and satellite centres like Namuizukya as shown in Fig. 8 below. • Electricity connection made, were small businesses 'like salon operators, steel fabrication, stationary shops video halls are also engaging in business • New large-scale piped water system planned for Kagulu parish.

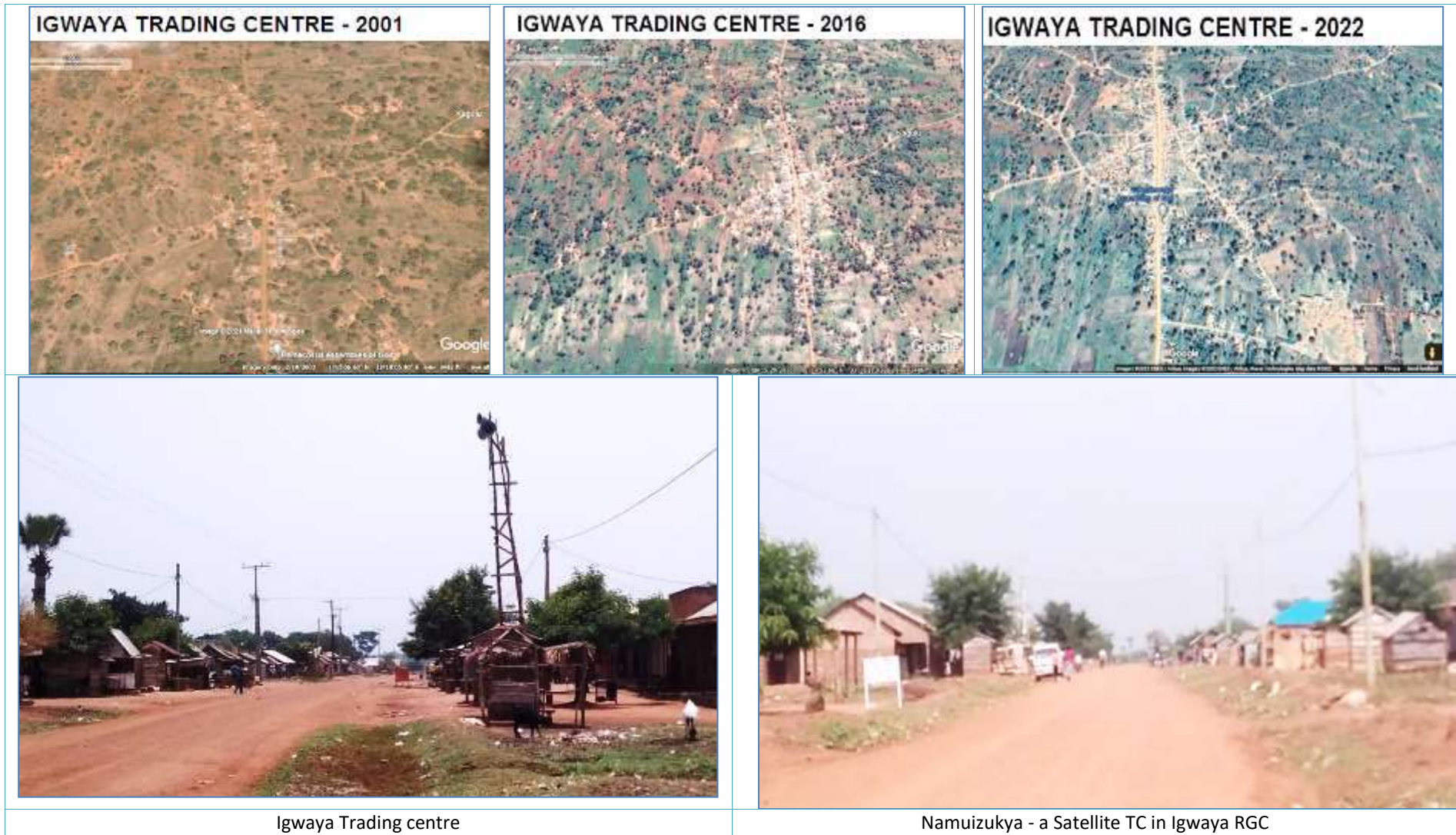


Figure 6-41: Google Earth Imagery Showing Changes in Human Settlement Patterns Between 2001- 2022

6.5.8 LAND TENURE AND METHOD OF ACQUISITION

6.5.8.1 LAND TENURE

Construction of project facilities such as the pipeline will require easement in some cases while permanent footprint of project facilities might also be required in some cases. Survey results indicated that the majority (88.1%) were under customary land ownerships, 9.9% tenant Kibanja owners and licensee (2%) on customary land. Majority of whom (64.9%) indicated that they bought it ,27.8% inherited from parents and 7.4% are renting the land. Attention will be required at the stage of compensation/paying some easement fees, especially for Kibanja owners in an event that PAPs claiming ownership of land are not rightful owners.

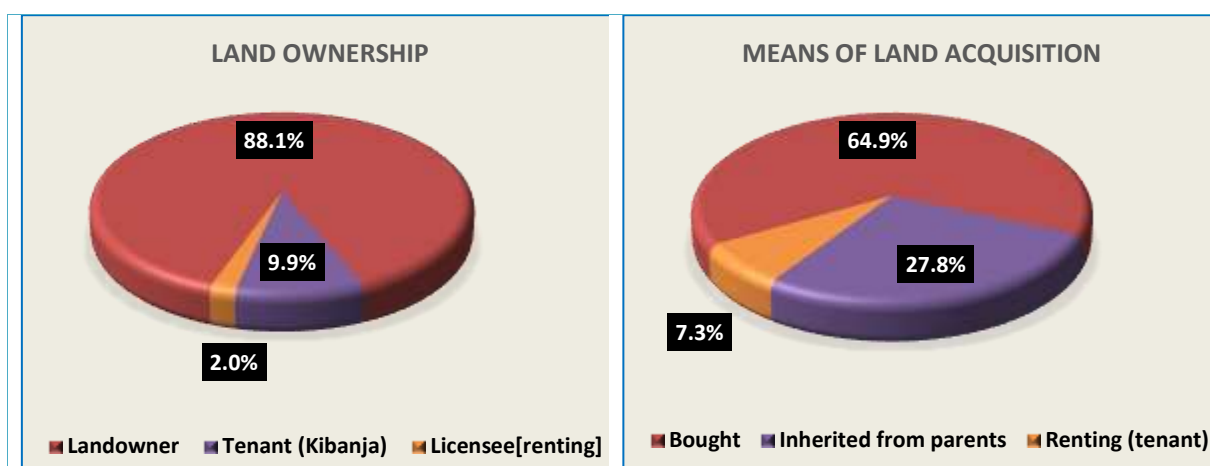


Figure 6-42: Land ownership and land acquisition

(Source: Socio-economic study)

6.5.8.2 LAND UPTAKE AND ACQUISITION

The project will acquire 2578 sq.mtrs to put up water related facilities e.g. production wells, reservoirs. The ESIA assessed the conditions of sites, consulted the land owners to confirm whether they consent to offer the land. The risks and challenges related to land acquisition were assessed in relation (relocation, loss of residential land, or loss of shelter), economic displacement (loss of land, assets, or access to assets leading to loss of income sources or other means of livelihood); alternative sites and possibility of land conflicts.

Table 6-21: Land acquisition for the project

Project Component	Size Of Available Land (Acres)	Land Requirement by Project (M ²)	Village	Owner (Name, Contact)	Land Tenure
Water Source Site, Lake Buffer Zone	0.2113	855	Mairo	Mwanja Samuel, 0778700431	Licensee
Reservoir Site	0.4009	1622.5	Butemeera A	Ntende George	Customary
Public Toilet Site	0.0247	100	Nabuku	Kagulu Livestock Market	Customary

source: RAP report



Figure 6-43: Existing motorable access route to the borehole at Mailo village passing through homesteads



Figure 6-44: Site location for borehole (facing downstream of Lake Kyoga shoreline) at Mailo village



Figure 6-45: Site location for borehole (facing upstream of Lake Kyoga shoreline) at Mailo village

6.5.8.3 PHYSICAL CULTURAL RESOURCES (PCR)

The physical cultural resources encountered included; a) a tree used in traditional worship approximately 100m from the project borehole in Mailo village, b) one grave along an existing path route to borehole (used by drilling team) as shown in Figure 6-46 and Figure 6-47 below.



Figure 6-46: A tree used in worship in Mailo village



Figure 6-47: A grave identified along the access road to the borehole

6.5.9 ECONOMIC ACTIVITIES

6.5.9.1 PRIMARY LIVELIHOOD ACTIVITY OF THE HOUSEHOLD HEAD

The primary occupations of the residents within the project area are farming, trading and grazing livestock. As shown in **Figure 6-48** below, most respondents (60.9 %) were involved in farming as the main economic and livelihood activity, followed by casual labour (23.1%), trading (9.9%) and service provision (7.3%). Other sources of income included fishing (3.3%), formal employment (2.6%) and students (1.3%).

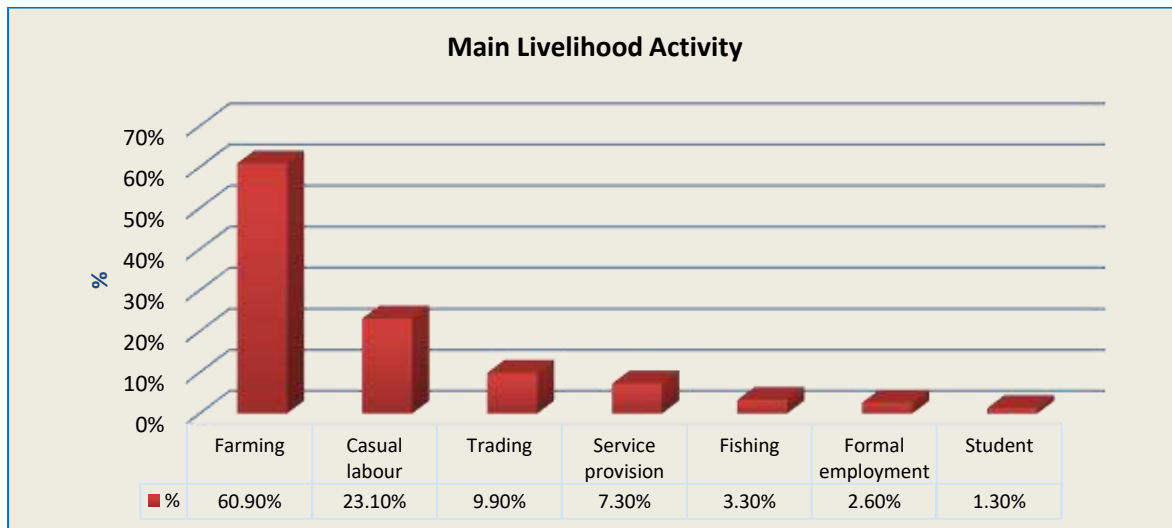


Figure 6-48: Livelihood activities in Igwaya RGC

(Source: Socio-economic study)

This is consistent with the Buyende third District Development Plan (BDDPIII 2020/2021 - 2024/2025) which indicates that (72%) of the households depend on subsistence farming as their main source of livelihood and use rudimentary tools and methods for cultivation such as the hand hoe and family labour resulting in low productivity. Fishing is another main economic activity in the district. The Nile River and Lake Kyoga are the main source of fish within the district.



Figure 6-49: Fishing in Iyingo landing site

6.5.9.2 COMMONLY GROWN CROPS

The major crops grown in the RGC include beans, banana crop, maize, sweet potatoes, Irish potato sorghum, cassava as shown in

Table 6-22 below. Respondents also indicated rearing livestock, specially, poultry and goats (35.6%), cattle (25.4%) and pigs (3.4%).

Table 6-22: Commonly Grown Crops

Crops grown	Percentage (%)	Animals reared	Percentage (%)
Banana crop	1.5	Goats	35.6
Beans	20.6	Cattle	25.4
Maize	28.9	Poultry	35.6
Irish potato	2.1	Pigs	3.4
Cassava	34	Total	100
Sorghum	7.2		
Rice	5.7		
Total	100		

(Source: Socio-economic survey)

6.5.9.3 AVERAGE ANNUAL INCOME

Majority of the respondents (48.7%) earn more than 1,403,000, followed by those that earn between 503,000 - 1,403,000 (34.9%) and less than 503,000 (16.4%) -**Figure 6-50**. This generally shows that the income levels are generally low for persons with families to feed, clothe, pay for medical care and educate children.

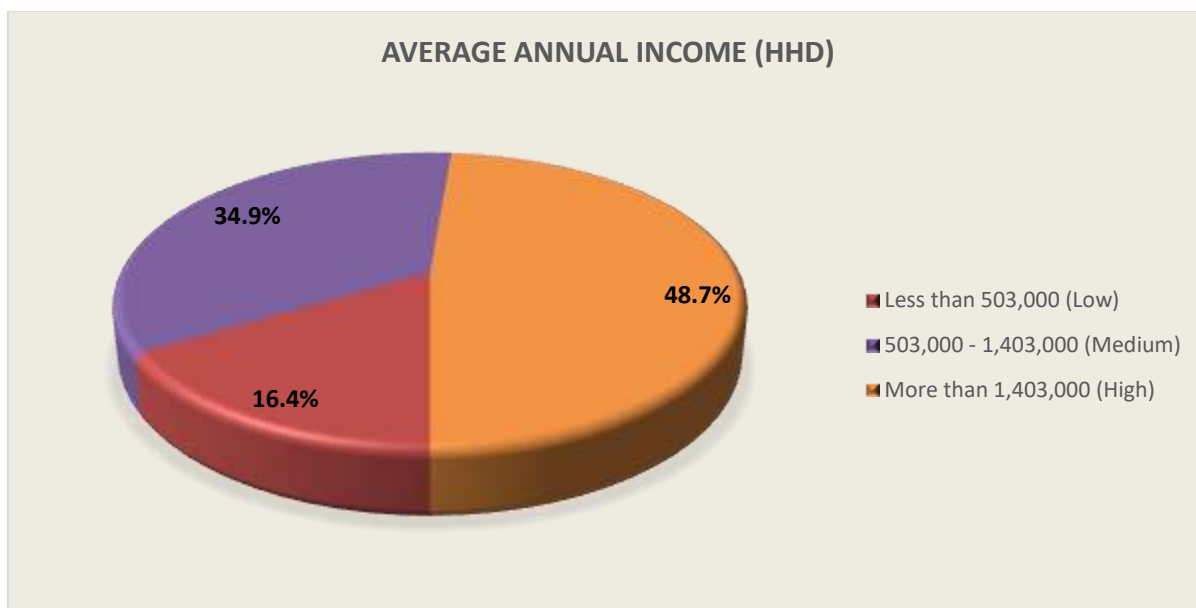


Figure 6-50: Average annual income earned by the household head

(Source: Socio-economic survey)

6.5.9.4 OWNERSHIP OF PHYSICAL ASSETS

Besides income levels, ownership and control of physical and financial assets are indicators of wealth/poverty levels. Assets generate and help diversify income; provide collateral to gain access to credit; alleviate liquidity constraints in the face of shocks; and provide status in society (Deere and Doss, 2006)⁷ hence the importance of establishing asset ownership at household level. From the field survey, respondents owned a variation of physical assets which included houses (24%), domestic animals (12.7%), mobile phones (23.35%) radios (14.5%) and bicycles (13.6%) among others (**Table 6-23**).

Table 6-23: Household assets

Assets owned by household	Frequency	%
House	109	24
Domestic animals	58	12.7
TV set	19	4.2
Radio	66	14.5
Car	3	0.7
Motorcycle	30	6.6
Bicycle	62	13.6
Mobile phone	106	23.3
Other	2	0.4

⁷ Deere, C. D., and Doss, C. R. (2006). "The gender asset gap: what do we know and why does it matter?" *Feminist Economics*, 12.1-2, pp. 1-50

(Source: Socio-economic survey)

Further analysis of ownership of household assets by gender of household heads is shown in Table 6-24: Ownership of HH assets by Gender

Assets owned by household	Female	Male	Frequency
House	12	97	109
Domestic animals	6	52	58
TV set	2	17	19
Radio	7	59	66
Car	0	3	3
Motorcycle	3	27	30
Bicycle	7	55	62
Mobile phone	12	94	106
Other	0	2	2
Total	50	405	455

(Source: Socio-economic survey)

In a meeting with the beneficiary, in Butemera village (Kagulu Sub county), members revealed that with the cultural set up ownership and control of productive assets such as houses, are dominated by the males compared to females. And therefore provision of clean and safe water will reduce the burden and time spent on collecting water, hence contributing to women participation in productive activities and subsequent asset acquisition.

below.

Table 6-24: Ownership of HH assets by Gender

Assets owned by household	Female	Male	Frequency
House	12	97	109
Domestic animals	6	52	58
TV set	2	17	19
Radio	7	59	66
Car	0	3	3
Motorcycle	3	27	30
Bicycle	7	55	62
Mobile phone	12	94	106
Other	0	2	2
Total	50	405	455

(Source: Socio-economic survey)

In a meeting with the beneficiary, in Butemera village (Kagulu Sub county), members revealed that with the cultural set up ownership and control of productive assets such as houses, are dominated by the males compared to females. And therefore provision of clean and safe water will reduce the burden and time spent on collecting water, hence contributing to women participation in productive activities and subsequent asset acquisition.

6.5.10 ACCESS TO WATER

By definition, access to safe water is the ratio of people served by a safe water point (such as piped water supply) to the total population, calculated basing on the estimated number of people per water point type (DWD/MWE, 2021). Data provided by Ministry of Water and Environment indicates that access to safe water in Buyende district stands at 38%, with rural access at 37% and urban access at 53% as of year 2021 (MWE/ Water Atlas, 2022). The water access per sub county stands at 28% in Buyende Sub County; 30% in Kidera Town Council; 37% in Kagulu Sub County; 42% in Bugaya Sub County; 47% in Nkondo Sub County and 53% in Town Council (**Figure 6-51**).

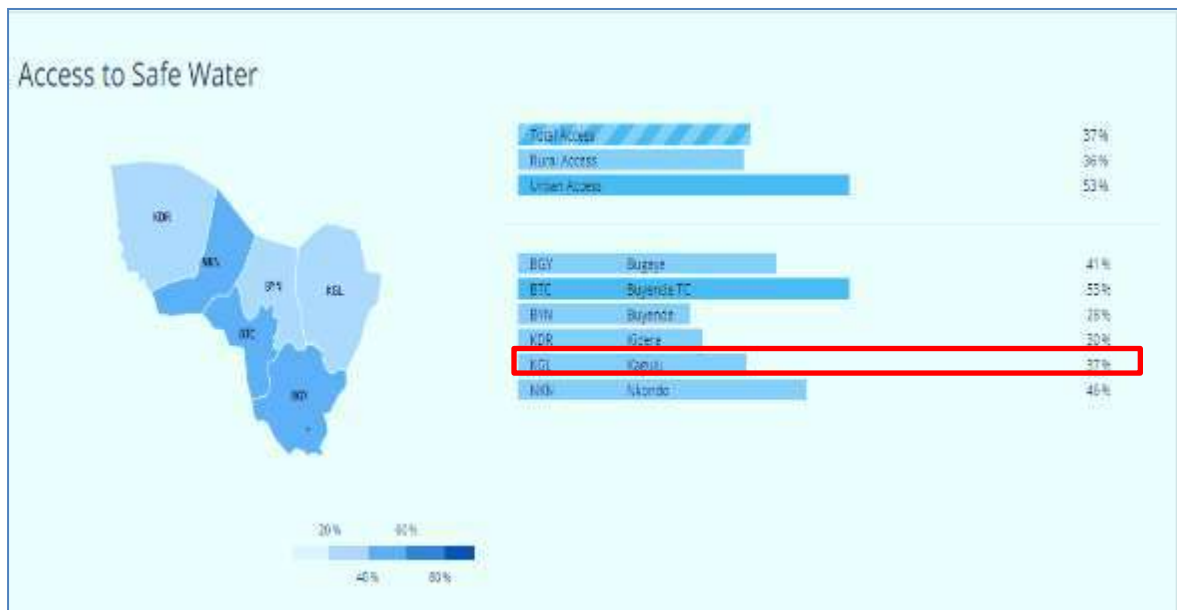


Figure 6-51: Access to water in the sub counties of Buyende District

(Source: Uganda Water Atlas, 20222)

6.5.10.1 WATER SOURCES

In Igwaya RGC, there are 50 functioning water source points of different technologies serving a total population of 24,021 people. More specifically, there are 15 open-source points along wetlands of Lake Kyoga; 2 community wells and springs; and 32 functional boreholes.



Borehole at Bumogoli village

Functional deep borehole at Nabuuku village



Figure 6-52: Water sources in Igwaya RGC

Respondents indicated that water in Igwaya RGC is mainly accessed through boreholes (97.6%), river/lake (2%) and piped water inhouse (0.7%). This is consistent with the Water Sector performance report which indicates that the main technology options used for water supply improvements in Buyende District are boreholes (98%), shallow wells (1%) and public tap (1%) -**Table 6-25**.

Table 6-25: Technology option for access to water in Igwaya RGC

Main water source	Frequency	Percentage (%)
Community Borehole	147	97.4
River/Lake	3	2
Piped Water in House	1	0.7
Total	151	100

(Source: Socio-economic survey)

There are non-functioning waters source points in Igwaya RGC, these include – one mini-piped water system at Iyingo landing site (Fig. 10); 40 deep boreholes such as shown in Bumogoli village, at Nabuuku village; one shadoof in Igwaya TC. During a consultative meeting at Iyingo landing site, it was revealed that the major reason for non-functionality of the mini-piped water system was due to technical breakdown and inability of the community to fund the repairs. At Nabuuku village, the non-functionality was due to technical breakdown and vandalism of equipment, while the non-functionality of Shadoof was attributed to low yield. Other reasons include locals using alternative sources nearby, non-functioning water and sanitation committees; water quality related issues especially salinity.

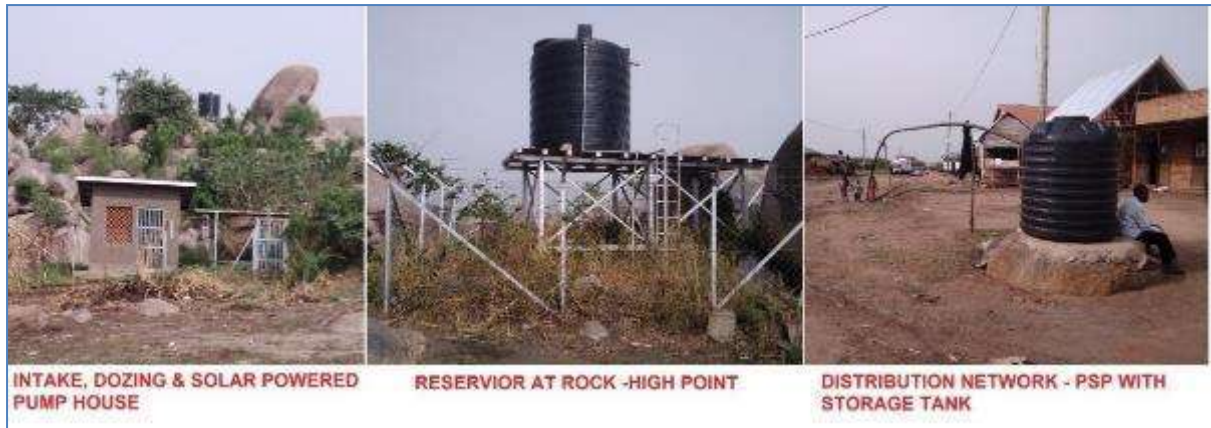


Figure 6-53: Non-functioning mini-piped water system at Iyingo landing site



Figure 6-54: Non-functioning deep borehole at Bumogoli village



Figure 6-55: Abandoned deep borehole at Nabuuku village in Igwaya RGC



Figure 6-56: Non-functional Shadoof at Igwaya Trading centre

6.5.10.2 PREFERENCE FOR WATER SOURCE

Most (81.5%) respondents indicated that they liked their current water source and also cited several reasons ranging from the water being free (26.8%), short distance to water source (25.6%), having no other option 24.4% and the water being clean (22.4%) as shown in the **Table 6-26** below.

Table 6-26: Preference of water source

Preference for water source	Frequency	Percentage (%)
No	28	18.5
Yes	123	81.5
Total	151	100
Reasons for preference		
Short distance	64	25.6
Free water	57	26.8
Clean water	56	22.4
Water tastes better	2	0.8
No other option	61	24.4
Total	250	100

***Multiple response allowed, (Source: Socio-economic survey)**

6.5.10.3 DISTANCE AND TRIPS MADE TO WATER SOURCE

Regarding distance to water source, the majority (60.9%) of respondents reported travelling 100-500 meters to access the water source while only (13.9%) travelled 1-1.5km to access the nearest water source in the proposed project area. Respondents also noted making 1-3 trips (72.2%), 3-5 trips (27.2%) and more than 5 trips (0.7%) to collect water (

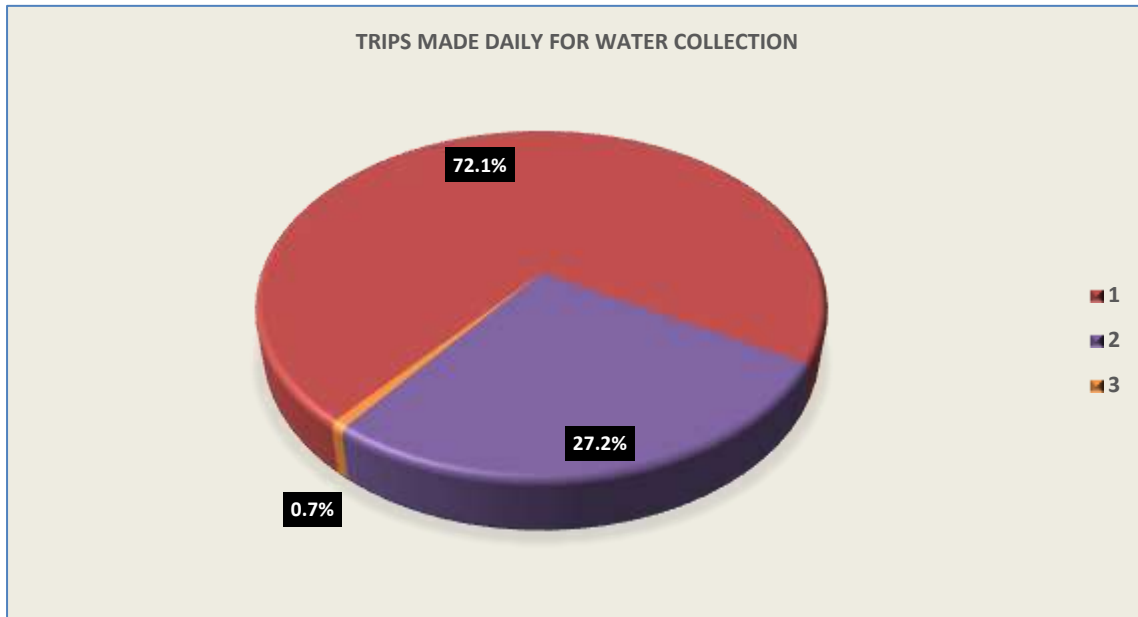


Figure 6-57).

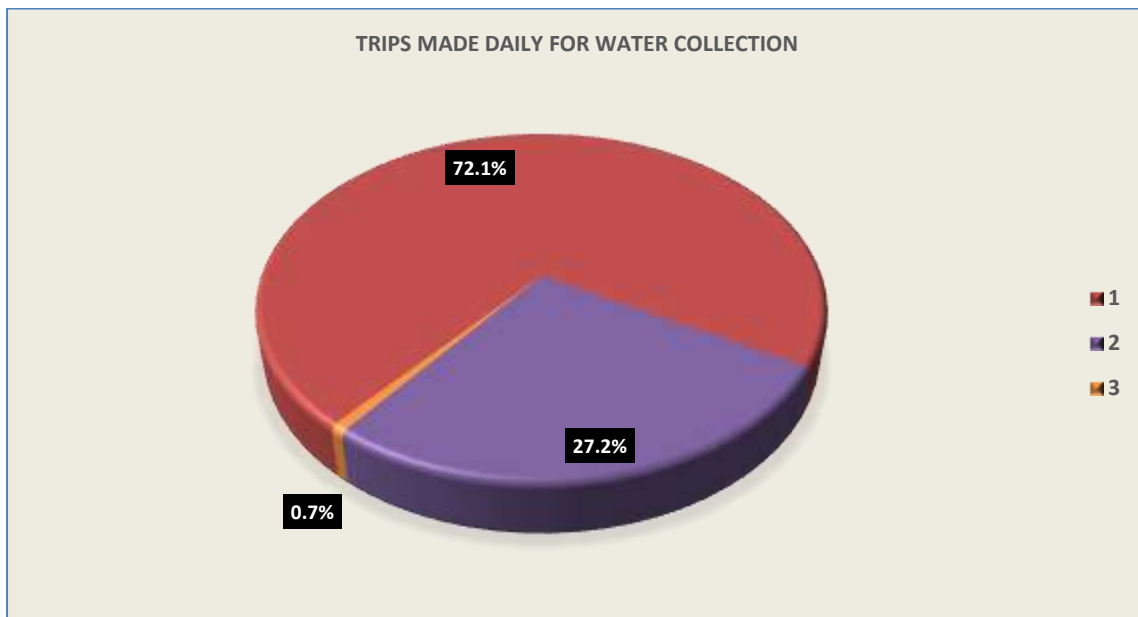


Figure 6-57: Trips to water collection

(Source: Socio-economic survey)

The survey shows that the above burden is being carried by women and children. Therefore, provision water near the households will reduce the burden of moving long distances and time spend to collect water.

6.5.10.4 TIME TAKEN TO REACH SOURCE OF DRINKING WATER

In terms of the time households spent fetching water, from the main water source, majority of respondents (65.6%) indicated spending 1 hour, 16.6% 1-2 hours and 9.3% 3-5 hours (**Table 6-27**).

Survey respondents attributed the longer time taken at boreholes to their slow recharge rates at the end of the dry season, coupled with long waiting queues which are usually used by a large number of the community.

Table 6-27: Time spent collecting water

Time taken to collecting water	Frequency	Percentage (%)
1	99	65.6
1 - 2	25	16.6
3 - 5	12	9.3
Above 5	13	8.6
Total	151	100

(Source: Socio-economic survey)

6.5.10.5 INVOLVEMENT IN COLLECTING WATER LEVEL

Access to clean and safe water in Uganda is still low and this remains one of the developmental challenges. The water coverage in rural areas was estimated at 68% which was a decline from 69% as of June 2019. As such the burden of fetching water is normally lies with women as it is given as one of the gender roles at household level. Results from the project area show that 31.1% of the respondents revealed adult women to be involved in water collection, 27.8% adult male, 27.8 boy children and 13.2% girl children (**Figure 6-58**).

6.5.10.6 WATER USE AT HOUSEHOLD

Regarding water usage the vast majority 66.2% mentioned that they used 50 litres and above, 13.9% 10-20 litres and 31-40 litres respectively.

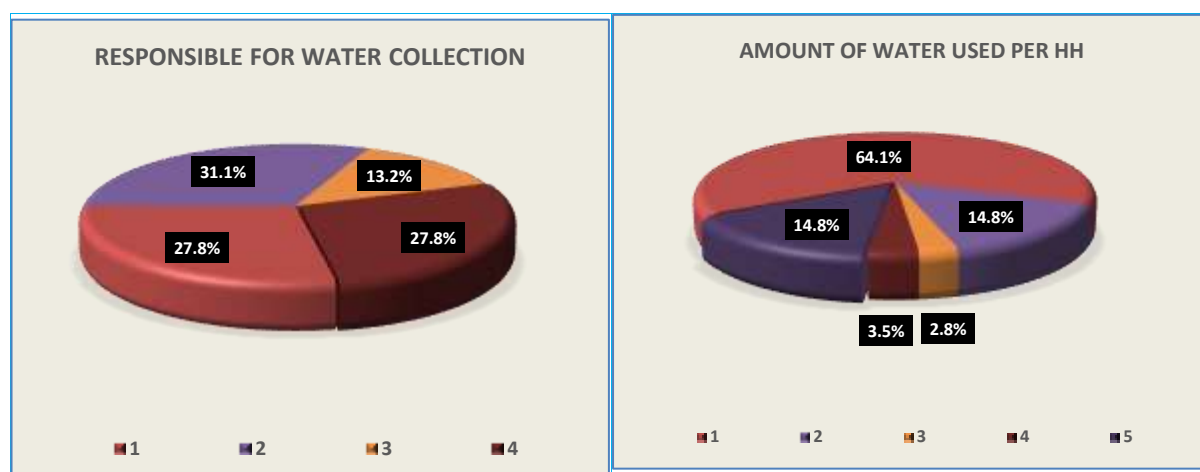


Figure 6-58: Water Collection and Usage

(Source: Socio-economic survey)

6.5.10.7 MAIN USES OF WATER IN YOUR HOME/BUSINESS

Domestic water uses include drinking, food preparation, bathing, washing clothes and dishes, and livestock as shown in the **Table 6-28** below.

Table 6-28: Water uses

Water uses	Frequency	Percentage (%)
Water for drinking	143	32.4
Washing clothes	142	32.1
Cooking (food/beverages)	128	29
Crop irrigation	4	1.0
Livestock	25	5.7
Total	442	100

*Multiple response allowed, (Source: Socio-economic survey)



Figure 6-59: Calves drinking water from a roadside pond in Buyumba village

6.5.10.8 CURRENT STATUS ON PAYMENT FOR WATER

On the issue of payment for water, 62.9% of the respondents indicated not paying for water while 37.1% paid for it. Regarding sale of water, majority of the respondents 66.1% indicated that they fetch the water from the main water source while 33.9% revealed accessing water from bicycle vendors (*Table 6-29*).

Table 6-29: Current status on payment for water

Payment for water	Frequency	Percentage (%)
Yes	56	37.1
No	95	62.9
Total	151	100

Who sell water to the household		
Water vendor on bicycle	19	33.9
Collection from water source	37	66.1
Total	56	100
Frequency of water bill		
Daily	19	33.9
Monthly	37	66.1
Total	66	100

(Source: Socio-economic survey)

Related to the above is the issue billing for the water supplied, 33.9% indicated getting charged daily by the vendors while 66.1% revealed that they were billed monthly (**Table 6-29**). Those who paid monthly, indicating paying a user fee for borehole operation and maintenance.

6.5.10.9 COST OF A 20 LITRE JERRYCAN OF WATER

Of the 56 respondents who noted payment for water, 57.1% indicated paying more than Ugx. 600/= for a 20l jerrycan (, 17.9% Ugx. 300/=, 14.3% Ugx. 200/=, 7.1% less than Ugx.100/= and 1.8% pay Ugx. 500 and Ugx. 600.

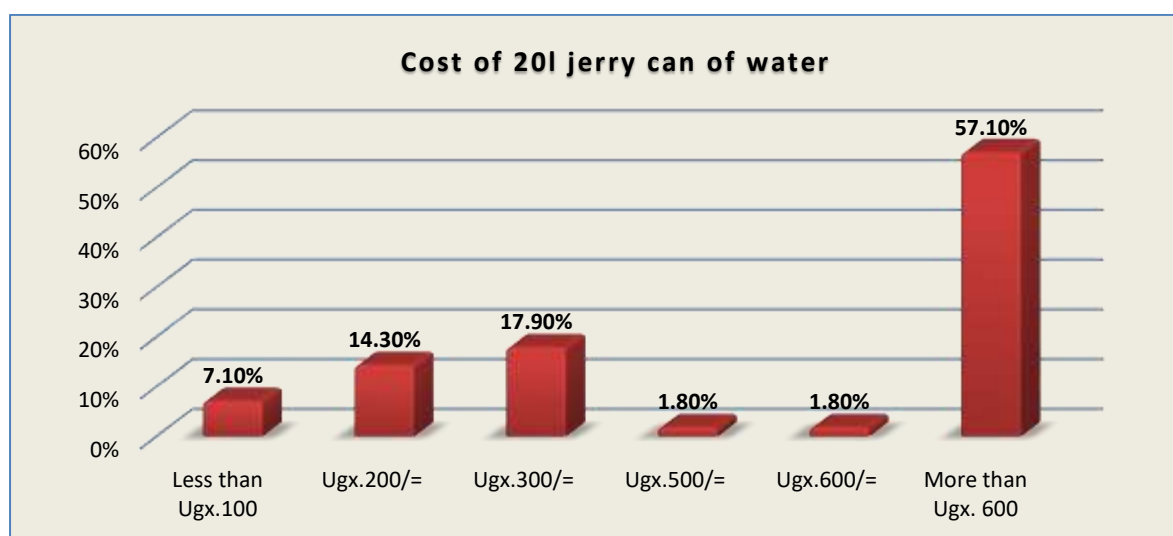


Figure 6-60: Amount paid for 20l Jerry can

(Source: Socio-economic survey)

6.5.10.10 PREFERRED SERVICE OPTIONS

Respondents were quizzed on which service options they would prefer on the proposed Igwaya RGC water supply system. Most (58.9%) of them noted preference of Yard Tap Connections (**Table 6-30**), house connection (35.8%) and a few noted public stand pipe (5.3%).

Table 6-30: Preferred service option

Preferred service option	Frequency	Percentage (%)
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House Connection	54	35.8
Yard Tap	89	58.9
Public Standpipe	8	5.3
Total	151	100

(Source: Socio-economic survey)

Of the 54 respondents who preferred household connections, majority (31.5%) indicated that they would afford to pay between Ugx. 5,000-10,000 and Ugx. 10,000-20,000 for the connection as shown in the **Table 6-31** below.

Table 6-31: Amount prepared to pay for house connection

Amount prepared for obtaining house connection	Frequency	Percentage (%)
50,000 – 60,000	3	5.6
30,000-40,000	2	3.7
20,000-30,000	7	13
10,000-20,000	17	31.5
5,000-10,000	17	31.5
3,000-5,000	5	9.3
2,000-3,000	2	3.7
1,000-2,000	1	1.9
Total	54	100

(Source: Socio-economic survey)

6.5.10.11 MAXIMUM RESPONDENTS ARE PREPARED TO PAY FOR EACH 20L JERRY CAN

Relatedly, a question related to payment for 20-liter jerry can obtained from a safe water was posed to the respondents as a proxy measure for their willingness to pay. Respondents gave varied answers with 57.3% indicating that they would be willing to pay 100 Ugx (**Figure 6-61**) and (18%) 200 Ugx.

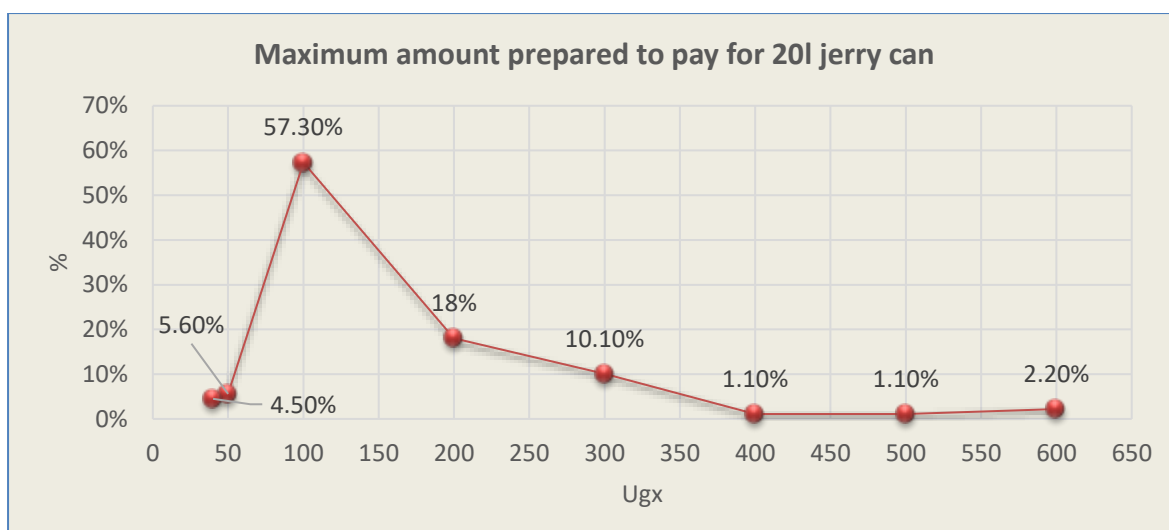


Figure 6-61: Maximum amount prepared to pay for 20l jerry can

(Source: Socio-economic survey)

6.5.10.12 OWNERSHIP OF MOBILE PHONE AND MOBILE MONEY PAYMENT

Mobile money can be defined as an electronic wallet service that enables one to send and receive money anywhere using a mobile/cellular phone. Mobile payments are some of the options that have been adopted for payment for water services. On owning a mobile handset 23.35% of the respondents indicated having mobile handsets and 99.3% indicated having access to mobile money payments which is indicative of increasing financial inclusion⁸. This is indicative of the need for awareness to adoption of mobile phones as a means of accessing financial services by the growing number of low-income earners in rural areas.

Table 6-32: Access to mobile payments

Mobile phone ownership	Frequency	Percentage (%)
No	5	76.65
Yes	146	23.35
Total	151	100
Access to mobile money payment system in area		
Yes	150	99.3
No	1	0.7
Total	151	100

(Source: Socio-economic survey)

6.5.11 SANITATION

6.5.11.1 WASTE DISPOSAL

⁸ Financial Inclusion (FI) which is the process of ensuring access to appropriate financial products and services at an affordable cost to the underprivileged and low-income groups (Ddumba Sentamu, 2009)

Sanitation facilities are critical sanitation facility within the households and community, and it has direct influence on the water, sanitation and hygiene (WASH). By year 2015, latrine coverage in Buyende district was at 72% (Buyende DDP, 2015/2020). According to the DHO, the current pit latrine coverage is not known. However, there are indications that it has dropped especially in rural villages near Lake Kyoga and growing urban agglomerations (trading centres, town boards).

Regarding disposal of human waste, the vast majority 94% revealed using Pit latrines (tradition basic sanitation facility), 3.3% VIP latrines (improved sanitation facility) and 1.3 % Pour flush toilet (standard sanitation facility) as shown in the **Table 6-33** below.

Table 6-33: Type of sanitation facility used

Type of toilet facility used	Frequency	Male	Female	Percentage (%)
Poor flush toilet	2	2	0	1.3
VIP latrine	5	4	1	3.3
Pit Latrine	141	125	16	94
Double Vault Latrine	2	2	0	1.3
Total	150	133	17	100

(Source: Socio-economic survey)

In terms gender, the survey revealed the overall the male headed households have more access to sanitary facilities than female headed households.

6.5.11.2 SHARING OF SANITATION FACILITIES

When asked about the issues of sharing toilets, 73.8% indicated that they don't while 26.2% indicated that they do. Those who share sanitary facilities cited the challenge of keeping shared toilets clean which exposes them to the risk of disease and infections. The main reason for sharing sanitation facilities included (i)lack of HH owned facility, and (ii) sharing with visitors/travellers since there are no public sanitation facilities in the RGC.

Table 6-34: Sharing Sanitation Facilities

Sharing of toilet	Frequency	Percentage (%)
No	111	73.8
Yes	38	26.2
Total	149	100

(Source: Socio-economic survey)

6.5.11.3 LENGTH TAKEN BY HOUSEHOLD TO EMPTY SANITATION FACILITIES

On the issue of emptying the latrines, 85.5% of the respondents indicated taking more than 2 years, 10.3% Every after two years and 4.3% Less than a year (**Table 6-35**).

Table 6-35: Emptying of latrines

Interval for household sanitation facility emptying	Frequency	Percentage (%)
Less than a year	5	4.3
Every after 2 years	12	10.3
More than 2 years	100	85.5
Total	117	100

(Source: Socio-economic survey)

6.5.11.4 OPEN DEFECACTION

Open defecation is a contributing factor to water and food contamination, hence increasing the risk of exposure to incidence and prevalence of water borne diseases (WHO⁹, 2015). Survey findings indicated that open defecation is prevalent in Igwaya RGC as shown in **Table 6-36** below. The most outstanding finding is that 68.3% of the respondents noted they have ever observed evidence of open defecation in / near open-source water points (Lake Kyoga, rivers, wetland, ponds); 39.4% said they have observed it in open ground, grass, bushes, crop / grazing fields; and 21.7% said they have ever observed evidence of open defecation in market place areas or stalls such as Kagulu – Nabuuku weekly market. In this regard, there is need for a public toilet at key public access infrastructures namely Kagulu – Nabuuku weekly market and Iyingo landing site, located within intensification line area.

Table 6-36: Response on observation of open defecation within Igwaya RGC project area

Basing on your experience, have you ever observed open defecation in your area?		Yes	No	Not Sure	Total
People defecating in / near open-source water points (Lake Kyoga, rivers, wetland, ponds)	Freq	103	44	4	151
	%	68.2	29.1	2.7	100
People defecating in open ground / grass / fields / bushes	Freq	58	83	10	151
	%	38.4	54.9	6.7	100
People defecating in market place areas / stalls	Freq	33	86	32	151
	%	21.7	57.0	21.3	100

(Source: Socio-economic survey)

6.5.11.5 PUBLIC TOILETS

The project proposed to construct 1 No. water borne public toilet with the following features- 2 No. stances for men, 2 No. stances for women, 2 No. stances for physically disabled (1 No. for each gender), Urinal for males, and 1 No. shower stall for each gender.

There is no functional public sanitation facility in all the 4 satellite centres of Igwaya RGC. In Igwaya trading Centre, the public latrine constructed by Kagulu SCLG is not emptied and not accessible as shown in **Figure 6-62**. In Iyingo and Buyumba landing sites, the pit latrine was destroyed by floods due

⁹ https://www.who.int/gho/publications/mdgs-sdgs/MDGs-SDGs2015_chapter5_snapshot_waterborne_diseases.pdf?ua=1

to raising water levels in lake Kyoga. During the ESIA study the need for a new public toilet was assessed.

Survey findings showed that 43% of the respondents noted the need for public sanitation facilities in Igwaya RGC. In response to the need, the Butemera / Igwaya Town Board Leadership have selected a site for construction of new public toilet. The land is owned by Kagulu SCLG. However, 57% of the respondents did not see the need, the major reason being that it will only serve Igwaya trading Centre not the rural areas of Igwaya RGC project area.



Damaged public toilet at Iyingo Landing site



Damaged public latrine at Buyumba landing site



Selected site for public toilet by Butemera / Igwaya Town Board Leadership Committee

Figure 6-62: Non-functional sanitation facilities at Iyingo and Buyumba landing sites and Butemera TC

Recommendation: There is need to add two more public toilets of modest specification to be situated at Kagulu – Nabuuku weekly market (opposite Kagulu SC headquarters) and Iyingo Landing site (part of the intensification line area).

6.5.11.6 SANITATION IN SCHOOLS

There are no adequate WASH facilities such as – water tanks, menstrual health facilities for girls and female teachers (e.g., private rooms; incinerators for disposing used sanitary pads), poor pit latrines with an average stance - pupil ratio of 1:198 (Buyende DDP, 2020/21- 2024/25), which is far higher than national target of 1:40 (MoES, 2020).

6.5.11.7 HAND WASHING

Awareness and handwashing practice is good amongst the surveyed population with 83.9% of the respondents being able to mention at least 3 critical times for hand washing (**Table 6-37**). This should be promoted further. The focus should shift to monitoring actual hand washing practice rather than knowledge.

Table 6-37: Handwashing practices

Practice handwashing	Frequency	Percentage (%)
No	24	16.1
Yes	127	83.9
Total	151	100

(Source: Socio-economic survey)

6.5.11.8 DISPOSAL OF SOLID WASTE

Regarding disposal of solid waste, survey results show that 63.8% of the respondents Dug-pit, 33.9% used it as farm manure, 1.4% disposed of their waste at a communal dump site, 0.9% had their garbage Collected by Town Authority or Private Company and 1.8% threw their waste by the road side (

Table 6-38).

Table 6-38: Solid Waste Disposal

Disposal of solid waste	Frequency	Percentage (%)
Dug-pit	141	63.8
Farm as manure	75	33.9
Collected by Town Authority or Private Company	2	0.9
Communal Dump	3	1.4
Total	221	100

(Source: Socio-economic survey)

Most of the respondents (58.3%) revealed that the solid waste collection fee is unaffordable while 41.7% indicated that it is relatively affordable (**Table 6-39**). Related to waste collection is the important issue of cost. Survey respondents were questioned on how much they pay for waste collection. 65.2% indicated not paying, 13.9% < Ugx. 5000 and 12.2% Ugx. <1000 and 6.1% paying Ugx 1000 per interval of waste collection.

Table 6-39: Perceptions on solid waste management

Perception about payment of fees	Frequency	Percentage (%)
No	88	58.3
Yes	63	41.7
Amount paid for solid waste collection		
<Ugx 1000	18	12.2

Ugx. 1000	9	6.1
<Ugx. 5000	21	13.9
Ugx. 5000	1	0.9
Ugx. 5000	3	1.7
No pay	98	65.2
Total	151	100

(Source: Socio-economic survey)

6.5.12 HEALTH SERVICES

6.5.12.1 ACCESS TO HEALTH SERVICES

Health is an important component of human capital because ill health results in loss of earning opportunities and perpetuation of poverty hence the need to have quick and easy access to health care services.

In the project area, (46.4%) of the respondents indicated that they were using Privately run clinic /drug shop, 35.1% health centre III, 13.9% Community Health centre and 4.6% of the respondent's health centre IIs to access healthcare services (**Table 6-40**). This is consistent with the UNHS 2019/20 which shows that 84.1% of the communities in Busoga region have a health seeking behaviour when they fall sick

Table 6-40: Access to health facility

Access to health facility	Frequency	Percentage (%)
Health Centre III	53	35.1
Health centre II	7	4.6
Community Health Centre	21	13.9
Privately run clinic /drug shop	70	46.4
Total	153	100

(Source: Socio-economic survey)

In relation to healthcare, field survey results indicate that majority of the respondents (45.3%) travel 100-500 m, 30.7% - between 1 to 1.5 Km, 22.7% - about 100 m and 1.3% over 5km to the nearest/preferred health facility (

Table 6-41). Ministry of Health Uganda recommends a maximum distance of 5 km to the nearest health facility.

Table 6-41: Distance to the nearest health facility

Distance to nearest health facility	Frequency	Percentage (%)
100 m	34	22.7
100-500 m	68	45.3
1-1.5 Km	46	30.7
Above 5 Km	2	1.3
Total	150	100

(Source: Socio-economic survey)

Relatedly, when questioned about the distance travelled to the nearest referral hospital¹⁰, 72.5% of the respondents indicated travelling over 5km ,14.8% 100m 8.1 % 1-1.5km 4.7% 100-500m

Table 6-42: Distance to the nearest referral facility

Distance to nearest referral facility	Frequency	Percentage (%)
100m	22	14.8
100-500m	7	4.7
1-1.5km	12	8.1)
Above 5km	108	72.5
Total	149	100

(Source: Socio-economic survey)

6.5.12.2 MOST COMMON DISEASES

Water scarcity is directly linked to Incidence and Prevalence of water related diseases. NOTE: Disease Incidence refers to the number of new cases in a period of time usually one year. Disease Prevalence refers to the number of individuals who have an illness or condition at any moment (WHO, 2004). There are both communicable and non-communicable diseases attributed to poor water, sanitation and hygiene conditions. A review of Buyende DDPIII (2020/21-2024/25) indicates that the area is affected by disasters and hazards such as disease outbreaks due to water logging, pests and diseases, hailstorms, long dry spells and hunger.

The Buyende DHO/HMIS2 data for 2015-2021 indicates that the major water related diseases include Cough or Cold, Malaria, Diarrhea, Intestinal worms, Gastrointestinal Disorders, Pneumonia, STIs, GBV related injuries, Typhoid, Stomach Aches, HIV/AIDs, Covid19 (HMIS2, 2015-2021). The HMIS2 data obtained from Kagulu HC III for period December 2021 – January 2022 indicates that the Out PATIENTS' Department attendance rate was high with 893 cases of malaria reported; 111 cases of intestinal worms and 80 cases for diarrhea.

¹⁰ According to Ministry of Health, the referral system is a formalized system that requires a patient from a lower-level facility to obtain a referral note from the health workers in that facility in order to go to the relevant higher-level facility.

The most common diseases were noted to include malaria (47.3%) and Respiratory Tract Infection (RTI) 38.6% are the main diseases reported. Malaria is recognized as the world’s major health threat affecting development especially in low-income countries. It is one of the leading causes of death and morbidity worldwide especially in the developing world with a morbidity rate of (61.2%) in Buyende. In Uganda, malaria is highly endemic with 90-95% of the population exposed to high transmission¹¹.

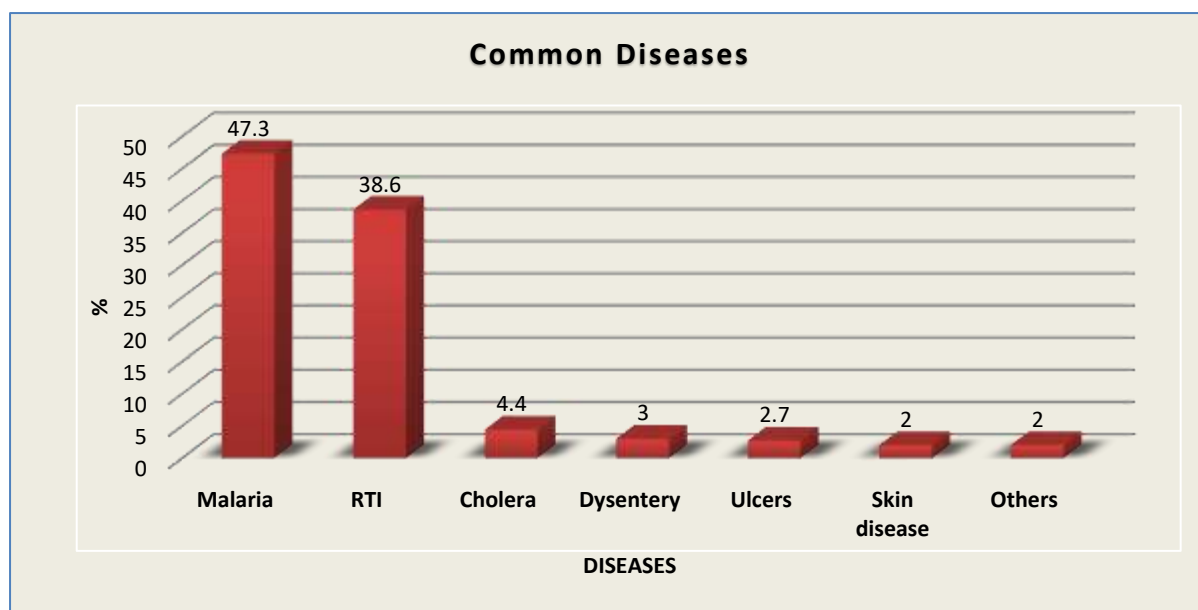


Figure 6-63: Common diseases in Igwaya RGC

**Multiple responses allowed, (Source: Socio-economic survey)*

6.5.12.3 WATER IN HEALTH CARE FACILITIES

Nationally, 33% of health facilities in Uganda have basic water supply (WHO Global Baseline Report, 2019). According to UNICEF/JMP¹², Uganda ranks highest in terms of ‘Limited’ water at HCF at 65.15% in Sub Saharan Africa in terms of indicators on Water in Health Care Facilities (WinHCF). It ranked 6th in terms of having ‘Basic’ water at 30.81% and 10th rank for having ‘No Service’.

In Buyende district, there are 24 health facilities (13 Gov’t; 11 PNFP; no PFP). Out of the 24 health facilities, there are 16 HC II, 7 HC III and 1 HC IV. According to Buyende District Health Inspector, only 10% (3 out of 24) of the health facilities are connected to piped water systems.

In Kagulu Sub County, 43% (3 out of 7) health facilities are connected to a piped water from Gravity Flow Scheme in Irundu Parish. The connected health facilities also have storage water tanks with capacity of 13,500 litres as shown in **Table 6-43** below. Within Igwaya RGC, there are 2 health facilities (Kagulu HC III and Joy HC II) all accessing water from borehole with no water storage tank.

Table 6-43: Status water supply in Health facilities in Igwaya RGC and entire Kagulu Sub County

Name & Ownership of Health Facility	Location	Major Source of water supply	No. of Water Tank	Capacity in Litres	Remarks
Igwaya RGC Area (Core project Area)					

¹¹ *The Influence of Socio-economic Factors on Malaria Incidence in Mayuge District Eastern Uganda: A Case Study of Bukatube Sub-County, 2013*

¹² *UNICEF Joint Monitoring Programme (JMP)*

Name & Ownership of Health Facility	Location	Major Source of water supply	No. of Water Tank	Capacity in Litres	Remarks
Kagulu HC III (Gov't/MoH)	Kabukye parish – Kagulu SC	Borehole	No	N/A	The cement water tank is damaged. No storage tank, limited hand washing facilities at OPD and Maternity wards
Joy Health Unit HC II (PNFP / CBO)	Kabukye parish – Kagulu SC	Borehole	No	N/A	Water supply is not enough. The facility will benefit from the Igwaya RGC solar powered piped water system
Maliya Foundation HC II	Igwaya village-Iyingo parish	Borehole	No	N/A	Water supply is not enough. The facility will benefit from the Igwaya RGC solar powered piped water system
Influence Zone to Igwaya RGC area					
Irundu HC III (Gov't/MoH)	Irundu ward - Irundu TC (curved from Kagulu SC)	GFS* / Piped water system	3	3,500l	The OPD attendance rate outstrips the water demand. However, the facility is far from Igwaya RGC.
Irundu St. Mathias Mulumba HC III (PNFP/UCMB)	Irundu ward - Irundu TC (curved from Kagulu SC)	GFS* / Piped water system	1	10,000l	The OPD attendance rate outstrips the water demand. However, the facility is far from Igwaya RGC.
Mpunde HC II (Gov't/MoH)	Bukutula parish – Kagulu SC	Borehole	No	N/A	Water scarcity is high, no water in wards. However, the facility is far from Igwaya RGC.
Nkoone HC II (Gov't/MoH)	Nkoone parish – Kagulu SC	Borehole	No	N/A	Water scarcity is high, no water in wards. However, the facility is far from Igwaya RGC.
<i>*Gravity Flow Scheme (GFS) constructed by Urban Water and Sewage Services (UWSS) project under the Water and Sanitation Development Facility – Eastern (WSDF-E), Ministry of Water & Environment (MWE)</i>					
<i>Source: Health Assistant, Kagulu Sub County Lower Local Government</i>					



Figure 6-64: Damaged concrete water tank at Kagulu HC III

Recommendation: The project will provide improved supply of safe and clean water to 2 health facilities namely Kagulu HC III (Gov't/MoH) and Joy Health Unit HC II (PNFP / CBO) in Igwaya RGC area. The improved access to safe and clean water is a contribution to Targets of 'SDG 3 - Ensure healthy lives and promote well-being for all at all ages'. For instance, the availability of sustainable water is essential for ensuring infection prevention and control (IPC) in health care facilities. In regard to the above, the WHO notes that "Achieving SDG 3 will depend on progress in other SDGs – e.g., clean water and sanitation, poverty reduction, education; nutrition; gender equality; sustainable energy and safer cities" (WHO¹³, 2017). It will also contribute to achievement of health sector targets under NDP III 2020/21- 2024/25.

6.5.13 EDUCATION SERVICES

Education is a critical issue which impacts nearly every aspect of human life and socio- development planning and knowledge of the level of education among stakeholders is imperative as it guides on the method and frequency of engagement before and during project implementation. There are 211 (91 government aided and 120 private) primary schools and 17 (6 government aided and 11 private) secondary schools in Buyende District (Buyende DLG, 2020). Enrolment in govt aided primary schools stands at 67,679 (53,710 males, 43,989 females) with a primary school completion rate of 67%.

During the ESIA study, information about the level of education achieved and the highest grade completed was captured. Field results show that over half (52.3%) of householders has attained primary education, 25.2% ordinary level education, University/college education 6%, A' level 4.6% and Vocational 1.3% (**Figure 6-65**). Remarkably, 10.6% of these respondents had attained University level education.

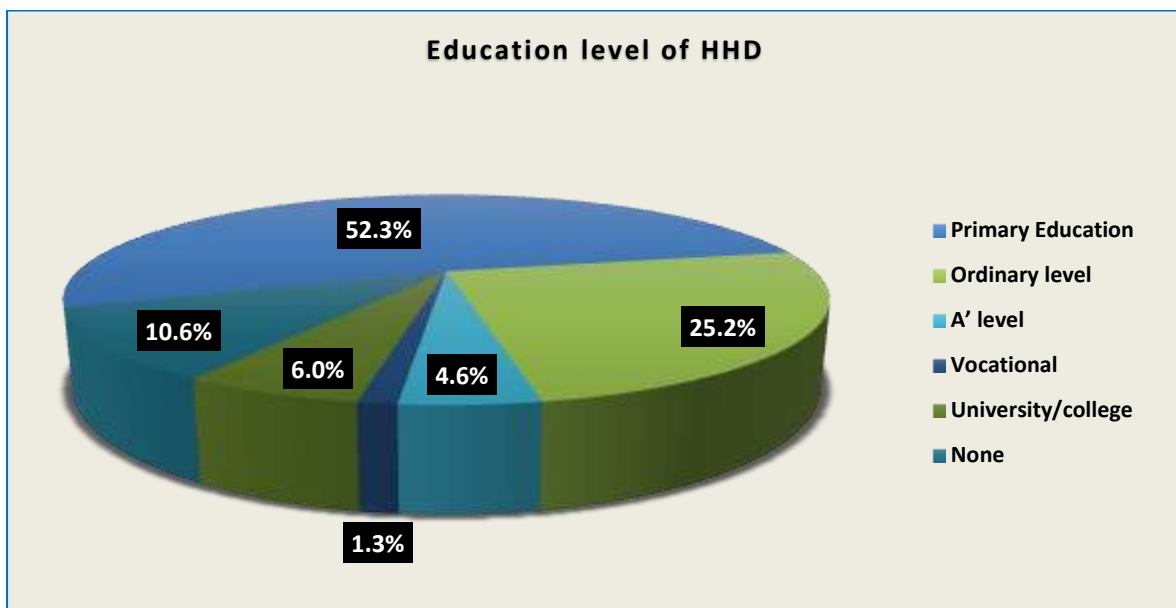


Figure 6-65: Education level of the household head

(Source: Socio-economic survey)

6.5.13.1 DISTANCE TO THE NEAREST PRIMARY SCHOOL

¹³ [https://www.who.int/docs/default-source/searo/hsd/hwf/01-monitoring-the-health-related-sdgs-background-paper.pdf?sfvrsn=3417607a_4#:~:text=The%20health%20goal%20\(SDG%203,one%20must%20be%20left%20behind%27.](https://www.who.int/docs/default-source/searo/hsd/hwf/01-monitoring-the-health-related-sdgs-background-paper.pdf?sfvrsn=3417607a_4#:~:text=The%20health%20goal%20(SDG%203,one%20must%20be%20left%20behind%27.)

Related to the above was issue of distance to the nearest primary school, survey results show that most households were able to access primary school that were within walking distance of 1-1.5km (65.6%), 100-500m (19.2%) and 100m (11.92%) Only (3.3%) of the respondents indicated travelling over 5km to access primary schools from their principal places of residence (**Table 6-44**).

Table 6-44: Distance to nearest Primary school

Distance to nearest primary sch.	Frequency	Percentage (%)
100m	18	11.9
100-500m	29	19.2
1-1.5km	99	65.6
Above 5km	5	3.3
Total	151	100

(Source: Socio-economic survey)

6.5.13.2 DISTANCE TO THE NEAREST SECONDARY SCHOOL

Regarding secondary schools, most respondents indicated that they have to travel (66.2%) 1.5-5km 12.6% 100m ,11.3 over 5km, 9.9%, 100m-500 to access secondary schools as shown in the **Table 6-45** below.

Table 6-45: Distance to nearest Secondary school

Distance to nearest secondary sch.	Frequency	Percentage (%)
100m	19	12.6
100-500m	15	9.9
1-1.5km	100	66.2
Above 5km	17	11.3
Total	151	100

(Source: Socio-economic survey)

6.5.13.3 ACCESS TO WATER IN SCHOOLS

The global target of achieving universal access to basic WASH services in schools by 2030 aims at extending water beyond the household to include institutional settings, such as schools, healthcare facilities and workplaces (UNICEF¹⁴, 2020). Its notable that water in schools has direct impact on education outcomes in primary secondary and tertiary levels (MOES, 2020).

In Kagulu Sub County, 22.5% (7 out of 31) schools have access to piped water under the GFS in Irundu parish as shown in **Table 6-46** below. Majority of the schools get water from deep boreholes. There is limited use of rain water harvest tanks (RWHT). The inadequate water availability is affecting

¹⁴ <https://gdc.unicef.org/resource/drinking-water-sanitation-and-hygiene-schools>

education outcomes. During stakeholder consultations it was revealed that water scarcity contributes to high rate of school dropout, absenteeism and performance among learners and teachers.

Table 6-46: Status water supply in schools in Igwaya RGC

	Igwaya RGC Project Area	Ownership	School Population			Major Source of water supply
			Male	Female	Total	
Igwaya RGC core project area						
Bumogoli parish						
1	Bumogoli PS	Gov't aided	482	415	897	Borehole
2	Kamugoya PS	Gov't aided	352	312	664	Borehole
3	Saint Joseph	Private	202	193	395	Borehole
Iyingo Parish						
4	Igwaya PS	Gov't aided	524	558	1,082	Borehole
5	Iyingo PS	Gov't aided	372	316	688	Borehole
6	Bamutye Memorial PS	Private	164	107	271	Borehole
7	New Hope Nursery & PS	Private	59	43	102	Borehole
8	Valley V. Kasanga	Private	105	99	204	Borehole
9	Saint Mary	Private	233	225	458	Borehole
Kagulu parish						
10	Kagulu PS	Gov't aided	269	276	545	Borehole
11	St. Peter SSS Kagulu	Community	164	176	340	Borehole
12	Mulali PS	Gov't aided	442	456	898	Borehole
13	Miru PS	Gov't aided	503	483	986	Borehole
14	Kirimwa PS	Gov't aided	286	261	547	Borehole
15	Busuuyi SDA PS	Gov't aided	171	173	344	Borehole
Influence Zone to Igwaya RGC area						
Kabukye parish						
16	Kabukye PS	Gov't aided	389	370	759	Borehole
17	Nsomba PS	Gov't aided	314	274	588	Borehole
18	Ngole PS	Gov't aided	376	365	741	Borehole
20	Bukutula PS	Gov't aided	243	267	510	Borehole
21	Igalaza PS	Gov't aided	490	469	959	Borehole
22	Munde PS	Gov't aided	376	367	743	Borehole
Nkoone parish						
23	Nkoone PS	Gov't aided	412	423	835	Borehole
24	Bupioko PS	Gov't aided	354	312	666	Borehole

	Igwaya RGC Project Area	Ownership	School Population			Major Source of water supply
			Male	Female	Total	
Irundu parish						
25	Irundu Township PS	Gov't aided	331	318	649	PSP- GFS
26	Irundu Central.PS	Gov't aided	414	401	815	PSP- GFS
28	Irundu COPE PS	Gov't aided	542	523	1,065	PSP- GFS
29	Irundu Modern SSS	Private	213	254	467	PSP- GFS
30	Irundu Central SSS	Private	310	295	605	PSP- GFS
31	Irundu High School SS	Private	219	189	408	PSP- GFS

Source: schools management/ Education statistics, May 2022

There will be an increase in access to safe and clean water in primary and secondary schools. In regard to the above, the project will contribute to SDG 4 ‘Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all’. It will also contribute to achievement of Education targets under NDP III 2020/21- 2024/25. More specifically, the availability of safe and clean water will enhance education outcomes at primary and secondary schools especially key indicators that include Enrolment rate, attendance rate, completion rate, teacher performance, absenteeism, lower the rate of absenteeism and dropout rate for girls; improve menstrual health conditions for girls and female teachers.



Figure 6-66: Bumogoli PS (Gov't aided) with no RWHT nor piped water supply



Figure 6-67: Buyumba Nursery School faces severe water scarcity



Figure 6-68: A secondary school (Kagulu Hills College) with no RWHT in Igwaya RGC

6.5.14 PREVALENCE OF GBV

Gender Based Violence, is an umbrella term for any harmful act that is perpetrated against a person's will and that is based on socially ascribed gender differences. GBV includes acts that inflict physical, mental, sexual harm or suffering; threats of such acts; and coercion and other deprivations of liberty, whether occurring in public or in private life. GBV disproportionately affects women and girls across their lifespan and takes many forms, including sexual, physical, and psychological abuse. It occurs at home, on the streets, in schools, workplaces, farm fields, and refugee camps; during times of peace as well as in conflicts and crises¹⁵. According to the UDHS 2016, 64% of females of ages 15-49 having

¹⁵ World Bank Good Practice Note: Addressing Gender Based Violence in Investment Project Financing involving Major Civil Works 28 September 2018

experienced physical, sexual, or emotional violence perpetrated by their current or most recent spouse or partner. Similarly, according to UNFPA 2013 ,61.1% of the females between 15-24 years think it is justified to beat a wife. The term GBV is most commonly used to underscore systemic inequality between males and females —which exists in every society in the world—and acts as a unifying and foundational characteristic of most forms of violence perpetrated against women and girls (VAWG). The term GBV stems from the 1993 United Nations Declaration on the Elimination of Violence against Women, which defines violence against women as “any act of gender-based violence that results in, or is likely to result in, physical, sexual or psychological harm or suffering to women.” Discrimination on the basis of sex or gender identity is not only a cause of many forms of GBV, but also contributes to the widespread acceptance and invisibility of such violence—so that perpetrators are not held accountable and survivors are discouraged from speaking out and accessing support. Therefore, as a project deliberate effort has to be made by the Contractor through Action plans and codes of conduct to mitigate against GBV.

6.5.14.1 PREVALENCE OF GBV IN KAGULU SC

The information collected from the project area for the year 2020 by the Uganda Police crime indicates that there 217 reported cases of sexual assault ,20 cases related to child abuse and 102 cases of common assault. Field consultation with Kagulu police also indicated that there are several forms of GBV shown in the **Figure 6-69** below.

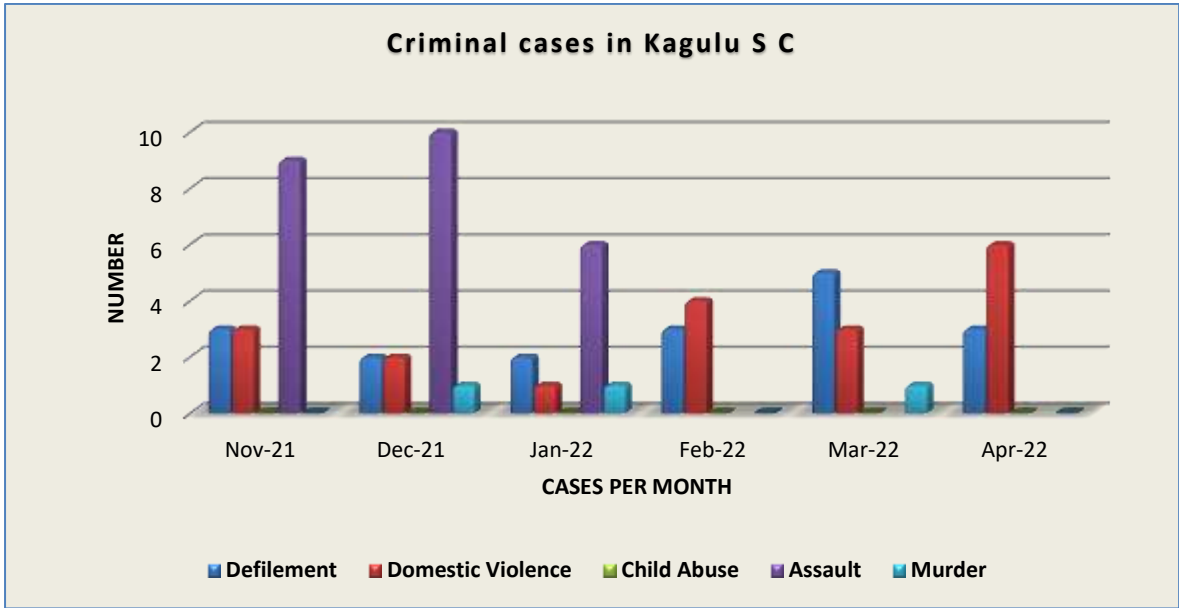


Figure 6-69: Reported criminal cases in Kagulu Sub County (Source: Kagulu Police Post (May 2022))

6.5.14.2 VICTIMS AND PERPETRATORS OF DOMESTIC VIOLENCE IN THE AREA

Existence of SGBV violates one’s rights and slows down progress in achieving sustainable inclusive human development UBOS, (2019). SGBV is perpetrated against men, women, boys and girls, however, the vast majority of cases reported involve women and girls. When asked about the victims of GBV in the community majority of the respondents noted Married women (41.7%). Girls (39.9%); 5.7% respondents also indicated that children of the are also victims of GBV (*Error! Reference source not found.*). Sexual & Gender -based violence (SGBV) is not a new phenomenon. Respondents noted the main (49.4%) perpetrators of GBV to be male spouses, 30.8% female spouses and strangers.

Table 6-47: Respondents' perception on victims and perpetrators of GBV

Main victims of GBV	% & Freq	Perpetrators of GBV	% & Freq
Girls	39.9% (113)	Male spouse	49.4% (130)
Married women	41.7% (118)	Female spouse	30.8% (81)
Boys	7.8% (22)	Other relative	5.7% (15)
Men	3.9% (11)	Clan elder	2.3% (6)
Children	5.7% (16)	Community leader	1.1% (3)
Maids	0.4% (1)	Stranger	8.4% (22)
Other	0.4% (1)	Employer/boss	1.1% (3)
Don't know	0.4% (1)	Male teacher	0.8% (2)
Total	100% (283)	Community member	0.4% (1)
		Total	100% (263)

*Multiple response allowed, (Source: Socio-economic survey)

6.5.14.3 COMMON TYPES OF ABUSES THAT RESPONDENTS ARE AWARE OF.

Regarding common forms of GBV known in the community, 34.4% cited battering/beating, 27.8% verbal insults and abuses, 4.1% Not economically supporting family, threatening violence against spouse or children 3.9% 3.6% burning ,8.2 unwanted touches and marrying of young girls as shown in the *Error! Reference source not found.* below

Table 6-48: Common types of Known by respondents

Forms of GBV	Frequency	Percentage (%)
Battering/beating	109	34.4
Burning	15	4.7
Verbal abuses/insults	88	27.8
Attempted murder	6	1.9
Forced sex	9	2.8
Unwanted sexual touches	26	8.2
Marrying off girls early	9	2.8
Threatening violence against spouse or children	9	2.8
Use of proceeds/money without spouse consent	3	0.9
Preventing spouse from owning property	5	1.6

Forms of GBV	Frequency	Percentage (%)
Preventing spouse from using family land	3	0.9
Stop spouse from talking/community meetings	8	2.5
Preventing spouse from working outside home	6	1.9
Engaging children in work instead of school	6	1.9
Not economically supporting family	13	4.1
Locking spouse or children out of house	2	0.6
Total	317	100

**Multiple responses allowed, (Source: Socio-economic survey)*

6.5.15 HIV/AIDS

According to the Uganda HIV/AIDS country progress report July 2016-june 2017¹⁶, the country has made great strides in reducing HIV incidence, HIV related mortality, infant HIV infection and HIV prevalence where the National HIV/AIDS Strategic Plan (NSP) targets were surpassed. The Uganda Population HIV Impact Assessment (UPHIA) results revealed that the country has made significant progress in reducing the HIV prevalence from 7.3% in 2011 to 6% in 2017. More still according to UNAIDS report, there are 1,400,000 people living with HIV and AIDS in Uganda of which 84% know their HIV positive status and 72% of people living with HIV were on treatment. Women are disproportionately affected by HIV in Uganda: of the 1 300 000 adults living with HIV, 770 000 (59.23%) were women. New HIV infections among young women aged 15–24 years were more than double those among young men: 14 000 new infections among young women, compared to 5000 among young men. HIV treatment was higher among women than men, however, with 79% of adult women living with HIV on treatment, compared to 63% of adult men (UNAIDS 2018¹⁷). According to the UGANDA POPULATION-BASED HIV IMPACT ASSESSMENT UPHIA 2016–2017 the HIV/AIDS prevail of Buyende is 4.7% since it lies within the East Central region.

6.5.15.1 FACTORS CONTRIBUTING TO THE SPREAD OF HIV/AIDS AND CONTROL STRATEGIES

Regarding factor that contribute to the spread of HIV/AIDS, respondents indicated lack of information 20.9%, poverty 17.5%, peer pressure 16.8% and alcohol/drug abuse 10.5%. Numerous factors likely to contribute to the spread of HIV/AIDS are presented in the **Table 6-49** below.

Table 6-49: Factors contributing to HIV/AIDS prevalence and control strategies

Contributing factors	Frequency	Control strategies	Frequency
Poverty	17.5% (77)	Sensitization activities	20.2% (82)
Lack of information	20.9% (92)	Prevention of GBV	10.9% (44)
Peer pressure	16.8% (74)	Bylaws against prostitution	15.8% (64)

¹⁶ https://www.unaids.org/sites/default/files/country/documents/UGA_2018_countryreport.pdf

¹⁷ <https://www.unaids.org/en/regionscountries/countries/uganda>

Alcohol abuse	10.5% (46)	Promotion of ABC	10.9% (44)
Drug abuse	6.6% (29)	Bylaws against drug/alcohol abuse	4.4% (18)
Parental neglect	3.6% (16)	Improve antenatal care services	7.7% (31)
No antenatal care service	2.5% (11)	Engage HIV service providers	6.4% (26)
No HIV service providers	2.7% (12)	Bylaws against early marriage	3.5% (14)
Prostitution	10.9% (48)	Gender empowerment	10.4% (42)
Early marriage	7.9% (35)	Testing & counselling	9.9% (40)
Total	100% (440)	Total	100% (405)

**Multiple responses allowed, (Source: Socio-economic survey)*

When interviewed about strategies of controlling HIV/AIDS, respondents revealed various ways in which it can be controlled such as sensitization activities, Bylaws against prostitution, promotion of ABC and Bylaws against drug/alcohol abuse among others as shown in the **Table 6-49** above.

6.5.16 PROJECT IMPACTS

Regarding impacts of constructing the water supply system, field results indicate that 41.5% of the respondents envisage improvement in the quality of life (**Figure 6-70**), 19.2% provide electricity accessibility, 18.7% increase job opportunity.

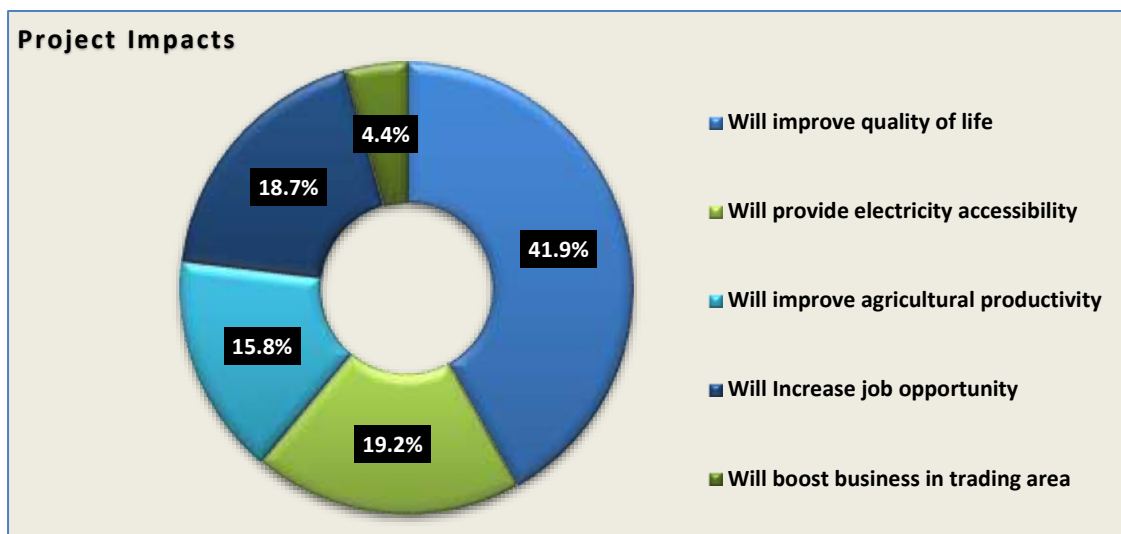


Figure 6-70: Anticipated impacts from the project

**Multiple responses allowed, (Source: Socio-economic survey)*

7 STAKEHOLDER CONSULTATION AND ENGAGEMENT

This section of the report presents the objectives, process, and the outcomes of the stakeholder involvement in the process of this ESIA. Emphasis has been placed on a fully inclusive, open and transparent public participation process and the transfer of information regarding the proposed construction of Large Solar Powered Piped Water Supply System and Sanitation Facility in Igwaya RGC, Buyende District to interested and affected persons (I&APs). The provision of sufficient and useful information on an on-going basis to I&APs to allow them to participate in the project and offer comments is a cornerstone of this Environmental Assessment process. Meetings were also held with disadvantaged and vulnerable groups affected by the project such as, women, PWDs, youth, elderly, among others. During meetings with the key stakeholders, key issues discussed included; proposed project component, benefits, likely environmental and social risks, impacts and mitigation measures, grievance redress mechanism at community, construction site, Sub County, District and MWE levels covering communities and workers and its importance and role during project implementation among others.

The ESIA process started with a scoping exercise aimed identifying relevant issues to form focus of the ESIA study and refine the terms of reference provided by the project proponent. This chapter presents the results of stakeholder engagement activities undertaken during February 2022 for the scoping stage and for the final ESIA during March and April 2022. The details of the stakeholders engaged at every level and the dates on which they were met is detailed in table 3.5.

7.1 OBJECTIVES OF CONSULTATION AND DISCLOSURE

Relevant and adequate project information were provided to stakeholders to enable them to understand project risks, impacts and opportunities. Consultation targeted relevant stakeholders, communities, government ministries, surrounding business/commercial entities and aimed at:

- a. Generate a good understanding of the project.
- b. Understand and characterize potential environmental, socio-economic risks/impacts of the project.
- c. Developing effective mitigation measures and management plans.
- d. Enhance local benefits from the proposed project.
- e. Enable affected communities to provide views hence participating in or refining project design, where applicable.

7.2 STANDARDS FOR CONSULTATION

The public consultation was guided by Ugandan guidelines as well as World Bank policy guidelines summarized in Box below.

Although no regulations exist for public consultation, national guidelines for EIA in Uganda require that the public is given full opportunity for involvement and participation throughout the EIA process. People including individuals, or groups of local communities who may be directly affected by a proposed project should be a focus for public involvement.

Since identification of the “public” likely to be indirectly affected by the proposed activity is often more difficult, it is required to exercise care in deciding who participates to ensure that a fair and balanced

representation of views is obtained, and views of minority groups are not overshadowed by more influential members of the public.

The public may appropriately be involved in the EIA process through:

- 1. Informing them about the proposed project.*
- 2. Open public meetings on the projects.*
- 3. Inviting written comments on proposed project.*
- 4. Use of community representatives.*
- 5. Comment and review of the Environmental Impact Statements; and,*
- 6. Making relevant documents available to any interested members of the public in specified places or at the cost of reproduction.*

Three stages for public involvement in the EIA process are spelt out:

a) public consultation before EIA is done

If after receiving and screening/reviewing the developer's project brief, the Authority (NEMA), in consultation with the Lead Agency, decides that it is necessary to consult and seek public comment, it shall, within four weeks from submission of the project brief and/or notice of intent to develop, publish the developer's notification and other supporting documents or their summary in a public media. It is required that objections and comments from the public and other stakeholders shall be submitted to the Authority and to the Lead Agency within 21 days from the publication of notice.

b) public consultation during the EIA

The team conducting the EIA shall consult and seek public opinion/views on social and environmental aspects of the project. Such public involvement shall be during scoping and any other appropriate stages during the conduct of the study.

c) public consultation after EIA (EIA Review)

The EIS shall be a public document and may be inspected at any reasonable time by any person. Considering the scale and level of influences likely to result from the operation of a project, the Authority, in consultation with the Lead agency, shall decide regions where it is necessary to display the EIA report to the public.

World Bank Safeguard Policy: Stakeholder Engagement and Information Disclosure

The Policy recognizes the importance of open and transparent engagement with project stakeholders. Success of any project is hinged on level and quality of stakeholder engagement which is an inclusive process expected to occur throughout the project life cycle. Engagement is more useful when introduced in the early phases of project development and is mainstreamed into all levels of decision making. Additionally, consultations should be done in a manner that gives affected communities, opportunities to express their views on project risks and impacts and their mitigation measures.

In applying Policy, the following scope is envisaged:

- a. *Stakeholder identification and analysis:*** The Policy requires the identification of key project affected parties and those with interests in the project. At this level emphasis will be on vulnerable people or groups of people whose situation are likely to be accelerated by project implementation. Identification should be able to bring out different sets of affected people and their interests.

- b. **Information Disclosure:** The borrower is obliged to undertake timely and effective disclosure of information regarding the project including its purpose, nature, scale, potential risks and impacts on the local communities and further present possible mitigation measures.
- c. **Meaningful:** Consultation is meaningful if a dialogue exists, communities and individuals should be given an opportunity to interact with respect and dignity. Interactions should be based on prior disclosure of project relevant information to all parties.

7.3 SUMMARY OF KEY ISSUES RAISED FROM STAKEHOLDER CONSULTATIONS

The issues raised from stakeholders engaged in relation to the Igwaya RGC water supply system and sanitation facility project are detailed in **Annex D**, the major issues were mainly:

- Proper coordination of the project among the consultants/contractors, MWE, District officials and village authorities should be emphasized;
- Community ownership of the project should be a key component enshrined in project development. The roles and responsibilities of district technical and political teams, sub county, parishes and villages authorities to support the functionality of the project should be defined throughout the project lifecycle;
- There is need to extend piped water to Igwaya, Buyumba & Iyingo fishing villages, Kagulu Hill, Kagulu HC II, Kagulu weekly market and the nearby Miru TC, locations which is highly populated in the RGC;
- Proposed locations of the sanitation facility: At the weekly market, the health Centre II, Iyingo landing site and Buyumba landing site;
- Proper documented processes on land acquisition and compensation for proposed project component sites;
- Recruitment for available job opportunities on the project should prioritize community members; especially youth in Kagulu Sub County;
- The price of piped water and connection to individual households should be affordable; and
- There is a cultural tree about 100m from the abstraction point where some of the resident go to worship ancestral spirits. Activities of the project implementation should not disturb the peace and cultural beliefs at the site. Furthermore, the drilling trucks almost destroyed our grave yards. The project should consider compensation for the graveyard to facilitate relocation.
- The current situation on water, sanitation and hygiene in Igwaya RGC:
 - Water scarcity is among the major problems faced in the RGC. There is no functional piped water system in whole of Kagulu Sub County. The only piped water system was at Iyingo landing site, but it is currently nonfunctional. There was a major technical breakdown and up to now it has never been repaired.
 - The most water stressed parish in Kagulu SC is Bumogoli parish – Igwaya, Buyumba & Iyingo fishing villages.
 - At Kagulu HC II and Kagulu weekly market (just opposite SC Hdqtrs), there is no reliable water source.

- At Kagulu Hill, a major eco-tourism site in Buyende District, there is a motorized borehole but still there is need for a piped water system. There is need to extend piped water to Igwaya, Buyumba & Iyingo fishing villages, Kagulu Hill, Kagulu HC II, Kagulu weekly market and nearby Miru TC which is highly populated.
- Commonly asked questions:
 - Where shall we go to apply for job opportunities?
 - How can one have water extended to their house?
 - How much money will be charged per jerrycan?
 - If the HC is connected to the proposed piped water supply system, will it be charged to use the water?
 - What will be the payment procedure for the use of water?
 - Concerns were raised on the effectiveness and safety of the piped water. This was in relation to the dosing of water at the intake point.
 - Will they give us a PSP in our landing site?

7.4 GRIEVANCE REDRESS MECHANISM

7.4.1 OVERVIEW

Effective Grievance Redress Mechanism gives an opportunity to the organization to implement a set of specific measures to ensure good governance accountability and transparency in managing and mitigation of environmental and social issue of a particular project. The Grievance Redress Mechanism shall consist of grievance Redress committees and shall be formed at the community level, construction site, Sub County/town council, District and MWE. A separate GRM for workers shall also be formed at the Construction site. The flow of grievance management is provided under **Annex G**. The GRM shall be disclosed as part of stakeholder engagement.

7.4.2 PURPOSE AND OBJECTIVES OF THE GRM

The purpose of GRM shall be to provide opportunity for aggrieved parties to resolve issues through arbitration and negotiation based on transparent and fair hearing. It will allow the parties in the dispute to arrive at a win-win solution. Final outcome is such that the extra judicial systems will work smoothly and that number of disputes seeking interventions at the country judiciary will be minimized.

The objectives of the GRM include:

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

7.4.3 LIKELY SOURCES OF GRIEVANCES

Considering the nature and extent of works, the following community grievances may arise during the construction phase of the project:

- Land acquisition

- Restrictions on land use due to civil works, workers camps, material storage areas, material sources, etc.
- Clearance of right of way which may affect crops and trees
- Temporary displacement of road side activities in urban centers, including vendors
- Pollution due to noise, dust, and traffic incidents
- Workers Behaviour or conduct including GBV, VAC, SEA/SH
- Illicit behaviors like alcoholism, smoking, drug abuse etc. of the contractor's workers
- Disruption of social set up and security
- Compensation values and procedures
- Increased pressure on social services and infrastructure, including water supply
- Contractor's failure to pay workers and suppliers
- Accidents arising out of contractor's negligence to provide necessary information, protective gears and supervision

7.4.3.1 MEMBERSHIP AND COMPOSITION OF GRIEVANCE MANAGEMENT COMMITTEES

- a) GMCs at Village or Parish Levels
- b) Village and Parish GRM committees will be established as voluntary committees for each infrastructure to be constructed at village or parish levels depending on the community dynamics, area covered and nature of works. Community GRM Committees will have 10 members including
- c) Chairperson,
- d) Vice Chairperson,
- e) Secretary,
- f) Other Members (7) including a youth, Elderly Person, PWD and at least 3 members should be female. Quorum sitting shall be of at least five (5 members).

The LC I Chairpersons and Vice Chairpersons will be ex-officials to these committees.

NB: The committee shall be formed either at village or parish level given that linear projects traverse several communities. It is important that committees are accessible to communities at village or parish level.

7.4.3.2 GMCS AT CONSTRUCTION SITES

Each construction site shall have a Site GMC responsible for handling all community grievances related to construction including those grievances referred by the village/ Parish GMC. The Site GMC shall comprise of the following;

- a) The Resident Engineer/ Supervising Consultant (Chairperson)
- b) The Contractor's Contract Manager
- c) Sociologist for the Consultant
- d) Sociologist for Contractor (Secretary)
- e) Environmentalist for the Consultant
- f) Environmentalist for the Contractor
- g) Health and Safety Officer for the Contractor
- h) 2 Community Representatives (1 Female and 1 Male)

This committee shall consolidate and address all grievances from the community at the site and escalate any matters appropriately to the respective Local Government and MWE.

7.4.3.3 GMC AT SUB COUNTY/TOWN COUNCIL LEVEL

The committee will be formed at the sub-county level and its membership shall consist of;

- a) Local Council III (chairperson);
- b) The Sub County Chief,
- c) Community Development Officer (Secretary)
- d) Environment focal person
- e) Representatives of PAPs
- f) Parish Chief of the respective area where the complaint originated from.

7.4.3.4 GMC AT DISTRICT LEVEL

At the District Level, the Grievances Management Committee shall consist of;

- a) LC V Chairperson (Chairman)
- b) Chief Administrative Officer or a his/ her Representative
- c) District Community Development Officer (Secretary)
- d) Head of Natural Resources
- e) District Water Officer
- f) Representative from the PAPs
- g) District Lands officer

Note: Due to complex nature of grievances, the committees can be extended to include any other relevant officers suitable for addressing the prevailing grievances.

7.4.4 WORKERS GRIEVANCE COMMITTEE STRUCTURES

The common anticipated Grievances for Employee may include; Unsafe physical working conditions, Failure to issue formal contracts to workers, Illegal termination of contracts, Changes without prior notice, Poor employee relations, Poor/ failure/ delayed remuneration, Violation of workers' rights, Inadequate safety, health, and welfare amenities, Labor-management hostility, Incidences of workplace favouritism and nepotism, among others.

The grievance redress system for workers shall have three major committees set up and supported. These include the Workers' Council, Site Disciplinary Committee and overall Grievance Committee.

7.4.4.1 WORKERS' COUNCIL

The workers' council shall be constituted on the basis of directly elected representatives on the basis of different work sections. It will have representative workers including operators, drivers, mechanics, office/administration, technicians/lab, masons, flag ladies, foremen, clinic, casual laborers, surveyors etc. The different workers' categories shall mobilize and elect a representative to form a council of 5 members.

The 5 members shall select a Chairperson, Vice Chairperson, Secretary and members.

The council shall sit on a regular basis or monthly to discuss all complaints, welfare, working conditions among others. The Supervising Consultant's Sociologist shall be the patron of the Worker's Council

and shall ensure that the members are provided with the support and protection to freely discuss and voice workers' issues.

Any issue that has not been addressed by the Workers' Council shall be escalated or referred to either disciplinary or Site Grievance Committee. The issues that disciplinary in nature shall be referred to the Disciplinary Committee while other issues that are not disciplinary shall be referred to the Grievance Committee.

7.4.4.2 SITE DISCIPLINARY COMMITTEE

During the construction phase, a number of disciplinary related cases might emerge. Hence, each Site shall have to set up site disciplinary committee to ensure self-enforcement mechanism of discipline among workers.

The committee shall comprise of;

- a) Consultant's Sociologist (Chairperson)
- b) Contractor's Human Resource Officer (Secretary)
- c) Workers' representatives (a Female and a Male).

The site disciplinary committee shall receive all disciplinary related complaints referred from the Workers' Council or from the Contractor's Management.

7.4.4.3 OVERALL SITE GRIEVANCE MANAGEMENT COMMITTEE (GMC)

Each construction site shall have a Site Grievance Management Committee comprising of the following;

- a) The Resident Engineer/ Supervising Consultant (Chairperson)
- b) The Contractor's Contract Manager
- c) Sociologist for the Consultant
- d) Sociologist for Contractor (Secretary)
- e) Environmental Officer for the consultant
- f) Environment Officer for the contractor

7.4.4.4 MANAGEMENT OF GBV, VAC AND OTHER OFFENSES

The management and referral of GBV, VAC, and other related criminal cases or allegations shall be inline with the Uganda Criminal Judicial requirement. The contractor and client shall ensure adequate sensitizations of stakeholders on the prevention measures and reporting of all criminal cases including GBV and VAC. In addition, MWE is recruiting dedicated consultant to among others ensure the implementation of mitigation measures, reporting and survivor centered management of GBV and VAC on the project. The reporting and referral pathways have been presented under annex G

7.4.4.5 CAPACITY BUILDING FOR THE GRIEVANCES MANAGEMENT COMMITTEES

It will be the responsibility of the MWE to coordinate and arrange for capacity building of the grievance committees. Local government administration shall have the responsibility of sensitizing and popularizing grievance redress arrangements to the local people and stakeholders. The Project

Support Team shall lead the rollout the capacity building framework and trainings to ensure the committees perform to the expectations of the stakeholders.

8.1 OVERVIEW

The general approach to effective monitoring is to compare the pre- and post- project situations, measuring relevant environmental impacts against baseline conditions. Baseline data establish a reference basis for managing environmental impacts throughout the life of the project. A monitoring process will therefore be introduced to check progress and the resultant effects on the environment as the implementation of the proposed Igwaya Water Supply and Sanitation project proceeds.

The Developer will institute the necessary monitoring measures for both short-and long-term monitoring programme respectively. However, during monitoring close links shall be maintained with other relevant lead agencies. The key lead agencies that shall be kept in the loop will include Buyende and Kagulu Local Governments, NEMA and DWRM. It is the role of the Developer to ensure that the Contractor implements the proposed mitigation measures presented in this ESIA report. The planned mitigation measures indicated in this ESIA ESMP (**Table 8-1**) shall be planned and checked against their effectiveness in reducing the negative impacts/or enhancing the benefits identified in this report.

The process shall also include regular reviews of the impacts that cannot be contemplated at the time of doing this Environment Impact Assessment. Action shall be taken in response to the unforeseen changes and subsequently scale up the mitigation and monitoring measures. Monitoring shall undertake appropriate new actions to mitigate any negative effects. The issues to monitor may include the following:

- a. The clearing of the water transmission and distribution corridors including all forms of compensations and or resettlements made in respect of the displaced families or persons,
- b. Supervision of the excavations for the water pipes and subsequent laying and burying of pipes,
- c. Occupational health and safety of workers and the community among others,
- d. the fate of solid waste/debris disposal and other wastes after it has reached and has left the site,
- e. Behavioural changes among the community and Contractors staff,
- f. Water Quality,
- g. Noise and dust pollution, and
- h. Biodiversity changes.

Table 8-1: Environmental and Social Mitigation Plan

Impact/Risk	Mitigation /Enhancement commitments	Responsibility	Estimated Cost (UGX) & Remarks
POSITIVE IMPACTS – CONSTRUCTION PHASE			
Provision of direct jobs (casual workers) for locals - youth, women and men	• Recruit locals for construction jobs according to their skills.	• Contractor	Embedded in contractor's fees
	• Promote labor-intensive construction methods to create more jobs.	• Contractor	
	• Adhere to the local labour laws of 30% women in employment and remuneration of workers above the minimum wage.	• Contractor	
	• Ringfence some jobs such as cleaning and cooking specifically for local women.	• Contractor	
	• Encourage qualified females to apply for jobs.	• Contractor	
	• Gender sensitive facilities such as bathrooms, toilets and breastfeeding spaces to be provided to create a conducive working environment.	• Contractor	5,000,000

Impact/Risk	Mitigation /Enhancement commitments	Responsible entity	Estimated Annual & Remarks
NEGATIVE IMPACTS			
CONSTRUCTION PHASE			
Land take for project	LGs in the respective areas should be involved in mobilisation and sensitizing PAPs on the project land requirements	RWSS	RAP Budget
	Where land take is envisaged, compensation should be adequate and timely done. All land acquired for establishment of the water sources, water treatment plant, reservoir tanks and any other activity either by the developer shall be compensated for in accordance with applicable land acquisition legal instruments and GIIP relating to land acquisition	RWSS	
	PAPs should be given financial literacy on how to use their compensation packages to avoid squandering and remaining in worse off conditions	RWSS	
	In-kind compensation can be considered especially where the PAPs prefer so	RWSS	

Impact/Risk	Mitigation /Enhancement commitments	Responsible entity	Estimated Annual & Remarks
	Sensitize the community early enough about the project so that, those affected by the project will have time to relocate their businesses and manage their cropping calendars to avoid loss of crops.	RWSS	
Degradation of the Landscape and breeding grounds vectors	Construction materials (stone-based products, murrum and related fill materials) subsoil will be sourced preferably from relevant licensed sources i.e. extraction and processing of such materials (as applicable) be in accordance with the provisions in such licences. It is suggested that, the contractor(s)/suppliers be asked to provide copies of proof for such licenses before effecting the supply process	Contractor	No cost addition
	The sites be fully revegetated with plants species approved by the Supervising Engineer and DEO	Contractor	
	Excavated soil shall be stock-piled with its edges protected from erosion and such materials can be used during site restoration with the approval of the Engineer and Buyende DEO	Contractor	
	Restoration of materials source sites be approved by both the Supervising Engineer and the District Environment Officer of Buyende before issuance of certificate of works completion	Contractor	
	There should be close and routine monitoring of restoration activities in the site by environmentalist from the Contractor and the Engineer	Contractor	2,000,000
Loss of Vegetation	The project design should avoid the locations of the two trees of conservation importance to ensure their protection	MWE, Contractor	No cost addition
	Vegetation clearance should be limited to only localities required for project development needs		
	Restore sites where activities will be carried out at all the project sites. This site restoration and revegetation should involve planting of indigenous trees/vegetation types		
Loss of Fauna and Habitats	Clearance of fauna habitat (vegetation and soils) should be limited only to localities required for development	Contractor	No cost addition
	Restore sites where activities will be carried out at all the project sites		
	All project workers should be sensitized to observe instructions aimed at no hunting of any opportunistic wildlife in the sites		

Impact/Risk	Mitigation /Enhancement commitments	Responsible entity	Estimated Annual & Remarks
	Trenching, pipework laying as well as well as backfilling will be done concurrently. For pits like at the booster station, ensure that every evening, the pits are covered with timber while being secured with a warning tape to check accidental falls of wildlife and livestock in excavated pits		
	The natural vegetation at the location of the intake and water treatment plant should not unnecessarily cut to avoid impacting possible habitats for invertebrates		
Disturbance and degradation of wetland ecosystems	Obtain a wetland user permit from NEMA before constructing the intake and raw water transmission line within the protection zone of the Lake Nawampasa, a satellite of Lake Kyoga	Contractor	No cost addition
	The project implementation should then keenly follow the conditions in the Wetland User Permit to be issued by NEMA		
	Construction works of the borehole and raw water transmission line within the wetland, should be limited to project footprint and allocated timeline		
	All project workers should be sensitized on minimization of damage to the wetland flora and fauna		
	Close monitoring and supervision of the construction operations to ensure compliance to the NEMA permit conditions and avoid causing further damage to undesignated project areas		
Generation of solid waste	The Contractor shall develop and implement a Waste Management Plan	Contractor	No cost addition
	All sorts of waste generated during construction such as HPDE and uPVC offcuts and other accessories associated with water and sanitation projects shall be collected by the contractor and delivered to recycling facilities		5,000,000
	All organic waste generated at eating places during construction such as food stuffs shall be collected and disposed appropriately		
	All solid waste from works site be collected and disposed at Buyende District waste dump sites. Once segregated, plastic waste such as mineral water bottles, polyethene bags, jerrycans and cups will be collected by individuals who collect and sell it to plastic waste dealers. The ESIA Team met some of these and they expressed readiness to take up such waste if they are notified of its existence in the project		No cost addition

Impact/Risk	Mitigation /Enhancement commitments	Responsible entity	Estimated Annual & Remarks
	The contractor will work with Buyende District Local government to facilitate sound waste handling and disposal. All wastes must be taken to the approved waste disposal facilities. Proof of delivery and safe disposal of waste will be provided and records always maintained		
	Facilitate sound waste handling and disposal. All wastes must be taken to the approved waste disposal facilities. Proof of delivery and safe disposal of waste will be provided and records always maintained.		
Risk of contamination due to Flooding of water Source (DWD 60898)	The production well should be constructed with a water tight casing above the water table	MWE	Part of the design consultant's work
	The design and construction of the pump house at source DWD 60898 should incorporate a raised apron slab above the ground by the required height for the predicted flood depth of the area	MWE	Part of the design consultant's work
	Aprons should be constructed with deep foundation edges to avoid erosion	MWE	Part of the design consultant's work
	A water source protection plan has been developed to ensure sustained water quality and quantity for the project	MWE	Part of the design consultant's work
Noise Nuisance and Vibrations	Workers should be provided with the necessary personal protective equipment (PPE) such as ear muffs	Contractor	5,000,000
	Periodic medical hearing checks should be performed on workers exposed to high noise levels	Contractor	10,000,000
	Construction sites must be hoarded to curb noise impacts to neighbouring communities	Contractor	No cost addition
	Works should be undertaken during day time that is, from 8am to 6pm		

Impact/Risk	Mitigation /Enhancement commitments	Responsible entity	Estimated Annual & Remarks
	Works near schools or health centres should be done in periods like weekends for noise not to interfere with learning/health environment		
	Weekly monitoring of noise levels at active sites should be carried out by the contractor		
	Avoid operating noisy equipment when not required, such as idling of cars, operating of generators when not required		
Air Pollution	Travel speeds of construction vehicles along the road especially at trading/ business centres will be controlled and should not exceed 50 km/h	Contractor	No cost addition
	Trucks will be covered during haulage of construction materials to reduce on spillage of materials and wherever dust suppression is necessary, water will be sprayed over dusty areas	Contractor	No cost addition
	Workers will be provided with PPE and the use of PPE shall be enforced	Contractor	No cost addition
	Accessed roads which of murrum/gravel will be routinely sprinkled with water to suppress dust and frequency of which shall be included in the Contractor's Traffic Management Plan	Contractor	10,000,000
	Stockpiles of friable material will be grassed to prevent wind erosion	Contractor	No cost addition
	A maintenance programme for equipment and vehicles will be implemented, to ensure air emissions like particulates, SO ₂ and NO ₂ are minimised	Contractor	No cost addition
Traffic Safety	The Contractor shall develop and implement a Traffic Management Plan which is to guide aspect of traffic in the project	Contractor	No cost addition
	Likely disruptions to public access shall be identified in the Contractor's works schedule and responsive traffic management measures instituted to guide traffic through such areas	Contractor	No cost addition
	Vehicular access through areas of public institutions (markets, schools, and health centres) shall be managed by traffic/flag persons who are work hand-in-hand with the traffic police in their areas	Contractor	No cost addition
	Road and site safety training should be conducted as part of tool-box talks in the project	Contractor	No cost addition

Impact/Risk	Mitigation /Enhancement commitments	Responsible entity	Estimated Annual & Remarks
	Conspicuous signage shall be well placed on roads and the Contractor's Traffic guides on ground shall direct traffic in case of diversions or open trenches.	Contractor	5,000,000
	All company vehicles used in the transportation of construction workers, material, and equipment to and away from the site shall be in sound mechanical conditions. Evidence shall always be provided by recording the status of the vehicle in the Daily Vehicle Inspection Form before usage	Contractor	No cost addition
	All drivers to be employed by the Developer or Contractor shall be qualified, skilled with valid driving permits	Contractor	No cost addition
	The vehicle speed shall be limited to a maximum of 30km/hr areas near sensitive facilities	Contractor	No cost addition
	Works near sensitive facilities like schools and health centres shall only be limited to day time (7am to 6pm).	Contractor	No cost addition
Occupational Health and Safety Risks	Prepare and implement an occupational safety and health plan for all sites, approved by the MWE.	Contractor	No cost addition
	Provide safety guidelines to all operations prior to start of work.	Contractor	No cost addition
	Strict adherence to safety measures and procedures are required to minimise (or eliminate) risks of accidents or hazardous developments occurring and ensure healthy and safe conditions for all persons working on the site	Contractor	No cost addition
	On-site training shall be conducted on how to prevent and manage incidences and such could involve proper handling of electricity, water etc. and sensitization on various modes of escape, conduct and responsibility during such incidences	Contractor	10,000,000
	Regular drills on site safety will be routinely conducted followed 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 case of incidences	Contractor	No cost addition
	Personnel on duty shall always wear appropriate PPEs, such as safety glasses with side shields, face shields, hard hats/helmets, and safety boots be required for all site staff	Contractor	No cost addition

Impact/Risk	Mitigation /Enhancement commitments	Responsible entity	Estimated Annual & Remarks
	The Contractor shall establish emergency entrances, exits and amenities in the project facilities	Contractor	No cost addition
	The Contractor shall ensure that there are First Aid Kits on the site and such shall be modestly stocked with consumables that are key in delivery of first aid on the site	Contractor	5,000,000
	The Contractor shall secure site boundaries with fences or hoardings as appropriate to keep off intrusion in the project	Contractor	5,000,000
	The Contractor shall install caution signage around the site to discourage the public from being close to the site, for example, “falling debris”, “keep off the site	Contractor	2,000,000
	The Client through the Construction Supervisor will continually monitor Contractors’ compliance with Health and Safety measures	Contractor	5,000,000
	An Accident Log will be maintained onsite to register all injuries and to investigate their causes during both the construction and operation phases of the project	Contractor	No cost addition
	The manufacturer's instructions and Material Safety Data Sheets (MSDS) shall be followed for the storage of all chemicals used in water treatment. Storage must conform to compatibility restrictions	Contractor	No cost addition
	Work force shall be subjected only to standard work shifts/hours. Overtime allowances, if applicable/warranted shall be paid with ceiling limits. Working beyond such ceiling limits shall be discouraged, even if, so desired workforce or contractor	Contractor	No cost addition
Risk of increasing the spread of HIV-AIDS and other venereal diseases	Sensitize workers and the surrounding communities on awareness, prevention, and management of HIV/AIDS through staff training, awareness campaigns, multimedia, and workshops or during community barazas	Contractor	5,000,000
	Provide VCT services and Anti-Retro-Viral Treatment to both the workers who test HIV positive and those from the community who come test at the project site	Contractor	5,000,000
	Integrate monitoring of HIV/AIDS preventive activities as part of the construction supervision. Basic knowledge, attitude and practices are among the parameters to be monitored, and particularly on provision of condoms, status testing and use of ARVs, as well as sexual health and rights	Contractor	No cost addition

Impact/Risk	Mitigation /Enhancement commitments	Responsible entity	Estimated Annual & Remarks
	Ensure supply of condoms for the workers and the community members who access the project through points where such items are deposited in the project sites	Contractor	2,000,000
Risk of Gender Based Violence and Family / Marriage Breakdown	Develop and implement provisions that ensure that gender-based violence at the community level is not triggered by the Project such as effective and on-going community engagement and consultation, review of specific project components that are known to heighten GBV risk at the community level, for instance; compensation schemes; employment schemes for women; delivery of water supplies	Contractor	12,000,000
	Amongst project staff, the project PCU shall have a GBV Specialist to oversee GBV issues in the project	Contractor	12,000,000
	Specific plan for mitigating such risks, for instance; sensitization around gender equitable approaches to compensation and employment; water services	Contractor	5,000,000
	Ensure adequate referral mechanisms are in place if a case of GBV conflicts on project staff level is reported to police due to their criminal nature	Contractor	No cost addition
	The Contractor should have a “No sexual harassment” policy and mainstream it to ensure strict adherence to established mechanisms to avoid the emergence of these challenges	Contractor	No cost addition
	Include gender affirmative actions and workplace conditions such as engendered washrooms, changing rooms, female condoms, breastfeeding room for breast feeding mothers, observing working time of 8:00AM to 5:30 PM so that parents especially women can attend to their domestic duties	Contractor	No cost addition
Risk Violation of children rights by contractor and labour force on site	Strict adherence to rules prohibiting Child Labour as in national laws and ILO on matters out-lawing child labor in the project establishment	Contractor	No cost addition
	Continuous monitoring of VAC by CDOs, LCs, Police to ensure no child labor cases	Contractor	5,000,000
	Involving local CSOs in the prevention, reporting and management of VAC cases	Contractor	5,000,000
Risk of Non-Payment of	All workers must sign contracts as part of engagement in the project	Contractor	No cost addition

Impact/Risk	Mitigation /Enhancement commitments	Responsible entity	Estimated Annual & Remarks
Workers, Suppliers and Subcontractors	Include clauses for equal pay for equal work	Contractor	No cost addition
	Institute Contractor Grievance Committees to handle grievances including those related to labour issues	Contractor	5,000,000
	Involve the District Labour Officers in project supervision to offer guidance on management of labour issues	Contractor	5,000,000
	The provision of 'pay when paid clause' should be introduced in the contractor and supplier/sub-contractor contract	Contractor	No cost addition
	Understanding the terms or clauses of payment in the project	Contractor	No cost addition
	The effect of delayed payments on the project progress must be understood by all parties and personnel involved	Contractor	No cost addition
	Right for contractors to suspend work in the event of late or non-payments by the client to avoid unnecessary stand offs with suppliers	Contractor	No cost addition
Liability for loss of life, injury, or damage to private property	Provision of PPE to all worker	Contractor	No cost addition
	The contractor will ensure that the Project is implemented by total adherence to the Employment Act 2006	Contractor	No cost addition
	The workers should receive requisite training especially on the operation of the machinery and equipment	Contractor	5,000,000
	There should be adequate warning and directional signs	Contractor	2,000,000
	Ensuring that the prepared code of conduct for staff is followed to prevent accidents	Contractor	No cost addition
	Develop a site safety action plan detailing safety equipment to be used, emergency procedures, restriction on site, frequency and personnel responsible for safety inspections and controls	Contractor	No cost addition
	Cordon off unsafe areas and provide safe crossing points across trenches	Contractor	No cost addition

Impact/Risk	Mitigation /Enhancement commitments	Responsible entity	Estimated Annual & Remarks
	Provide an onsite clinic to provide first aid services to the staff	Contractor	30,000,000
	Contractor to ensure compliance with the Workmen's Compensation Act, ordinance regulations and union agreements	Contractor	No cost addition
	The Contractor to repair any damage done to private property	Contractor	Project contingency (10% of total contract value)
Destruction of Physical Cultural Resources	At the local level, additional consultations will be carried out prior to commencement of works by the contractor at the project sites	Contractor	2,000,000
	A 'chance find' procedure will guide actions to be taken if suspected archaeological artefacts or paleontological items are encountered and they should be handed over to Ministry of trade and industry- Department of Museums and Monuments	Contractor	No cost addition
	Construction workers and managers should be trained in basic skills of how to identify and handle archaeological materials/artifacts before commencement of work. Such training should be administered in liaison with the Department of Museums and Monuments (DMM)	Contractor	5,000,000
	Construction works will be designed to ensure no damage to any cultural sites or medicinal plants that may be encountered including older-trees that are culturally significant. Where such sites cannot be avoided, culturally appropriate measures will be agreed and implemented prior to the construction activities	Contractor	No cost addition
	Compensation of the affected sites will be undertaken before construction activities commence in accordance with World Bank requirements	RWSS	Included in the RAP valuation

Impact/Risk	Mitigation /Enhancement commitments	Responsible entity	Estimated Annual & Remarks
NEGATIVE IMPACTS AND RISKS - OPERATION PHASE			
impact of water Abstraction on the Lake	The developer should apply/acquire the abstraction permits with clear water abstraction details and provisions which are to be strictly observed in the project for sustainability of the Lake ecosystem for its uses and values	RWSS	6,000,000
	The water abstraction has to be strictly monitored by the DWRM in line with Water Abstraction Permit provisions	EUWS	5,000,000
	Water levels should be accompanied by monitoring of the water quality to ascertain any trend in water quality change with continued abstraction	EUWS	5,000,000
Potential Water and Soil Pollution in the Project Small Towns	The project (EUWS) should support Kagulu Sub County to develop and implement a development and structural plan that incorporates waste and/or wastewater management	RWSS, EUWS	100,000,000
	EUWS/MWE should create awareness on wastewater management and promote through community/youth skills development affordable technologies such as construction of soak pits, septic tanks at household and institutional levels	RWSS, EUWS	5,000,000
Impact of Solid Waste Nuisance as a Result of the Project	A Waste management plan for the operation phase of the project should be developed and implemented	RWSS, EUWS	5,000,000
	Waste collection bins should be provided at strategic positions at the water offices, and reservoirs sites for temporary waste storage. The waste collection bins should be provided with covers to avoid spillage by scavengers and clearly coded for sorting purposes		5,000,000
	The water supply system operator should hire a certified waste collection company to transport the waste for final disposal to designated waste dumping sites by NEMA	EUWS	6,000,000
	Project workers (both sub-contracted and EUWS) should be trained on appropriate waste handling by category for appropriate management	EUWS	No cost addition
Risk of Pollution from Mismanagement	A Periodic maintenance regime including emptying and desludging should be put in place and implemented to prevent sewage over flows	RWSS, EUWS	20,000,000
	Use of manifest system to ensure that the wastes are disposed of at a site (waste treatment plant) gazetted by NEMA	RWSS, EUWS	No cost addition

Impact/Risk	Mitigation /Enhancement commitments	Responsible entity	Estimated Annual & Remarks
of sanitation facilities	A robust management system for the sanitation facilities involving the communities, their leaders and the health workers should be put in place to monitor, detect, and alert the responsible authorities to call for emptying of any septic tank that causes a danger to the community	RWSS, EUWS	5,000,000
Increased cost of user fees / water bill per unit	Alternative water sources such as the boreholes should continue to be maintained by the Local government and water user committees.	KDLG – water office	5,000,000
	Under the guidance of MWE should put into consideration the project area’s economic profile and vulnerability when setting affordable water prices.	RWSS, EUWS	5,000,000
Risk of Sexual exploitation and abuse of community members by project workers	Develop and implement and SEA action plan with an Accountability and Response Framework as part of the C-ESMP. The SEA action plan will follow guidance on the World Bank’s Good Practice Note for Addressing Gender-based Violence in Investment Project Financing involving Major Civil Works (Sept 2018) and the Ministry of Gender, Labour and Social Development (Social, Safety and Health Safeguards Implementation Guidelines for Local Governments, 2020)	RWSS, EUWS	15,000,000
	<p>The SEA action plan will include how the project will ensure necessary steps are in place for:</p> <ul style="list-style-type: none"> • Prevention of SEA, • Response to SEA, • Engagement with the community, • Management and Coordination 	RWSS, EUWS	No cost addition
Total			356,000,000

8.2 ENVIRONMENTAL AND SOCIAL MONITORING PROGRAMME

8.2.1 PURPOSE OF MONITORING

A monitoring program aims to ensure that proposed mitigation and enhancement measures are implemented to generate intended results, otherwise the measures need to be modified, ceased or replaced when inappropriate. Moreover, monitoring allows assessing compliance with national standards as well as with the World Bank policies and guidelines.

8.2.2 SCOPE OF ENVIRONMENTAL AND SOCIAL MONITORING

Environmental monitoring will be undertaken at different levels as described below

- **Surveillance:** Undertaken by the Supervision Engineer on behalf of MWE.
- **Quarterly Monitoring:** Joint by all relevant stakeholders at various levels.
- **Audit activities:** To be done by a NEMA registered Environmental Auditor.
- **Spot checks:** By Supervising Engineer, MWE, Contractor, District Leadership, NEMA.

8.2.3 MONITORING ACTIVITIES AND PROCESSES

8.2.3.1 WEATHER FORECASTS

Weather monitoring and forecast is important to ensure that the Contractor plans for activities and provides mitigation where weather especially rainfall may pose challenges. This will be critical during excavation works.

8.2.3.2 SITE INSPECTION

Routine inspections will be carried out to cover all aspects of environmental and social management on the site. Daily inspection aims to identify any environmental issues and rectify them without delay whereas weekly, monthly and quarterly inspections will verify that the daily inspections are identifying any maintenance requirements and that these requirements are being completed in an appropriate time frame. Site inspections will be carried out by the Contractor with instructions from the Supervision Consultant.

8.2.3.3 MEETINGS

Monthly site meetings are to be held to discuss project progress and, in such meetings, safeguards issues shall be sufficiently discussed and minuted. That shall include a review of the effectiveness of the mitigation measures, successes, and non-compliances. This will be a platform for the Engineer, the client (MWE) and World Bank to raise any environmental issues arising from the joint inspection and as a reaction to the contractor's presentation.

8.2.3.4 RECORDKEEPING

MWE shall ensure that all relevant monitoring and compliance records are readily available. Section 122 (6) of NEA (2019) states, "A developer shall maintain proper records of the monitoring undertaken under subsection (2), which shall be made available to the Authority or lead agency upon request" while subsection (7) states, "A lead agency or the Authority may require the developer to submit monitoring reports in a prescribed form".

8.2.3.5 MONTHLY AND QUARTERLY ENVIRONMENTAL AND SOCIAL REPORT

Either a standalone Monthly Environment and Social shall be prepared, or safeguards shall be sufficiently covered in the Contractor's Monthly Progress Report in fulfilment of the Contractor's

contractual reporting obligations. The report will highlight 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. This report will also have to be verified and approved by the supervising consultant Planning for management of environmental aspects is typically done on a continuous basis. In that regard, every monthly progress report should include a schedule for environmental and social activities for the next month.

This Contractor’s Monthly Report is expected to summarize the following:

- a) Progress in implementing the CESMP and the standalone management plans;
- b) Status of key approvals and documentation for the project;
- c) Compliance with legal obligations and specifications;
- d) Compliance to the commitment to child labor and GBV (SEA & SH) prevention and management
- e) Findings of the monitoring programmes, with emphasis on any breaches of the control standards, action levels or standards of general site management;
- f) Summary of any complaints by the community and actions taken/to be taken; and
- g) Key environmental activities for the next month.

On a quarterly basis, the supervising consultant will prepare an Environment and Social Report covering similar thematic areas as listed above (for the quarter) that will be submitted to the developer (MWE). This report will inform the MWE quarterly report that will be shared with the World Bank and other stakeholders.

MWE should stipulate reporting requirements in the bidding documents for sourcing the project contractor and supervising consultant, and binding clauses should also be included in the subsequent contracts to ensure compliance.

8.2.3.5.1 ACCIDENT AND INCIDENT REPORTING

The supervising consultant and contractor shall ensure reporting of any serious and severe incidents to MWE within 24 hours of their occurrence while MWE will ensure similar reporting to the World Bank within 48 hours of their occurrence.

8.2.3.5.2 REPORTING CHANNELS ON SGBV/SEA-SH ON SEVERE INCIDENTS & BREACHES DURING IMPLEMENTATION

During implementation, the contractor shall follow guidelines on where and how to report SGBV/SEA-SH incidents and breaches. The ESS team will track, record, report and manage all GBV/SEA related incidents (breaches). All reports on GBV/SEA-SH shall indicate BY WHO, TO WHOM, WHAT, WHEN and TARGET / ACHIEVEMENTS. It is essential that the confidentiality and safety of victims and/or survivors will (must) be protected.

FORMANT / ISSUES TO REPORT	BY WHO	TO WHOM	WHEN
<p>The project will track and report severe GBV/SEA-SH incidents, breaches and allegations, by clearly establishing the following:</p> <ul style="list-style-type: none"> • Keep record of all incidents (GBV/SEA-SH Register) • Nature of the case; • Location; age, sex of victims and/or survivors; 	Social Safeguards officer / GRM	MWE (who can then report to bank)	As soon as becomes known (Tracking is done continuously / daily)

<ul style="list-style-type: none"> • Perpetrators sex, relationship to victim / survivor; origin • Project-related (Yes / No) • Whether the victims and/or survivor were referred to services. • Any other resolution of matter done 			
<p>The GBV Service Provider (contracted to project) shall ensure continuous monthly reporting is done on following:</p> <ul style="list-style-type: none"> • Total number of GBV/SEA-SH cases received / referred, disaggregated by age and by sex; location, date of occurrence, referral status • The number of cases open, closed cases, and average time they have been open / closed • Summary data on perpetrators (location, relation to victims and/or survivors), date of occurrences 	GBV Service provider (e.g. CBO, NGO)	Contractor & MWE	Monthly
<p>The contractor (through a designated officer e.g. Supervising Engineer) shall prepare a Status Report on GBV/SEA-SH. Specifically, the report shall highlight the following issues:</p> <ul style="list-style-type: none"> • Progress on Key Indicators on GBV/SEA-SH showing Planned and Achieved Target) • GBV /SEA-SH Incident Register (Excel file) • Training done (total number of participants – workers, local leaders, community actors) • Community awareness meetings done on GBV/SEA-SH prevention and response / reporting and community feedback (minutes of the community meetings can also be shared) • Performance of GRM- how correctly for receiving and resolving complaints; GRM indicators • Status on appropriate mechanism to resolve GBV/SEA-SH complaints 	Contractor	MWE	Monthly / Quarterly
<p>The MWE as an implementing Agency (IA) shall prepare status reports on GBV/SEA-SH and report to World Bank.</p>	MWE	World Bank	Monthly / Quarterly

If the aggrieved party is satisfied, the matter shall be closed and signed off with them in the complaints log book (Annex 10). The grievances on GBV, VAC, sexual harassment, among others that result into body injuries, shall be referred to nearby health centre facilities. However, in case of criminal cases, grievances on GBV, VAC, sexual harassment, among others, shall be immediately referred to Police (in

respective cells) for statutory investigations and management in accordance with Uganda’s legal system.

Therefore, in a formal reporting, the following procedure will be undertaken using the report form;

- Getting the details of the Victim of GBV by GBV focal person
- Documenting the details of the Case
- Preparing witnesses to engage other Legal Actors like the Police
- Establishing the appropriate procedure including the need to for medical examination of the victim and the perpetrator
- Producing a comprehensive report to enable duty bearers assess and take appropriate actions
- Submitting the report to Duty Bearers like Uganda Police, State Attorneys and Courts
- Follow up of GBV Cases and victims to ensure appropriate services are accessed by the Victim

8.2.4 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN REVIEWS

The ESMP is a living/dynamic document subject to similar influences and changes from variations to the provisions of the project specifications. It will be reviewed at an interval of 6 months in order to identify any required amendments.

8.2.5 ENVIRONMENTAL COMPLIANCE AUDIT

MWE will take the responsibility to fulfil the requirements for an environmental and social audit, not less than 12 nor more than 36 months after project completion or commencement of operations respectively in line with the National Environment Act 2019 and the Audit Regulations of 2020.

8.2.6 APPROVAL OF THE ESMP ACTIVITIES

Implementation of ESMP activities will be approved by MWE and safeguards compliance will be one of the bases for payment. Final payment for the contractor shall be tagged to successful restoration of all disturbed areas and clean-up of all construction sites.

8.2.7 ENFORCEMENT OF COMPLIANCE

The supervising engineer must strictly supervise implementation of the ESMP and where there are breaches, the supervising engineer should issue written instructions, cautions and warnings as applicable. Where the contractor fails to comply, contractual clauses should be invoked, and penalties or fines effected. If necessary, the civil works can be suspended if the contractor repeatedly fails to adhere to instructions. MWE should penalize the supervising consultant if he fails to supervise and enforce ESMP implementation by the contractor.

8.2.8 OPERATION PHASE MONITORING

8.2.8.1 WATER SUPPLY PLAN

MWE should develop, implement, and maintain a water safety plan taking into consideration the potential risks to the safety of the water from the supply catchment area to the consumer. A water safety plan should consist of three key components:

- a) System assessment to determine whether the drinking-water supply chain (up to the point of consumption) as a whole can deliver water of a quality that meets health-based targets;
- b) Identifying control measures in a drinking water system that will collectively control identified risks and ensure that the health-based targets are met; and

- c) Management plans describing actions to be taken during normal operation or incident conditions and documenting the system assessment (including upgrade and improvement), monitoring and communication plans and supporting programmes.

A water safety plan should include:

- a) Measures to protect the source of drinking water from risks of pollution;
- b) Measures to ensure all installations intended for the production of drinking water exclude any possibility of contamination. For this purpose and in particular:
- The installation for collection, the pipes and the reservoirs should be made from materials suited to the water and in such a way as to prevent the introduction of foreign substances in water;
 - the equipment and its use for production should meet hygienic requirements;
- c) Measures to ensure an appropriate treatment such as pre-treatment processes, coagulation, flocculation, sedimentation, filtration and disinfection are undertaken to assure the safety of water for the consumers;
- d) Appropriate operational monitoring system including monitoring parameters that can be measured and for which limits have been set to define the operational effectiveness of the activity; frequency of monitoring and procedures for corrective action that can be implemented in response to deviation from limits. If, during production it is found that the water is polluted, the producer shall stop all operations until the cause of pollution is eliminated; and
- e) A verification plan to ensure that individual components of a drinking-water system, and system as a whole is operating safely.

Public health surveillance (that is, surveillance of health status and trends) contributes to verifying drinking-water safety. Adequate infrastructure, proper monitoring and effective planning and management; and a system of independent surveillance are basic and essential requirements to ensure the safety of drinking-water. Surveillance should cover the total supply network from the source of untreated water to the consumer delivery points.

8.2.8.2 WATER QUALITY MONITORING PLAN

MWE will undertake water quality tests before use of the water by the communities to determine if water is safe to drink and to establish a baseline so that any future degradation can be detected. The Uganda Drinking Water Standards (**Table 8-2**) are as follows:

Table 8-2: Uganda Drinking Water Quality Standards and WHO Drinking Water Standards

Characteristic	Unit	US-201: 2008 Requirement	WHO 2011 Requirement
Physical Requirements			
Colour	Hazen units, max. Pt scale	15	No Guideline
Odour		Acceptable to consumers and no abnormal changes	No Guideline
Taste		Acceptable to consumers and no abnormal changes	No Guideline
Turbidity	NTU	5	1

Characteristic	Unit	US-201: 2008 Requirement	WHO 2011 Requirement
Dissolved Solids	mg/l	700	No Guideline
Suspended Solids	mg/l	0	No Guideline
Electrical Conductivity (EC)	µS/cm	1500	250
Chemical Requirements			
pH		6.5 – 8.5	6.5 – 8.5
Total Hardness (as CaCO ₃)	mg/l	500	No Guideline
Calcium (as Ca)	mg/l	75	No Guideline
Sodium (as Na)	mg/l	200	200
Magnesium	mg/l	50	No Guideline
Arsenic (as As)	mg/l	0.05	0.01
Copper (as Cu)	mg/l	1.0	2.0
Chloride (as Cl)	mg/l	250	250
Chromium (as Cr 6+)	mg/l	0.05	0.05
Fluoride (as F)	mg/l	1.0	1.5
Iron (as Fe)	mg/l	<0.30	No Guideline
Manganese (as Mn)	mg/l	0.1	0.1
Nitrates (as NO ₃)	mg/l	5	50 (Total Nitrogen)
Barium	mg/l	1.0	0.7
Aluminium (as Al)	mg/l	0.1	0.2
Sulphates	mg/l	200	250
Zinc (as Zn)	mg/l	5.0	3.0
Lead (as Pb)	mg/l	0.05	0.01
Selenium (as Se)	mg/l	0.01	0.01
Cadmium (as Cd)	mg/l	0.01	0.003
Phenolic substances (C ₆ H ₅ OH)	mg/l	0.001	No Guideline
Mercury (as Hg)	mg/l	0.001	0.001
Cyanide	mg/l	0.01	0.07
Poly nuclear aromatic substances	mg/l	nil	No Guideline
Residual free chlorine	mg/l	0.2	0.2
Mineral oil	mg/l	0.01	No Guideline
Anionic detergents	mg/l	0.2	No Guideline
Pesticides		Trace	Trace
Carbon chloroform extracts (CCE, organic pollutants)	mg/l	0.2	No Guideline
Source: Uganda Bureau of Standards, WHO Guidelines, 2011			

The minimum parameters to be tested are as detailed below:

Physicochemical:

- Conductivity, or dissolved solids
- Colour

- Turbidity
- Taste
- Odour

Microbiological:

- Faecal coliform bacteria or E. coli;
- Shigella spp
- Salmonella spp

Chemical:

- Fluoride as F-
- Nitrate
- Nitrite
- pH value
- Aluminium
- Iron(total)
- Ammonia
- Residual chlorine

The frequency of sampling and surveillance will be as detailed in **Table 8-3** below:

Table 8-3: Minimum frequency of sampling of water for surveillance

Population served (P)	Frequency (minimum) of sampling
P > 100,000	10 samples every month per 100,000 of population served
25,001 – 100,000	10 samples every month
10,001 – 25,000	3 samples every month
2500 – 10,000	2 samples every month
P < 2500	1 sample every month

A sampling programme that takes into consideration appropriate international recommendations should be established and implemented. The sampling should be regular, and its frequency should mainly depend on the following factors:

- a) Quality of water harnessed including effects on the water from climatic, human and industrial activities;
- b) Type of treatment for drinking worthiness;
- c) Volume of water processed;
- d) Risks of contamination;
- e) Background of public water supply network;
- f) Population served; and
- g) Capabilities of the analytical facility (both in terms of capacity and in terms of analytical performance).

8.2.8.3 OPERATION PHASE ANNUAL COMPLIANCE AUDIT

During the operation period, MWE will take the responsibility to fulfil the requirements for an environmental and social audit in line with the National Environment Act 2019 and the Audit Regulations of 2020. MWE shall submit the environmental compliance audit report to NEMA and undertake mitigation measures to address and rectify any non-compliance detected.

8.3 STAKEHOLDERS TO BE INVOLVED IN THE ESMP IMPLEMENTATION, THEIR ROLES AND RESPONSIBILITIES

The management and supervision of the ESMP is strictly the responsibility of the Ministry of Water and Environment as the Developer. During construction, the Contractor will be responsible for the day-to-day implementation of the ESMP. During the operation phase, the National Water and Sewerage Corporation (NWSC) Or Eastern Umbrella for Water and Sanitation (EUWS), who will take over management of the project, will be responsible for the implementation of the ESMP. The Developer, the Contractor and the Operator should employ an Environmentalist with relevant academic qualification and work experience. At the local level Buyende District Local Government will be responsible for the day-to-day monitoring of the ESMP in their area of jurisdiction.

At the National level, two institutions i.e. the National Environment Management Authority (NEMA) and the Department of Occupational Safety and Health (DOSH) of the Ministry of Gender, Labour and Social Development will be involved. The role of NEMA is to monitor the project as per the Environment Act N^o.5 of 2019 and to approve external environmental compliance audits as per the Environmental Audit Regulations (1999). The role of DOSH is to issue permits and periodically inspect the project site. DOSH will issue workplace Certificates every year if the project meets working conditions as set out in the Occupational Safety and Health Act 2006. The district and Sub County will approve construction permits in their area of jurisdiction.

As a means of impartiality, local NGO's or CBOs will be involved in the implementation of ESMP. Their role is to be neutral observers. They should have experience in environmental management and skills in conflict resolution.

8.3.1 INSTITUTIONAL AND IMPLEMENTATION ARRANGEMENTS¹⁸

The Project will be implemented by MoWE in close collaboration with Buyende District local government and their partners (e.g. private sector players). To facilitate integration within the sector, a MoU outlining joint responsibilities will be signed between the MWE, and Buyende district local governments .

Table 8-4: Institutional Mandates

Institution	Mandate/ Responsibilities
Funding Institution	
The World Bank	The World Bank will be financing the project and is therefore expected to offer implementation support supervision to the project's environmental and social performance through missions. The World Bank will designate a safeguards team that can participate in safeguards missions.
Implementing Agencies	
Ministry of Water and	The Ministry of Water and Environment (MoWE) has the overall mission: to promote and ensure the rational and sustainable utilization, development and effective management of water and environment resources for socio-economic

¹⁸ Uganda -Integrated Water Management and Development Project Appraisal Document Report No: PAD2716 World Bank May 23 2018

Environment-MoWE	<p>development of the country. The ministry has three directorates: Directorate of Water Resources Management (DWRM), Directorate of Water Development (DWD) and the Directorate of Environmental Affairs (DEA).</p> <p>MoWE shall take lead on implementation of the project and shall ensure all recommendations contained in the mitigation plan are implemented.</p>
Directorate of Environmental Affairs-DEA	<p>The DEA is responsible for environmental policy, regulation, coordination, inspection, supervision and monitoring of the environment and natural resources as well as the restoration of degraded ecosystems and mitigating and adapting to climate change.</p> <p>On this project, DEA together with NEMA will be responsible for issuing wetland user permits for the water abstraction and treatment plant sites.</p>
Directorate of Water Development (DWD)	<p>The DWD is responsible for providing overall technical oversight for the planning, implementation, and supervision of the delivery of urban and rural water and sanitation services across the country, including water for production. DWD is responsible for regulation of provision of water supply and sanitation and the provision of capacity development and other support services to Local Governments, Private Operators, and other service providers.</p> <p>On this project, DWD under its department of RWS is responsible for planning and execution of the project up to the construction phase. WSDF, in the same Directorate will take over operation and management of the project as well as implementation of the project source protection plans through its EUWS, both departments under DWD.</p>
Directorate of Water Resources Management-(DWRM)	<p>The DWRM is responsible for developing and maintaining national water laws, policies, and regulations; managing, monitoring and regulation of water resources through issuing water use, abstraction, and wastewater discharge permits; Integrated Water Resources Management (IWRM) activities; coordinating Uganda's participation in joint management of transboundary waters resources and peaceful cooperation with Nile Basin riparian countries.</p> <p>On this project, DWRM will be responsible for issues surface water abstraction permits for the project as well as approval and monitoring the implementation of source protection plans.</p>
Private Sector Involvement	
Supervising Consultant	<p>The Contractor will prepare Method Statements for specific activities such as excavation works and submit for the Supervision Engineer's review and comments before commencement of works. If the Engineer notifies the Contractor that a specific method statement has failed to provide adequate mitigations, such a statement should be revised and resubmitted until when approved</p>
Contractor	<p>The contractors to be hired to undertake project civil works shall be required to develop a Contractor's ESMP which will include among others the following aspects: the initial sub-project ESIA approved by both NEMA and World Bank,</p>

	Health and Safety Management Plan, Traffic Management Plan, Waste Management Plan, Equipment Yard Management Plan, Labor Influx Management Plan which shall also include Code of Conduct for Workers, Construction Materials Acquisition Due Diligence Procedure, etc. The Contractors shall hire the following key staff to undertake project implementation: Project Manager, Environmental Specialist, Sociologist and a Health and Safety Officer.
Statutory Agencies	
Ministry of Local Government-MoLG	<p>The Ministry is mandated to carry out a number of responsibilities in the Local Government Act as follows: to inspect, monitor, and where necessary offer technical advice/assistance, support supervision and training to all Local Governments; to coordinate and advise Local Governments for purposes of harmonization and advocacy; to act a Liaison/Linkage Ministry with respect to other Central Government Ministries and Departments, Parastatals, Private Sector, Regional and International Organizations; and to research, analyze, develop and formulate national policies on all taxes, fees, levies, rates for Local Governments.</p> <p>Buyende DLG fall under this Ministry and will be supervised and supported by MoLG.</p>
National Environment Management Authority-NEMA	<p>NEMA retains its mandatory role of coordination, supervision and monitoring environmental issues. As for the implementation of the ESIA process, NEMA's role will involve coordinating the review of the ESIA's of the planned interventions with relevant line agencies. Other lead agencies that would participate in the review are the Ministry of Local Government and local governments.</p> <p>Specifically, the Environmental Monitoring and Compliance Department of NEMA is 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.</p>
Supervision	
District Environment Officer (DEO)	The functions of the District Environment Officer are amongst others, advice the district Environment committee on all matters relating to the environment amongst others.
District Environmental Committees	The functions of the District Environment Committees include: to act as a forum for community members to discuss and recommend environmental policies and bye laws to the District Council and advice the District Technical Planning Committee, the District Council and NEMA on environmental management issues in the district.
NGOs	The NGOs working in the sector are coordinated at the national level through UWASNET, Uganda Water and Sanitation NGO Network an umbrella organization, which has been largely funded by sector development partners through MoWE.

Water Management at District Level	They receive funding from the MWE in the form of a conditional grant and can also mobilize additional local resources for water and sanitation programs. Local Governments, in consultation with MoWE appoint and manage private operators for rural piped water schemes that are outside the jurisdiction of NWSC.
Uganda Police (Kagulu Police Post/ Buyunde District Police)	The project will be implemented in Kagulu Sub County, Buyende District. The police post at Kagulu Sub County will handle all security and safety matters arising from the project. Depending on level of management, cases can be referred to Buyende District and/or further to national level for management. Grievances, however, will be management through a project/community grievance redress mechanism unless, unresolved at these levels.
Beneficiary Community	
Beneficiary Communities	The Communities are responsible for demanding, planning, contributing a cash contribution to capital cost, and operating and maintaining rural water supply and sanitation facilities. A water user committee (WUC), which is sometimes referred to as a Water and Sanitation Committee (WSC) should ideally be established at each water point. Being the primary beneficiaries of the project, the community will be made to participate fully in all aspects of the program including project identification preparation, implementation, operation and maintenance.

The goal of the IWMDP is to the maximum extent possible utilize existing institutional structures and capacity within the MWE and the local government to implement the Project. In order to successfully implement the ESMP, it is important to ensure that target groups and stakeholders who play a role in implementing it are provided with the appropriate and continuous Environmental and Social Safeguards capacity development.

The key institutions/group of people whose capacity needs to be enhanced to effectively implement and monitor the ESMP of this project are:

- Beneficiary Communities: There is a need to carry out training and awareness trainings for the key community members on the safeguard's aspects of the project. Further, they need to be facilitated to enable them effectively monitor the ESMP implementation process.
- Staff of the respective District Local Governments: The staff at the district level needs to be trained on key aspects of the project. They also need to be facilitated to enable them effectively monitor the ESMP implementation process.

There is a need for the project to foster inter institutional monitoring of the implementation of the project's ESMP. An interinstitutional monitoring committee should be formed, trained and their activities facilitated. A capacity building plan should be developed after instituting an inter institutional monitoring committee.

8.3.1.1 ROLES OF THE CONTRACTORS DURING PROJECT IMPLEMENTATION

During the construction phase and operation and maintenance phase, MWE will engage contractors to undertake the civil works and O&M tasks for the project respectively. Contractors will be responsible for complying with all relevant legislation and adhere to all mitigation measures specified in the ESMMP including the NEMA conditions of approval. MWE will therefore have to ensure

enforcement of mitigation measures which will be enshrined under contractual obligations. The contractors will be obliged to commit resources to ensure implementation of obligations in the contract through hiring qualified Safeguards Officers to operationalize the environmental and social requirements in the ESMP and supporting documentation. The construction contractor has not yet been procured, while the NUWS has been identified as the most suitable O&M phase contractor in the project feasibility study. However, based on experience for similar projects, the following safeguards team is recommended:

- a) Health & Safety Officer
- b) Environmentalist
- c) Sociologist
- d) Site Nurse
- e) Community Liaison Officer/Grievance Officer

MWE through the supervising consultant must approve the contractors' safeguards team. It may be useful to include the minimum requirements in the contracts for the civil works/ O&M phase. The Contractors are encouraged to sign MoUs with different service providers for safeguards related matters (waste management, HIV/AIDS, etc).

8.3.1.2 ROLE OF SUPERVISING CONSULTANT

The Supervising Consultant should have in their teams at least an Environment Specialist and a Social Specialist who will have overall responsibility of issuing guidance and instructions to the contractor including review and approval of the contractor's management plans. The Environmental Specialist and Social Safeguards Specialist will work closely with MWE Safeguards Team in supervising the contractor. In addition, the Supervising Consultant will conduct scheduled site supervisions to monitor state of safeguards compliance as documented or executed by the Contractors. The Supervising Consultant will have obligation to also oversee compliance and observation of environment, safety, health and social requirements alongside other cross-cutting issues in the project.

8.3.1.3 STAFFING REQUIREMENTS

The following personnel are proposed for each ESMP implementing stakeholder: -

Table 8-5: Personnel required to implement and monitor the ESMP

Stakeholder	Personnel required
Ministry of Water and Environment	Water Engineer Sociologist Environmental Health Officer Health and Safety Officer Project Support Teams
Construction Contractor	Site Engineer Site Supervisor Site Foreman Environmental Officer Sociologist Health & Safety Officer

	Site Nurse
O&M Contractor	Environmental Officer Sociologist Grievance Management Officer
Buyende District Local Government	District Environmental Officer District Water Officer District Engineer District Community Development Officer
Kagulu sub county	Community Development Officer Councilors Secretary for Health
NEMA	Monitoring Officer
OSH Department	Health and Safety Inspector supported by District Labour Officer
NGO/ CBO	Representative with skills in environmental management and conflict resolution
Department of Museums and Monuments	Archaeologist

The ESMP is based on a collaborative approach where the responsibility for the implementation and monitoring of the environmental and social management measures is shared among relevant stakeholders, to varying degrees. Successful ESMP implementation and more particularly its institutional arrangements and its environmental and social monitoring programs, will be based on a program of institutional support and capacity-building. Contractors must also be aware of the need to integrate best practices in their work.

It is the onus of each ESMP implementing stakeholder to ensure that all its personnel required in implementation of this ESMP are adequately qualified and were appointed based on their qualification and suitability for their respective roles. The ESIA Consultant recommends a training program (safeguards clinic) be implemented through the ESMP to enhance the environmental and social awareness of the project's key personnel. Monitoring may require the services of environmental specialists or a company with laboratory and analytical facilities (for complex environmental problems) or inspection by the local government environmental officers.

8.3.2 THE ENVIRONMENTAL AND SOCIAL MONITORING TEAM

While the Developer will do his own internal monitoring; a monitoring team headed by the District Environment Officer of Buyende District and composed of the local environmental authorities, representatives from the District and NEMA and any other lead agencies may also carry out monitoring. The Contractor shall undertake monitoring of key environmental parameters like water quality, noise, and air pollution etc. and make monthly reports to the Developer.

Table 8-6: Environmental and Social Monitoring Plan

Environmental and Social Aspect	Parameters	Monitoring frequency	Sampling Area	Measurement Units	Method	Target level/ Standard	Responsibility	Annual costs estimate (UGX)
IMPACT								
CONSTRUCTION PHASE								
Land acquisition/ displacement of land uses	PAPs	Before commencement & continuous throughout implementation	BH areas & along TL	No. of PAPs Compensated Land consent agreements	<i>RAP Implementation Report/ Grievance Log</i>	100% compensation	MWE/ RAP Consultant	Proj. Sup. RAP Budget
Land use/ cover change	Area cleared; Species type	Monthly After construction/ material extraction	Quarry site, Sand mines, Intake/ WTP/ Reservoir site Along the TL and DL	Ha No. species	<i>Progress Reports</i> <i>Restoration/ completion certificates</i>	Restricted to TL & DL Restored	Supervising Engineer MWE/NEMA	Contract

Environmental and Social Aspect	Parameters	Monitoring frequency	Sampling Area	Measurement Units	Method	Target level/ Standard	Responsibility	Annual costs estimate (UGX)
Wetland management	Area cleared; Species type Wetland integrity	Monthly After construction/ material extraction	Intake site	Ha No. species	<i>Progress Reports</i> <i>Restoration/ completion certificates</i>	Compliance with Wetland permit	Supervising Engineer MWE/NEMA	Contract
Waste management	Amount of Solid waste	Once a week	Project site	Kg for Solid waste, Litres for Liquid waste	Observations and Measurements	0 Legal disposal	MWE DLG Contractor	5,000,000 MWE Budget Contract
Noise pollution	Noise level Workers	Once a week Before and after project	Project site	dBa Hearing medical check	<i>Noise Level Meter</i> <i>Health report</i>	Ntl Stds Hearing standard	MWE	5,000,000 10,000,000
Air Quality	Dust (PM ₁₀)	Once per months (daily inspection to be made to detect and remedy	Project site	ppm	<i>Micro-dust Pro</i>	Ntl Stds	Contractor MWE / Sup. Consultant	Contract 10,000,000

Environmental and Social Aspect	Parameters	Monitoring frequency	Sampling Area	Measurement Units	Method	Target level/ Standard	Responsibility	Annual costs estimate (UGX)
		excessive dust generation).						
Safety and health risks	Signage No. of training First aid kits No. and type of PPE. Fence in place Monitoring Health and sanitation facilities in site.	Daily by contractor, weekly by Consultant and Quarterly by MWE.	Project site	Number of safety measures provided	Incidents/Acc. Log, injuries and inspection No of incidents categorized as near misses, fatalities, lost-time injuries, unsafe acts and positive observations recorded. No. of accidents recorded No. of toolbox talks conducted	0	MWE Contractor	5,000,000 10,000,000 5,000,000 2,000,000 Contract Contract

Environmental and Social Aspect	Parameters	Monitoring frequency	Sampling Area	Measurement Units	Method	Target level/ Standard	Responsibility	Annual costs estimate (UGX)
HIV/AIDS	No. of sensitization training	Monthly Sub contracted	Project site Community	Number of HIV/AIDS mainstreaming strategies provided	Monthly report		MWE Contractor	5,000,000
	VCT services and Anti-Retro-Viral Treatment							5,000,000
	Supply of condoms							2,000,000
GBV, VAC Cases	Nature of GBV Case	Daily by contractor, weekly by Consultant and Quarterly by MWE.	Project site	No. Reported Cases No. of cases resolved	Grievance Log Police Case Files	0	MWE Consultant Contractor	12,000,000
	GBV specialist							12,000,000
	Monitoring of VAC							5,000,000
	Reporting and management of VAC cases							5,000,000
GRM for workers and communities	Contractor Grievance Committees	Monthly	Project site	No. Reported Cases	Grievance Log	0	MWE Consultant Contractor	5,000,000 10,000,000
Liability for loss	Training on the operation of the machinery & equipment	Daily by contractor, weekly by Consultant and	Project site	No. of losses recorded	Grievance Log	0	MWE Insurance Company	5,000,000
	Signage							2,000,000

Environmental and Social Aspect	Parameters	Monitoring frequency	Sampling Area	Measurement Units	Method	Target level/ Standard	Responsibility	Annual costs estimate (UGX)
	Onsite clinic	Quarterly by MWE.					Contractor	30,000,000
Physical cultural resources	Consultation Training Compensation/preservation	During project construction phase	Project sites	No. of resources identified	Consultation Chance finds	0	Contractor MWE MMU	7,000,000 RAP budget
Operation phase								
Ground Water levels	Water levels Monitoring Quality monitoring	Before operation, Daily, Monthly, quarterly, annually	Intake	M ³	Abstraction permits	DWRM	EUWS DWRM	6,000,000 5,000,000 5,000,000
Water Quality & Quantity	All	Monthly	BHs	All	Lab. Analysis Hydrogeological analysis	Ntl Stds	MWE	40,000,000
Waste Management	Amount of Solid waste	Once a week	Project site	Kg for Solid waste, Litres	Observations and Measurements	0 Legal disposal	MWE DLG	6,000,000 MWE Budget

Environmental and Social Aspect	Parameters	Monitoring frequency	Sampling Area	Measurement Units	Method	Target level/ Standard	Responsibility	Annual costs estimate (UGX)
				for Liquid waste				

9 MANAGEMENT PLANS

9.1 CONTRACTOR MANAGEMENT PLANS

The Contractor will be required to prepare some standalone safeguards management plans in addition to the Contractor's Environment and Social Management Plan. Reference should always be made to the Contractor's Environmental and Social Management Plan as the overarching document that contains general Control Statements for various impacts such as air quality, solid waste, and hazardous materials, water quality and ecosystem, noise and vibration control, erosion control, waste handling and disposal and safety and occupational health. In addition to the Management Plans, the Contractor should prepare Method Statements for specific activities such as excavation works and submit for the Supervision Engineer's review and comments before commencement of works. If the Engineer notifies the Contractor that a specific method statement has failed to provide adequate mitigations, such a statement should be revised and resubmitted until when approved.

9.1.1 LABOUR FORCE MANAGEMENT PLAN

The Contractor is expected to have a clear plan for recruitment of workers to promote project ownership by the communities. The Contractor should give preference to local people by recruitment of unskilled and semi-skilled labour from project villages and this should be done through local areas councils from where those seeking employment should get letters of recommendations.

9.1.2 QUALITY MANAGEMENT PLAN

A quality management plan defines the quality policies and procedures relevant to the project for both project deliverables and project processes and who is charged with what responsibility to ensure compliance to set standards. Given the nature of this project, the contractor should have a quality management plan to guide the quality control and assurance processes to achieve the intended outcomes in terms of social, design, structural and investment outcomes in line with environmental and social safeguards policies.

9.1.3 EROSION AND POLLUTION CONTROL PLAN

Soil erosion is a very important aspect given the location of the construction site for the water sources and reservoir. In addition, the transmission and distribution lines will go through some wetlands. Erosion risks are expected to be mainly associated with vegetation clearance, construction of access roads and storage of excavated materials. In some cases, the project area may receive high amounts of rainfall that will be associated with several soil erosion and drainage impacts, such as, siltation and water stagnation that could be experienced in the direct project area. There is need to lay special strategies for managing the soil erosion.

An erosion control plan should be overlaid on the project grading plan(s) or site plan if there is not a grading plan. The erosion control plan needs to show what Best Management Practices (BMPs) will be used and where, as well as the total disturbance area. The plan must include measures to prevent erosion, contain sediment and control drainage. The erosion control plan must also include installation details of the BMPs as well as notes. Construction sites often have areas where soil disturbing activities such as clearing, grading, or cut/fill work has stopped for a period of time. Bare areas that are not actively under construction need some type of temporary cover to prevent or minimize erosion in the event of rainfall. Applicable areas include topsoil stockpiles, rough graded areas, sediment basin dikes, ditches, temporary earthen structures, and graded areas undergoing settlement. The following controls should be considered:

- Stabilization which includes a wide range of erosion prevention practices that cover exposed soil such as the use of straw, mulch, erosion control blankets, plastic sheeting or tarpaulins.
- Temporary seeding which is a soil stabilization practice involving the establishment of temporary vegetative cover to reduce erosion on construction sites that have disturbed areas that are temporarily idle.

Erosion prevention practices like stabilization are generally less costly and more effective than sediment control measures, which involve settling or filtering mobilized soil particles before they are transported by runoff to surface waters. Various practices can be used for sediment removal from dewatering discharge. Sedimentation is primarily effective at removing larger sized particles, while filtration and chemical treatment can also remove the fine particles. These approaches are less effective for dissolved nutrients and metals that are non-adsorbed. Effectiveness of chemical treatment depends greatly on the pH and temperature of the water being treated. The Contractor should ideally include a comprehensive Erosion, Sedimentation and Pollution Control Plan Checklist.

9.1.4 WASTE MANAGEMENT PLAN

The Waste Management Plan (WMP) shall be prepared to address waste management aspects associated with the construction of the markets in line with legal and regulatory requirements. The Contractor, all subcontractors, and vendors involved in the project shall have to adhere to this Plan. The Contractor is

responsible for ensuring that waste is managed in accordance with this Plan by providing the necessary resources and by issuing instructions and guidance during project execution. The Contractor will implement waste management measures and practices throughout the construction period to mitigate the associated risks. The WMP will contain the following information:

- Relevant legislation and guidelines for waste management of the Project;
- The procedures and initiatives proposed to address the management of waste materials;
- Safeguards, mitigation measures and monitoring to manage waste impacts during construction;
- Roles and responsibilities of those involved in the implementation of waste management controls;
- An effective monitoring, auditing and reporting framework to assess the effectiveness of the controls implemented
- Checklists and forms for day-to-day waste management activities.

9.1.5 OCCUPATIONAL HEALTH AND SAFETY PLAN

The Contractor will have to prepare a document that presents the framework for occupational health and safety management and monitoring measures that he will undertake. The OHS plan should typically cover safety programs that will be applied for promoting health and safety, preventing harm, fatality and hazards to the employees, sub-contractors, properties and the general public.

9.1.6 HANDLING OF CHEMICALS AND OTHER POTENTIALLY HARMFUL MATERIALS

Chlorine, a harmful and toxic chemical, will be employed at the storage reservoirs during project operation. Thus, it must be safely handled to prevent any accidents, including health and safety issues. This section analyses the handling aspects of this chemical.

9.1.6.1 DESIGN AND MANAGEMENT OF CHLORINATION STORAGE AND DOSING AREAS

The following special storage and handling features should be utilized and maintained during the water supply project operation.

- a) Storage and equipment rooms be equipped with doors, opening outward to the outdoors complete with panic hardware;
- b) Viewing window into chlorine storage and equipment rooms for operator security;
- c) Visual and audible emergency alarms at the chlorine room entrance;
- d) Exhaust fans with a typical rating to air changeover every minute;
- e) A chlorine gas leak detector to generate alarms and attendant ammonia bottle to help locate a leak;
- f) A drench shower located where it is easily accessible in case of emergency, with single turn (butterfly valve) water tap;
- g) An emergency kit to repair leaking containers.

For systems that use gas chlorination:

- a) Install alarm and safety systems, including automatic shutoff valves, that are automatically activated when a chlorine release is detected;
- b) Install containment and scrubber systems to capture and neutralize chlorine should a leak occur;
- c) Use corrosion-resistant piping, valves, metering equipment, and any other equipment coming in contact with gaseous or liquid chlorine, and keep this equipment free from contaminants, including oil and grease;
- d) Store chlorine away from all sources of organic chemicals, and protect from sunlight, moisture, and high temperatures.

9.1.6.2 HANDLING OF CHLORINE DURING OPERATION

Chlorine reacts violently with hydrogen, acetylene gases and solvents creating heat (EPA, 2011b). The reaction of chlorine with ammonia can create explosive compounds and gases that are toxic to breathe. Chlorine also reacts with metals. In the presence of water, chlorine can create a highly corrosive and dangerous acid mist. Therefore:

- a) Prepare and approve standard operating procedures for its storage and handling;
- b) Never store chlorine gas and ammonia in the same building or area;
- c) Keep chlorine isolated and in different rooms from the chemicals that it reacts with;
- d) Chlorine storage areas, storage containers and process equipment and lines should be properly labelled and appropriate hazard warning should be posted in accordance with site specific operating procedures;
- e) Gas containers should be stored in separate or divided rooms separately from flammable materials and other chemicals such as ammonia and sulphur dioxide, if used elsewhere in the installation;
- f) Containers should be stored and used above ground level and always in a vertical position;
- g) Chlorine gas containers should be stored in marked areas shielded from external heat sources;
- h) The protective hood should be kept secure on all unused containers and should only be taken off only when the container is being used. All containers in use should be secured in position by chains or other methods as appropriate. Gas containers should only be lifted with suitably rated and tested equipment and never by their protective hoods;
- i) Empty cylinders should be clearly marked and segregated from unused cylinders.

9.1.7 EMERGENCY RESPONSE PLAN

The main purpose of an Emergency Response Plan (ERP) is to provide a systematic approach to the protection of employees, assets and the environment from impact of serious incidents. The plan encompasses organizing, coordinating and implementing a range of procedures to prevent, mitigate, respond to

and recover from the consequences of an emergency event. The ERP covers the required actions for all situations that could generate emergency situations during the project's construction phase. It will be developed to establish general guidelines and response procedures for the management of emergency events on the Project. It will also establish an emergency management command structure and mechanisms for review, oversight and accountability. The contractor shall establish procedures to ensure that all personnel have the skills to report environment incidents. The contractor shall keep records of all incidents, investigation, and analysis and counter measures taken.

The ERP will also set out the means by which these measures will be communicated to affected communities in a culturally appropriate manner. The ERP should have Best Practices, which include working with local and national agencies like the fire brigade, police, hospitals, counter terrorism units etc. The following are key emergencies, which the project should be prepared to handle:

- Fire
- Electricity shocks and electrocution
- Bomb threat
- Civil disturbance
- Hostage
- Terrorist incident
- Death of a worker on the project site
- Suicide
- Shooting or stabbing
- Disasters e.g. earthquake, lightening, collapse of excavation walls
- Large-scale hazardous material spill
- Mass casualties
- Health epidemics
- Rapture or leak of equipment
- Flooding

9.1.8 SECURITY MANAGEMENT PLAN

The purpose of the Security Management Plan is to assure a safe and secure project environment for staff, visitors and its service providers alike and to mitigate any risk of loss/damage to project property, equipment or its infrastructure. It identifies potential security risks present in the construction phase,

methods and policies to mitigate these risks, and the requirements to ensure the highest levels of safety and security in the implementation of the Project. It will therefore, set out commitment of the Project to security. The Plan will specifically deal with:

1. Security issues in the project i.e. being safe from attacks from thugs and ill motivated persons;
2. Being prepared for insecurity incidents; and
3. Decisively responding to and managing the insecurity circumstances and incidents.

9.1.9 COMMUNITY HEALTH AND SAFETY PLAN

The Plan applies to Project construction activities and the associated risks and potential impacts that these activities may have on community health and safety. The risks and potential project impacts to community health and safety can emerge from both within and outside the so-called project area of influence. Therefore, the scope of this plan focuses on the management of aspects associated with the interaction of construction activities, the workforce, and the community as well as mitigation of contagious diseases (e.g. COVID-19; Ebola etc). The Plan should include control measures designed to avoid, minimize or mitigate the adverse effects of project activities on the health and safety of the community, while at the same time, enhancing the beneficial effects and capitalize on opportunities that may contribute to improving overall community well-being.

9.1.10 STAKEHOLDER COMMUNICATIONS AND ENGAGEMENT PLAN (SEP)

In pursuit of timely, meaningful and appropriate stakeholder engagement, the contractor is expected to have a clear strategy for stakeholder engagement to assist in managing and facilitating future engagement through the various stages of the Project's life cycle from mobilization up to handover. This stakeholder engagement plan shall detail the key stakeholders to be engaged and the schedule of engagements throughout the various stages of construction, decommissioning and the defects liability period.

9.1.11 HIV/AIDS AND GENDER MANAGEMENT PLAN

The Contractor in pursuit of his commitment to health and safety will organize trainings, conduct awareness and education on the use of infection control measure in the workplace. The Contractor is expected to provide appropriate PPE to protect workers from the risk of exposure to HIV/AIDS and incorporate HIV/AIDS information in occupational health and safety inductions, provide guideline in preventing the spread of HIV/AIDS and other sexually transmitted infections (STIs), publicize knowledge related to HIV/AIDS and STIs to the work crews and the surrounding communities, provide information on good HIV prevention interventions, including promotion of the correct use of condoms and ensure sufficient resources are available for HIV programs.

9.1.12 CHILD PROTECTION AND MANAGEMENT PLAN

Contractors should be cognizant of the importance of child protection issues and their responsibility to uphold the rights of children at all times. A child protection plan should spell out measures to prevent any form of abuse of children such sexual violence, exploitative labour and sexual exploitation which include children. Additionally, the plan should have stringent punitive measures properly defined for potential perpetrators of child related abuse. This should also be signed by contractor workers as part of their contractual obligations to guard against child abuse.

The Child protection Plan shall include the following:

1. Brief Overview of Child Concerns
2. Policy, Legal and Regulatory framework governing child protection issues
3. Child Protection Risks at each site
4. Contractor's Policy on Children and Codes of Conduct
5. Child Protection Services by contractor (Prevention & Mitigation)
6. Arrangements for Referral & Linkage to Other Child protection services in area
7. Support Offered to Children to access justice
8. Mentorship & Training
9. Monitoring & Reporting
10. Schedule of Engagements such as Community Meetings and Joint Stakeholder Meetings.

9.1.13 CHANCE FINDS PROCEDURE

During excavations, chance finds may be encountered. Therefore, the contractor should have a chance finds management plan that defines the measures necessary for the overall management of any cultural heritage encountered during construction.

In order to avoid potential damage to cultural property discovered during construction, the following will apply:

- Workers must be vigilant to any relics found during excavation;
- In case of a discovery during the excavation, workers must immediately report the findings to the Foreman;
- The Foreman must stop the work immediately and communicate the findings to the Supervisor;
- The Supervisor then communicates the findings to the Contractor Manager;
- The Contractor Manager then notifies MWE Safeguards Team;
- The Department of Museums and Monument of Uganda will then be notified either via communicating with the MWE Safeguards Team via telephone or email or based on a site visit within 14 days from the time of discovery;

- Any further excavations or continuation of the infrastructure development at the Site of the discovered heritage will be undertaken only with the approval of the Department of Museums and Monuments;
- Should the Conservator of Antiquities from the Department of Museums and Monuments confirm that the discovered resource falls within the heritage resource description, he/she will report the resource to the Minister of Tourism, Heritage and Antiquities for preservation and protection;
- Rescue excavation or *in-situ* conservation will be proposed based on the disturbance likely to be caused by the project or in relation to cost vis-à-vis value of the heritage resource;
- MWE will then apply for either an excavation or preservation in-situ license of the discovered resource. The feasible proposal will then be executed. In case of in-situ conservation, the site will be managed and open to the communities and tourists that access the project area; and
- All chance finds will be recorded in the chance find form.

The project activities will then continue after the following have taken place:

1. In the case of archaeological artefacts discovery, MWE will inform the Uganda Museum and grant a period where specialists from the Department of Museums and Monuments excavate and curate the artefacts professionally;
2. In the case of discovered human remains the police will have to be notified and either the remains are taken for forensic investigation or the LC1 authorities sanction the reburial of the remains at another location. The Contractor then meets the relocation and reburial expenses which shall be claimed from MWE; and
3. In the case of an encounter with an unknown sacred site, relocation ceremonies will be undertaken by the custodians of the site and the contractor then meets the relocation expenses which shall be claimed from MWE.

Overall, the following precautions ought to be undertaken:

- A. **Site avoidance:** If the boundaries of the site have been delineated, attempt must be made to redesign the proposed development to avoid the site;
- B. **Mitigation:** If it is not feasible to avoid the site through re-design, it will be necessary to sample it using data collection program prior to its loss. This could include surface collection and/or excavation; and
- C. **Site Protection:** It may be possible to protect the site through the installation of barriers during the time of the development and/or possibly for a longer term. This could include erection of high visibility fencing around the site or covering the site area with a geo-textile and then capping it with fill. The exact prescription would be site- specific.

During the implementation of the project and in the event that, a PCR is encountered, the following can be contacted:

<p>Ministry of Tourism, Wildlife and Antiquities Rwenzori Towers 2nd Floor, Plot 6 Nakasero Road. KAMPALA, UGANDA. P. O. Box 4241 Kampala Phone: +256 414 561 700 Email: info@tourism.go.ug</p>	<p>The Uganda Museum Plot 5-7 Kira Road, P. O Box 365, KAMPALA-UGANDA (+256) 414 232707. www.ugandamuseums.or.ug</p>
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9.2 DECOMMISSIONING PLAN

The Igwaya RGC Water Supply and Sanitation Project has been planned to operate up to 2039 after which, a system upgrade may be required. Therefore, for the next 20 years, full scale decommissioning of the project is not anticipated to take place except a site construction decommissioning approach which can be considered at the moment in this study. Therefore, the practical decommissioning will for now involve the following:

- a. Restoration of disturbed sites through levelling and re-vegetation measures;
- b. Removal of obsolete equipment and associated equipment parts;
- c. Demobilization and return of imported labour force after the project;
- d. Grievance management mechanisms with the host communities before site closure;
- e. Repairs of damaged roads and restoration of access routes and rout deviations;
- f. Removal of construction debris and unused materials.

Although limited adverse impacts may occur, the contractor and the Developer shall prevent any condition from developing on site during construction, operation and decommissioning that would prevent restoring the site to a useful condition upon removal of the water transmission lines. Within 12 months before facility removal, the operator shall develop a decommissioning plan, detailing the following;

- a. Requirements and procedure for removing equipment and structures from the site,
- b. Requirements and procedures to restore the site to a useful condition;
- c. Site investigation to determine contaminated areas and extent of contamination;
- d. Description of options for remediation of contaminated areas on site, post decommissioning land use, information on how possible socio-environmental impacts will be minimized during decommissioning and measures to protect the public against risk or danger resulting from site conditions prevailing after decommissioning,
- e. Plan on how decommissioning will be funded.

The developer shall submit the decommissioning plan to NEMA for approval. Decommissioning shall also have a restoration plan to adequately remediate any onsite contamination and restore site to the maximum extent consistent with anticipated post decommissioning use.

10 KEY RECOMMENDATIONS AND CONCLUSIONS

RECOMMENDATIONS

Generally, the purpose of this project is to increase sustainable access to safe water and basic sanitation in Igwaya RGC along the transmission route. From the assessment, the positive impacts outweigh the negative impacts. Further, the negative impacts of the project are identifiable and mitigatable. The report presents specific mitigation measures for each impact identified. The mitigation measures are aimed at either eliminating the impact or reducing its magnitude and or severity or both. Therefore, study recommends that the project should proceed but with the following recommendations;

- a. The Design should consider additional works for preventing and managing flooding and contamination of the water source. These works may include proper landscaping, raising the platform and put in place an embankment to protect the borehole (water source) from flooding and contamination.
- b. Ensure adequate and qualified staffing for Environmental and social safeguards management at MWE, Supervising Engineer, and Contractor during implementation to enhance oversight and compliance roles with environmental and social safeguards requirements.
- c. Keep the Right of Way within the existing Road reserves as much as practicable in order to minimize delays and expenditures associated with land acquisition. Where land has to be acquired, ensure that affected persons are fully and fairly compensated before commencement of works.
- d. During implementation, the Developer should engage with key stakeholders such as UNRA, LGs and the communities in laying of the water transmission and distribution lines so as to take care of any planned road upgrades, other developments and stakeholder support in the project area.
- e. Monitoring the implementation of the E&S mitigation during pre and post construction phase mitigation measures by coordinating with local authorities and involving the district and sub-county officials.
- f. The Contractor should develop a Construction specific ESMP after developing the final designs. This should constitute the monitoring checklist to be used by the Supervising Consult and MoWE.
- g. The environmental management and monitoring plan should be attached as a condition for the project construction contract so as to make the contractor aware of his environmental obligation before securing the contract and enhance the implementation of the ESMP.

CONCLUSIONS

In this study, the need for the project was examined, its compatibility with the surroundings and economic benefits evaluated and environmental impacts assessed and analyzed.

Adverse impacts were identified, mitigation measures to avoid, reduce and minimize these impacts have been suggested, either as part of the design, or as measures to be implemented. Good practice

measures were also identified in order to minimize the impact of the proposed development further. The proponent has agreed to these mitigation measures and they are, therefore, expressed as commitments.

Overall, the negative impacts of this project are rated by this study as largely insignificant; that notwithstanding, adequate measures have been proposed to avoid, minimize, mitigate and compensate the impacts. Hence the project can be implemented in a sustainable way.

Based on the above, it is recommended that the project be approved by relevant authorities such as the proponent and NEMA since the planned activities do not pose a significant threat to environment and communities if the mitigation measures and monitoring plan are implemented effectively.

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ANNEX A: NEMA APPROVAL OF TOR



NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY (NEMA)

NEMA House
Plot 17, 19 & 21, Jinja Road,
P.O.Box 22266, Kampala, UGANDA.
Tel: 256-414-251064, 251065, 251068
342768, 342769, 342717
Fax: 256-414-257521 / 232880
Email: info@nema.go.ug
Website: www.nema.go.ug

NEMA/4.5
7th June, 2022

The Permanent Secretary,
Ministry of Water and Environment,
P.O. Box 20026,
KAMPALA.

Tel: +256 417889400
Email: mwe@mwe.go.ug

RE: SCOPING REPORT AND TERMS OF REFERENCE FOR UNDERTAKING AN ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT FOR FIVE LARGE SOLAR POWERED PIPED WATER SUPPLY SYSTEMS AND SANITATION FACILITIES IN, IGWAYA AND KIDERA IN BUYENDE DISTRICT, KITENGA IN KALIRO DISTRICT, BUKIZIBU-BUMWENA IN MAYUGE DISTRICT AND LUGALA IN NAMAYINGO DISTRICT (EIATOR 8454)

Reference is made 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 on 6th April, 2022, for review and consideration for approval.

This Authority has finalized the review and grants formal **approval** of the said TOR. Please note that the approval of the TORs **does not grant permission** to start implementing any of the proposed project activities, as this is not a Certificate of approval.

Please undertake separate Environmental and Social Impact Assessments (ESIAs) in respect to piped water supply systems and sanitation facilities in:

- (a) Igwaya and Kidera, Buyende District;
- (b) Kitenga, Kaliro District;
- (c) Bukizibu-Bumwena, Mayuge District; and,
- (d) Lugala, Namayingo District.

In addition to the scope of work presented in the TOR, you are advised to make due consideration of the aspects below during the conduct of the ESIA studies, and the preparation of ESIA reports:

- i. Provide a comprehensive description of the project components and activities covering the construction and operational phases, associated infrastructure, details of the design and capacity of water supply systems, the methods and

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7/6/2022

chemicals to be used for water treatment, and size of the workforce; and the implications of these on the environment.

- ii. Undertake geotechnical investigations of the proposed project sites so as to inform the design and construction of the Water Supply Systems and Sanitation Facilities.
- iii. Include in the ESIA reports hydrological investigative reports in regards to the potential impacts of the project on underground water resources within the proposed project areas, and mitigation actions to address such impacts.
- iv. Provide a detailed description of the waste streams that will be generated from the activities of the piped water supply systems and sanitation facilities, and the measures and equipment that will be put in place to handle such waste.
- v. Include in the ESIA reports other relevant baseline information that is project site specific, on the soils, water, air quality and noise levels; as well as, clear-coloured photographs depicting the current status of the project areas and the neighbouring environs.
- vi. Provide clear coloured and well-labelled location maps/images (*preferably each covering A-3 size paper*) and accurate sets of GPS coordinates clearly indicating the site boundaries and locations of the various project components. Ensure that all GPS coordinates are provided in UTM format.
- vii. Append to the ESIA report well-labelled copies of the proposed site layout plan (*preferably covering A3 or larger paper size*) that shows the layout and placement of the different project components.
- viii. Carry out comprehensive consultations with all the relevant key stakeholders including, Buyende, Kaliro, Mayuge and Namayingo District Local Government Authorities, Department of Occupational Safety and Health (Ministry of Gender, Labour and Social Development), local communities in the neighbourhood and the Directorate of Water Resources Management (DWRM) particularly in regards to potential impacts of the proposed project on water resources in the project area. The views of the stakeholders consulted should be well documented and appended to the ESIA reports.
- ix. Include in the ESIA report, comprehensive analysis of analysis of alternatives/ options to the selected project location, design and technology among other aspects.
- x. Carry out a comprehensive evaluation of the negative environmental impacts associated with the proposed project activities and the relevant mitigation measures to minimize the identified environmental impacts of the proposed project.

- xi. Make reference to all the relevant provisions of the applicable policies, laws, regulations, guidelines and standards, in particular, the National Environment Act, No. 5 of 2019.
- xii. Append to the ESIA reports, authentic copies of land ownership and acquisition documents.
- xiii. Consider any other critical environmental aspects/concerns which, may have not been initially foreseen during preparation of the scoping report and TOR, and include an evaluation of such environmental and social concerns in the ESIA reports.
- xiv. Indicate the estimated cost of the project evidenced by a certificate of valuation of the capital investment of the project, issued by a qualified and registered valuer in accordance with Regulation 18(1) of The National Environment (Environmental and Social Assessment) Regulations, S.I No. 143/2020.
- xv. Provide evidence of payment of a non-refundable administration fee of 30% (thirty percent) of the total fees on submission of the Environmental and Social Impact Statements, in accordance with Regulation 49(2) of The National Environment (Environmental and Social Assessment) Regulations, S.I No. 143/2020.

Note that only registered environmental practitioners including the team leader should be contracted to conduct the ESIA for the proposed project.

This is therefore, to recommend that you proceed with carrying out the ESIA studies for the proposed solar powered piped water supply systems and sanitation facilities. We look forward to the receipt of comprehensive copies of the ESIA reports, for our further action.



Monica Angom
FOR: EXECUTIVE DIRECTOR

ANNEX B: DESIGNS AND TECHNICAL DRAWINGS



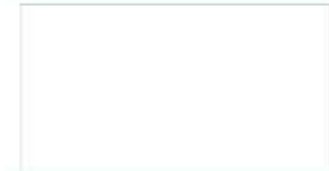
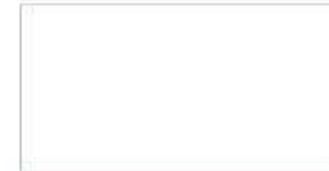
Republic of Uganda

Ministry of Water and Environment

Feasibility study, Detailed Engineering Design, Environmental and Social Impacts Assessment for Piped Water Supply Schemes in Selected Rural Growth Centers (RGCs) in the County

Contact No: MWE/CONS/17-18/00014/1

Book of Drawings: Igwaya Rural Growth Centre



Prepared for:

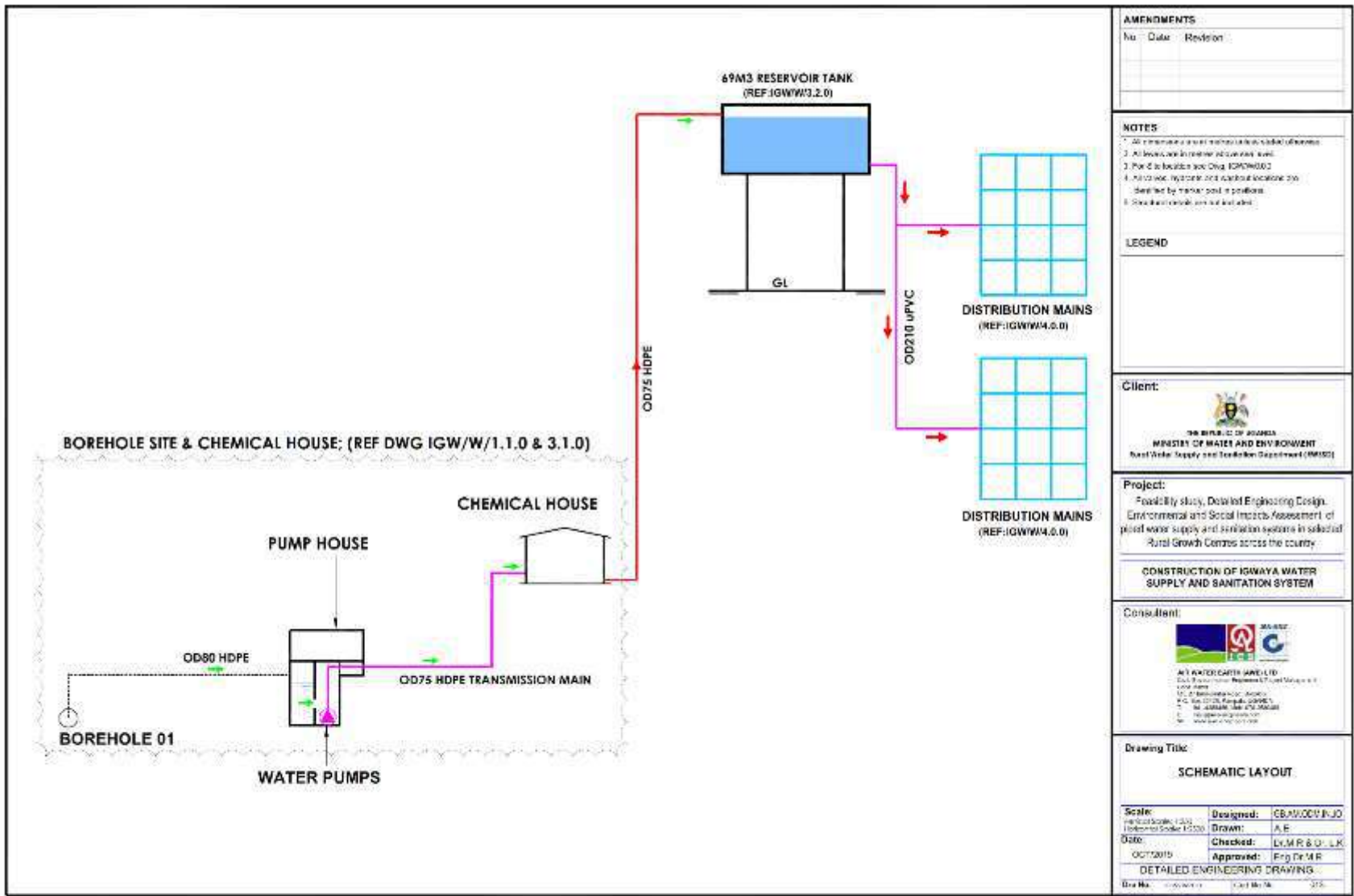
MINISTRY OF WATER AND ENVIRONMENT,
RURAL WATER & SANITATION DEPARTMENT
- RWSO
Plot 21/28 Port Bell Road, Luzira
P. O. Box 20026, Kampala, Uganda.



By:

A/R WATER EARTH (AWE) LTD
Civil, Environmental Engineers & Project
Management Consultants
M1, 27 Binayomira Road, Bugolobi
P. O. Box 22425, Kampala, UGANDA.
T: 041-4268485, Mob: 078-2580490
E: mail@awe-engineers.com
W: www.awe-engineers.com





AMENDMENTS		
No.	Date	Revision

NOTES

- All dimensions are in millimeters unless stated otherwise.
- All levels are in meters above sea level.
- Part of location see DWG:IGWW/0.0.0
- All works, hydraulic and structural locations shall be marked and located in position.
- Structural details are not included.

LEGEND

Client:



REPUBLIC OF RWANDA
MINISTRY OF WATER AND ENVIRONMENT
Rural Water Supply and Sanitation Department (RWSSD)

Project:
Feasibility study, Detailed Engineering Design, Environmental and Social Impact Assessment of piped water supply and sanitation systems in selected Rural Growth Centres across the country.

CONSTRUCTION OF IGWAYA WATER SUPPLY AND SANITATION SYSTEM

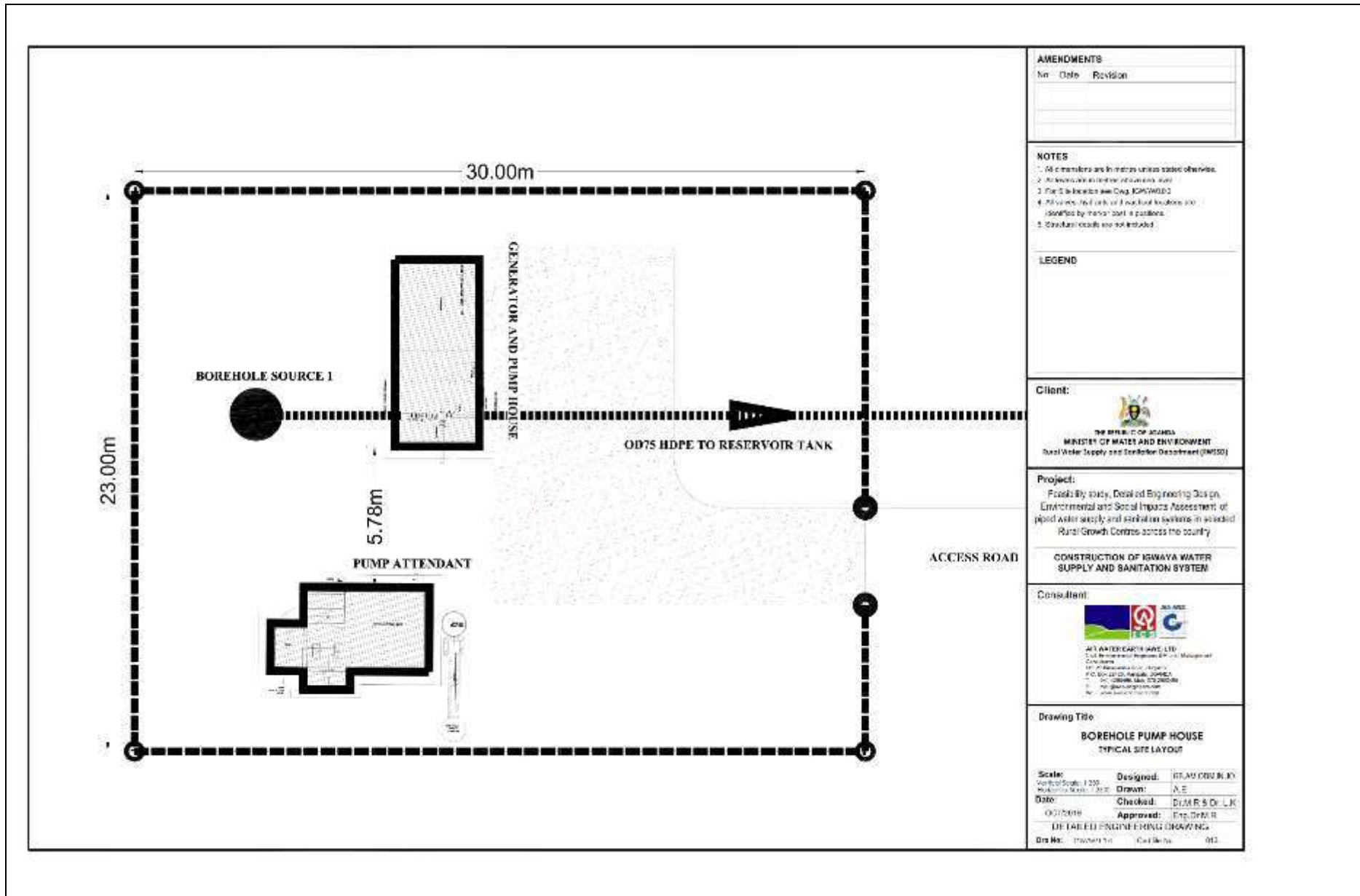
Consultant:



A1 WATER-CARE RWANDA
E-1, Avenue de la République, Kigali, Rwanda
T: +250 78 600 000
F: +250 78 600 000
E: info@water-care.org
www.water-care.org

Drawing Title:
SCHEMATIC LAYOUT

Scale: As indicated on drawings Referenced Scale: 1:500	Designed: CBAR/001/F/JD
Date: OCT/2015	Drawn: A.E
	Checked: LY.M.R & G.L.K
	Approved: Eng. Dr. M.R
DETAILED ENGINEERING DRAWING	
Doc No.: IGW/001/001	Sheet No.: 015



AMENDMENTS		
Nr	Date	Revision

NOTES

- All dimensions are in metric units stated otherwise.
- All levels are indicated and unless stated.
- Part 3 to be done as per Dwg. 02/19/0001
- All valves, fittings and equipment locations are identified by marks and a position.
- Structural details are not included.

LEGEND

Client:



THE REPUBLIC OF RWANDA
 MINISTRY OF WATER AND ENVIRONMENT
 Rural Water Supply and Sanitation Department (RWSSD)

Project:

Feasibility study, Detailed Engineering Design, Environmental and Social Impact Assessment of piped water supply and sanitation systems in selected Rural Growth Centres across the country.

CONSTRUCTION OF ISHUYA WATER SUPPLY AND SANITATION SYSTEM

Consultant:



A2 WATER CARE RWANDA LTD.
 5th Environmental Engineer (P.E.), Municipal Engineer
 177, Avenue de la Paix, Kigali
 P.O. Box 4125, Kigali, RWANDA
 T: +250 78 42 28 00
 E: info@watercare.rwanda
 W: www.watercare.rwanda

Drawing Title

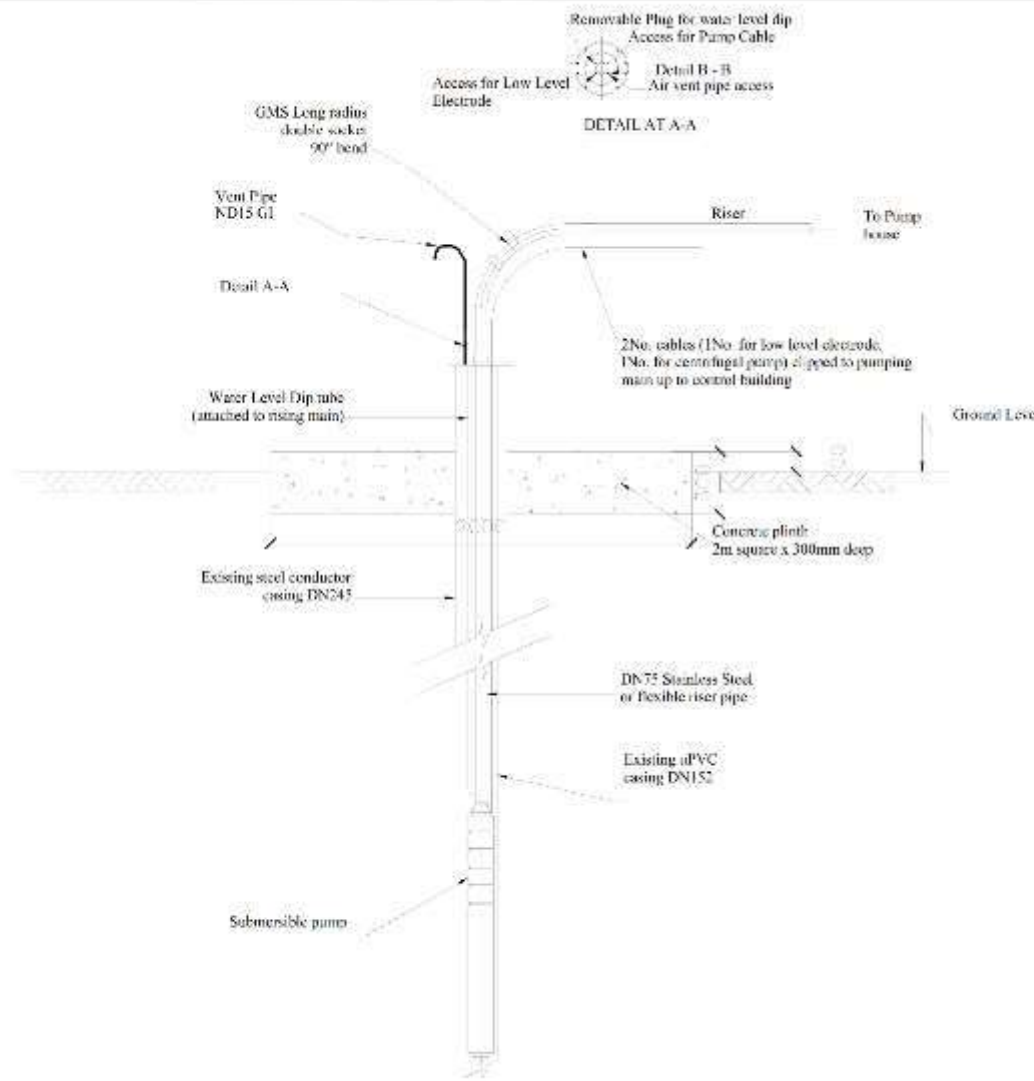
**BOREHOLE PUMP HOUSE
 TYPICAL SITE LAYOUT**

Scale: Vertical Scale: 1:20
 Horizontal Scale: 1:200

Designed: REYAN DUMIRIJO
Drawn: A.E
Date: 03/12/2018
Checked: DIMIRI & DE LUK
Approved: Eng. DIMIRI

DETAILED ENGINEERING DRAWING

Dwg No: 02/19/0001/10 **Sheet No:** 012



AMENDMENTS		
No.	Date	Revision

NOTES

- All dimensions are in metric units unless otherwise stated.
- All measurements are to be taken as shown.
- Part 3 is based on SANS 10400-3.
- All valves, fittings and electrical fixtures are identified by marks and a position.
- Structural details are not included.

LEGEND

Client:



THE REPUBLIC OF LESOTHO
 MINISTRY OF WATER AND ENVIRONMENT
 Rural Water Supply and Sanitation Department (RMSSD)

Project:
 Feasibility study, Detailed Engineering Design, Environmental and Social Impact Assessment of piped water supply and sanitation systems in selected Rural Growth Centres across the country.

CONSTRUCTION OF ISHAYA WATER SUPPLY AND SANITATION SYSTEM

Consultant:



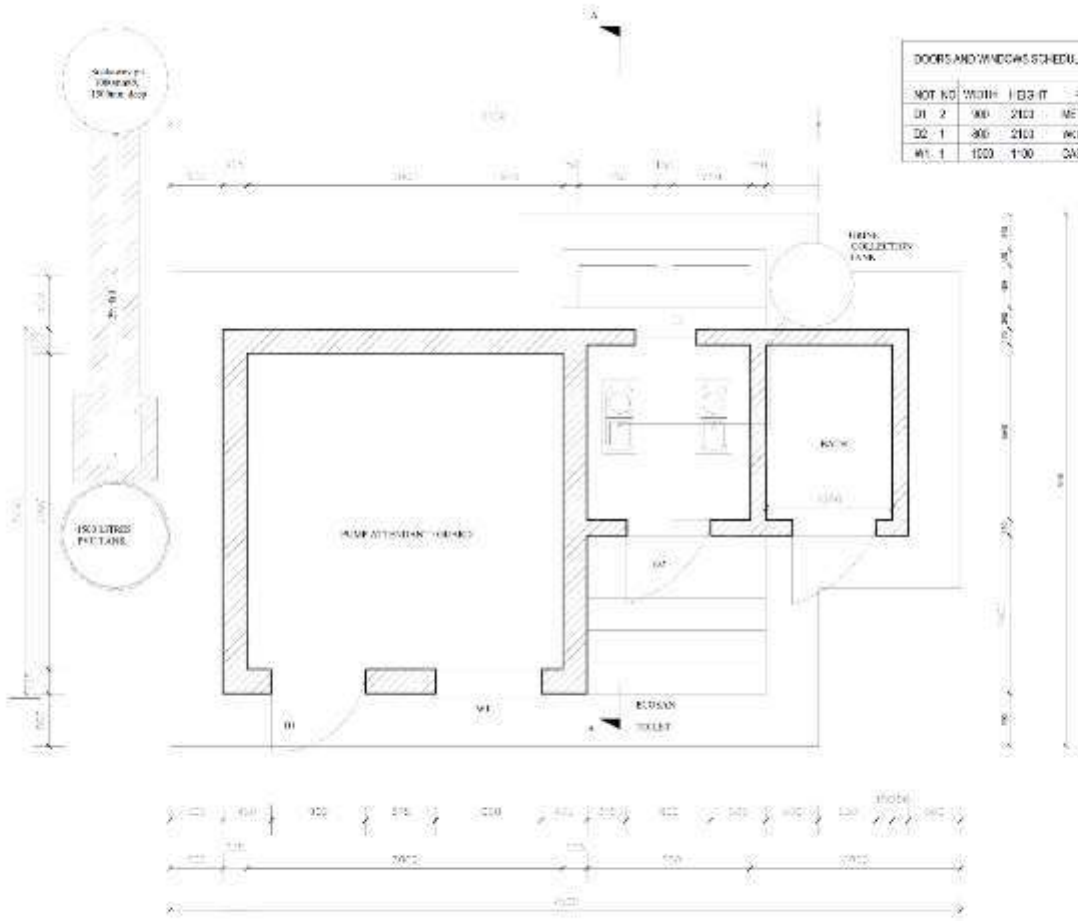
A3 WATERCARE WAVE LTD.
 544, Bechuana Street, Maseru
 Cape Town
 P.O. Box 4125, Maseru, LESOTHO
 T: +27 28 26 26 000
 F: +27 28 26 26 000
 W: www.a3watercare.com

Drawing Title
BOREHOLE PUMP HOUSE
 TYPICAL SECTION THROUGH BOREHOLE

Scale: Vertical Scale: 1:20 Horizontal Scale: 1:20	Designed: REJAY CHOUHAN
Date: 03/12/2018	Drawn: A.E.
	Checked: DIMAS & DE LUK
	Approved: Eng. DIMAS

DETAILED ENGINEERING DRAWING

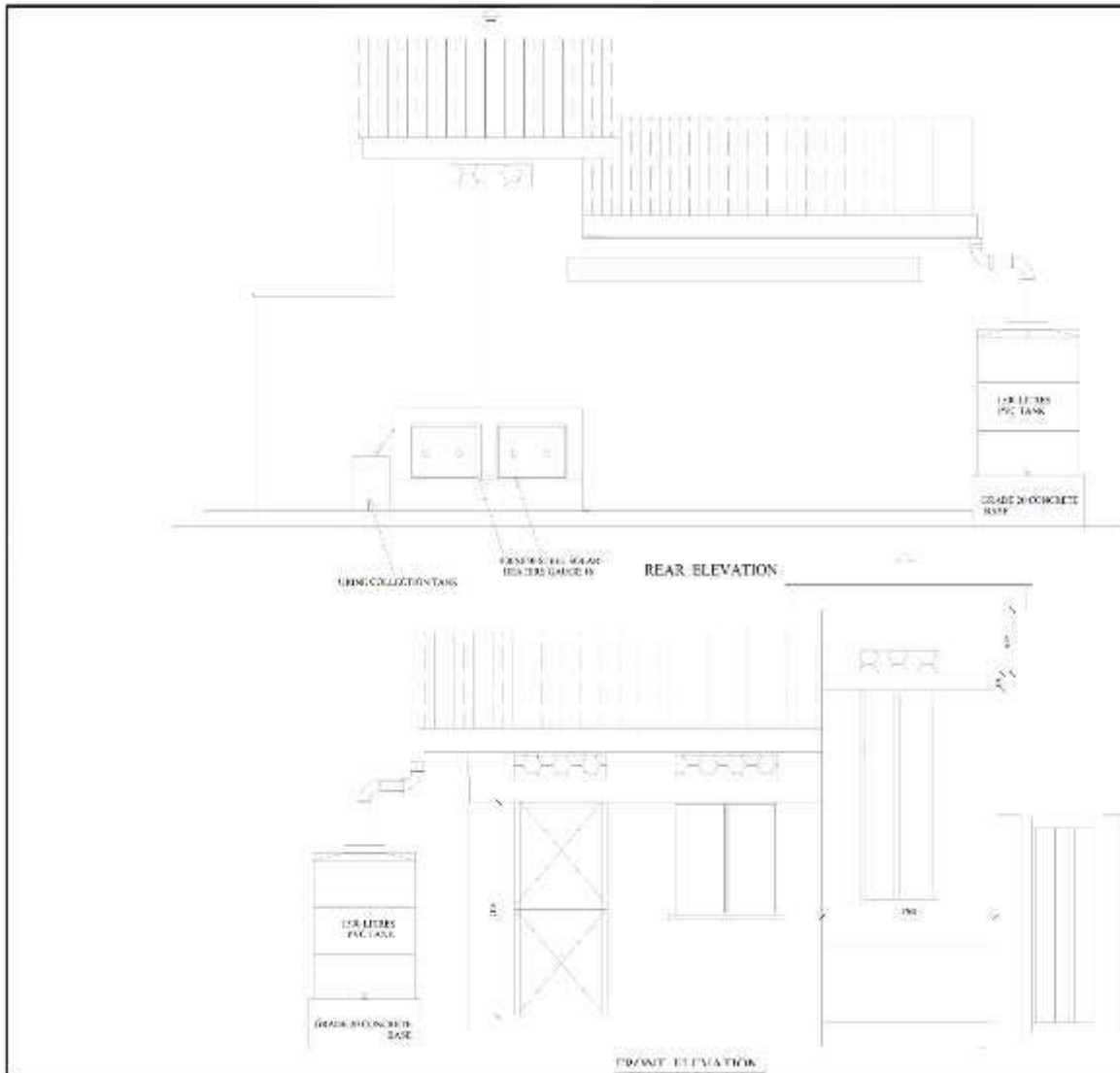
Dr No: DW/2018/11 **Client No:** 012



DOORS AND WINDOWS SCHEDULE			
NO. NO.	WIDTH	HEIGHT	REMARKS
DI - 2	900	2100	METAL
DI - 1	900	2100	ALUMINUM
WI - 1	1000	1100	CASERMENT

GROUND PLAN

AMENDMENTS		
No.	Date	Revision
NOTES 1. All dimensions are in metric units unless otherwise stated. 2. All measurements are to the face unless otherwise stated. 3. Part 3 Schedule 8 and 9 of the Building Code of Practice (BCP) 2011. 4. All vertical dimensions of structural members are identified by marks and a position. 5. Structural details are not included.		
LEGEND		
Client:  THE MINISTRY OF WATER AND ENVIRONMENT RURAL WATER SUPPLY AND SANITATION DEPARTMENT Rural Water Supply and Sanitation Department, FREETOWN		
Project: Feasibility study, Detailed Engineering Design, Environmental and Social Impact Assessment of piped water supply and sanitation systems in selected Rural Growth Centres across the country.		
CONSTRUCTION OF ISHAYA WATER SUPPLY AND SANITATION SYSTEM		
Consultant:  ANTECAPRI (PTY) LTD. 5th Floor, Independence Square, 1st Avenue, Freetown, Sierra Leone. P.O. Box 4725, Freetown, SIERRA LEONE Tel: +232 22 22 2800 Fax: +232 22 22 2800 Email: antecapri@antecapri.com		
Drawing Title PUMP ATTENDANT / GUARD + ECOSAN GROUND FLOOR PLAN		
Scale: Vertical Scale: 1:20 Horizontal Scale: 1:20	Designed: REYAN OJOU N. KY Drawn: A. E. Date: 03/2019 Checked: D.J.M.R. & Dr. L.K. Approved: Eng. Dr. M. R.	Dr. No.: 66/001/13 Sheet No.: 012



AMENDMENTS		
Nr	Date	Revision

NOTES

- All dimensions are in metric units stated otherwise.
- All elevations are in meters above sea level.
- Part 3 buildings are Clg. RCPTW003
- All vertical loads of structural loadings are identified by marked post positions.
- Structural details are not included.

LEGEND

Client:



THE REPUBLIC OF RWANDA
 MINISTRY OF WATER AND ENVIRONMENT
 Rural Water Supply and Sanitation Department (RWSSD)

Project:
 Feasibility study, Detailed Engineering Design, Environmental and Social Impact Assessment of piped water supply and sanitation systems in selected Rural Growth Centres across the country.

CONSTRUCTION OF ISHAYA WATER SUPPLY AND SANITATION SYSTEM

Consultant:



ANTECAPITAL WAY LTD
 5th Management System (P.M.S.) Management
 Consultants
 17, Avenue des Nations Unies
 P.O. Box 4925, Kigali, RWANDA
 T: +250 78 52 28 00
 E: antecapital@antecapital.com
 W: www.antecapital.com

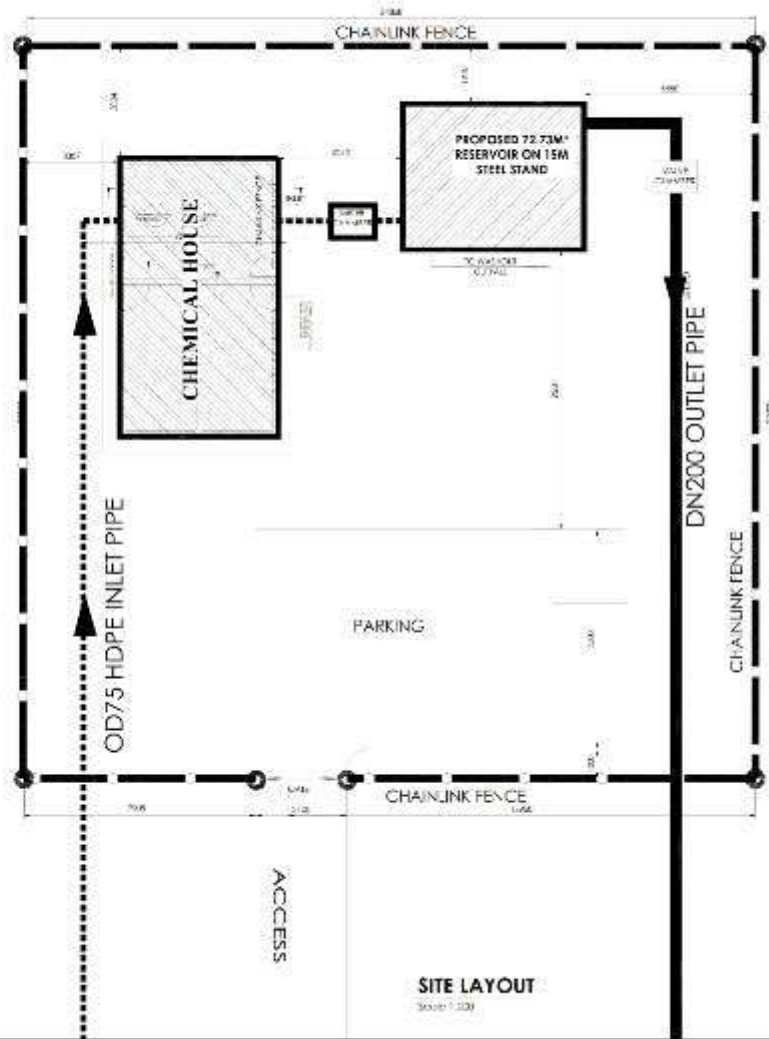
Drawing Title
PUMP ATTENDANT / GUARD + ECOSAN FRONT & REAR ELEVATIONS

Scale: Vertical Scale: 1:20
 Horizontal Scale: 1:20

Designed: REYAN DUBINAYI
Drawn: A.E
Date: 06/12/2018
Checked: DIMAS DE LUK
Approved: Eng. DIMAS DE LUK

DETAILED ENGINEERING DRAWING

Dr. No.: 18/000/11 **Cl. No.:** 012



AMENDMENTS		
Nr	Date	Revision

- NOTES**
- All dimensions are in metric units unless otherwise stated.
 - All measurements are to the centerline unless otherwise stated.
 - Part 3 to be done as per Dwg. 000000000.
 - All valves, fittings and equipment locations are identified by marks and a position.
 - Structural details are not included.

LEGEND

Client:



THE REPUBLIC OF LESOTHO
 MINISTRY OF WATER AND ENVIRONMENT
 Rural Water Supply and Sanitation Department (RWSSD)

Project:

Feasibility study, Detailed Engineering Design, Environmental and Social Impact Assessment of piped water supply and sanitation systems in selected Rural Growth Centres across the country.

CONSTRUCTION OF ISHAYA WATER SUPPLY AND SANITATION SYSTEM

Consultant:



A3 WATERCARE (PTY) LTD.
 104 Beaufort Street, Bopape, Maseru
 051 461 1111
 P.O. Box 4125, Maseru, LESOTHO
 E-mail: info@watercare.co.za
 Web: www.watercare.co.za

Drawing Title

72.73M³ RESERVOIR TANK
 000000000

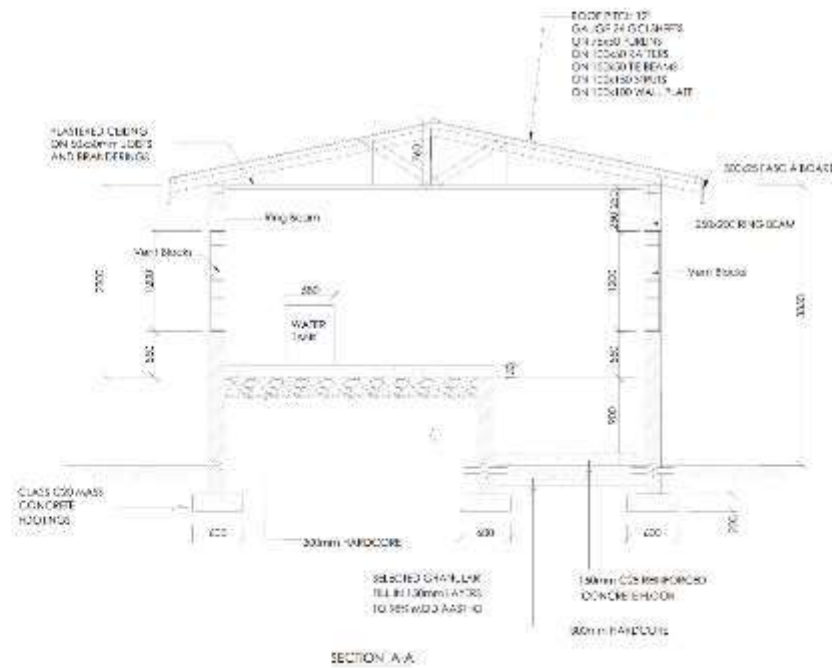
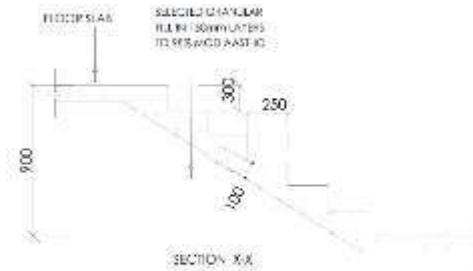
Scale: Architectural Scale: 1:200 Mechanical Scale: 1:200	Designed: Drawn:	REJAY CHEN M. Eng A. E.
Date: 03/12/2018	Checked: Approved:	D.J.M.R. & D.L.K. Eng. D.J.M.R.

DETAILED ENGINEERING DRAWING

Dwg No.: 000000000 **Sheet No.:** 012

DOOR SCHEDULE				
MARK	WCH	HEIGHT	No.	DESCRIPTION
D1	WC	2100	01	SINGLE LEAF HARDWOOD SWING DOORS

DOOR SCHEDULE



AMENDMENTS		
No.	Date	Reason

NOTES

- All dimensions are in metric unless stated otherwise.
- All levels are in metres above sea level.
- For Site location see Map: 000000000.
- All valves, hydrants and washout locations are indicated by symbols and in position.
- Structural details not included.

LEGEND

Client:



MINISTRY OF WATER AND ENVIRONMENT
Federal Water Supply and Sanitation Department (FMSSD)

Project:
Feasibility study, Detailed Engineering Design, Environmental and Social Impact Assessment of piped water supply and sanitation systems in selected Rural Growth Centres across the country.

CONSTRUCTION OF IGWAWA WATER SUPPLY AND SANITATION SYSTEM

Consultant:



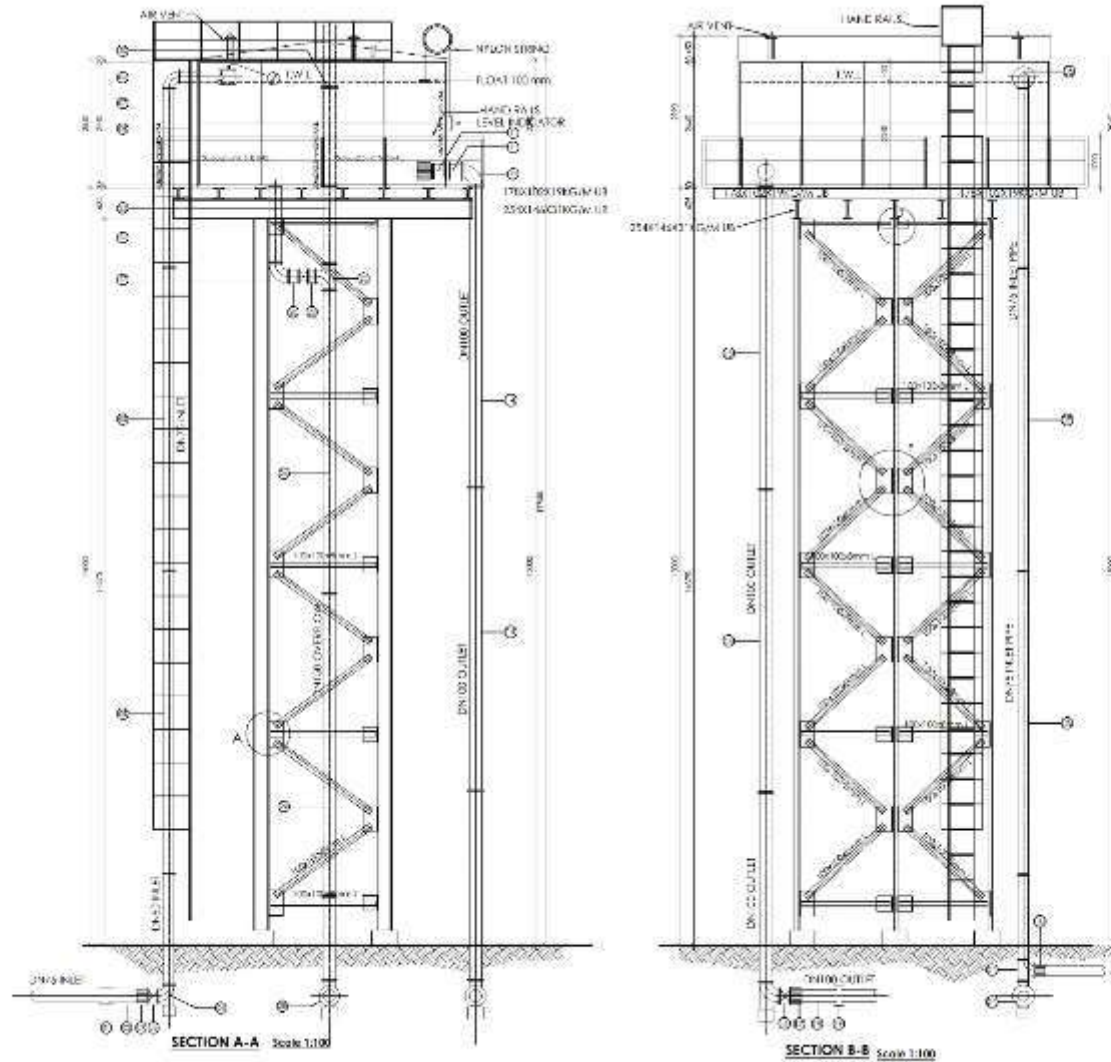
JAWA WATER SUPPLY COMPANY LIMITED
Civil & Environmental Engineering & Project Management
Consultants
15/15, Oluwalana Road, Lagos
P.O. BOX 20000, Ikeja, Lagos State
T: 01-2619515, 01-2612200
E: info@jawa.com.ng
www.jawa.com.ng

Drawing Title:
CHEMICAL HOUSE
SECTIONS AND DOOR SCHEDULE

Scale: 1/200 (Elevations)	Designed: OBAIDUNNI
1/100 (Sections)	Drawn: A.E.
Date: OCT 2011	Checked: E.A.R. & D.L.K.
	Approved: Eng. D.M.R.

DETAILED ENGINEERING DRAWING

Draw No: 410000111 Date: 11/10/11 01



AMENDMENTS		
Nr.	Date	Revision

NOTES

- All dimensions are in metric units unless otherwise stated.
- All measurements are to the outside unless otherwise stated.
- Part 3 details are as per SANS 10130-3.
- All valves, fittings and equipment shall be identified by manufacturer's position.
- Structural details are not included.

LEGEND

Client:



REPUBLIC OF LESOTHO
MINISTRY OF WATER AND ENVIRONMENT
Rural Water Supply and Sanitation Department (RMSSD)

Project:

Feasibility study, Detailed Engineering Design, Environmental and Social Impact Assessment of piped water supply and sanitation systems in selected Rural Growth Centres across the country.

CONSTRUCTION OF ISHAYA WATER SUPPLY AND SANITATION SYSTEM

Consultant:



A3 WATERCARTS (PTY) LTD.
1st Floor, 100, Main Street, Maseru
Cape Town
P.O. Box 1122, Maseru, LESOTHO
Tel: +27 28 25 25 25
Fax: +27 28 25 25 25
www.a3watercarts.com

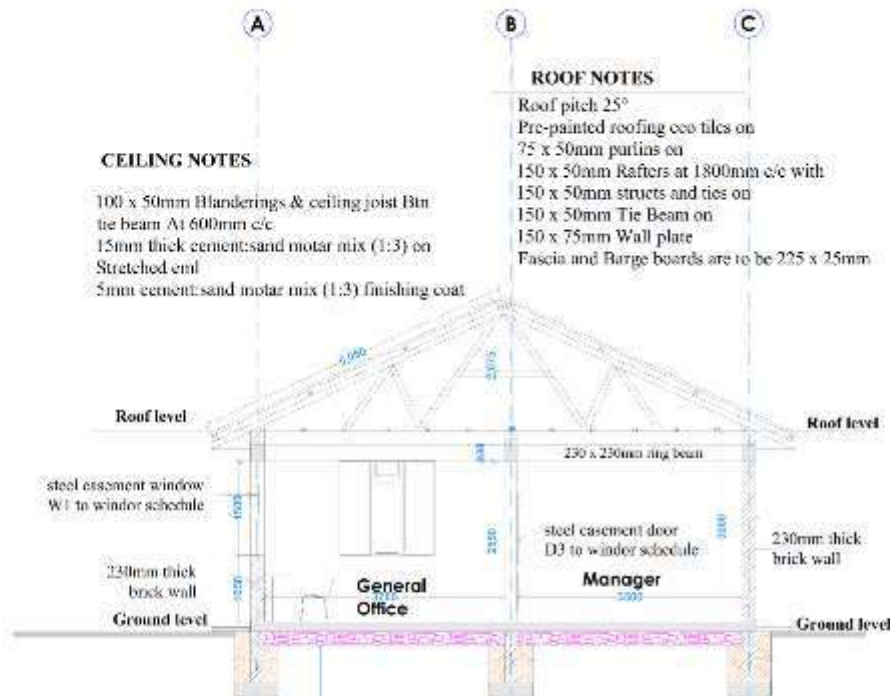
Drawing Title:

72.73M³ RESERVOIR TANK
SECTION A & B

Scale: Vertical Scale: 1:20 Horizontal Scale: 1:20	Designed: R. J. VAN DER MERWE Drawn: A. E.
Date: 02/12/2018	Checked: D. J. M. R. & D. L. K. Approved: Eng. D. M. R.

DETAILED ENGINEERING DRAWING

Dr. No.: 05/2018/01 **Cal. No.:** 012



SECTION L--J02 scale 1:75
Water Office Block

FOUNDATION NOTES

100mm high skirting (mahogany) on
Floor finish as specified on
25mm thick cement screed on
150mm thick concrete floor slab mix(1:3:6)12mm agg on
200mm thick well compacted & approved hardcore filling on
Consolidated murrum
690 x230mm concrete strip foundation slab mix(1:3:6)19mm agg in
Well levelled and rammed trenches whose depths are to be determined on site
Levels are to be checked before ground breaking

CEILING NOTES

100 x 50mm Blanderings & ceiling joist 13m tie beam A1 600mm c/c
15mm thick cement:sand motar mix (1:3) on Stretched end
5mm cement:sand motar mix (1:3) finishing coat

ROOF NOTES

Roof pitch 25°
Pre-painted roofing ccc tiles on
75 x 50mm purlins on
150 x 50mm Rafters at 1800mm c/c with
150 x 50mm struts and ties on
150 x 50mm Tie Beam on
150 x 75mm Wall plate
Fascia and Barge boards are to be 225 x 25mm

AMENDMENTS

No. Date Revision

NOTES

1. All dimensions are in millimetres unless stated otherwise.
2. All levels are in metres above sea level.
3. Note all dimensions and fixings in brackets.
4. All works to be done and verified before work commences for a particular location.
5. Structural details are not included.

LEGEND

Client:



REPUBLIC OF UGANDA
MINISTRY OF WATER AND ENVIRONMENT
Rural Water Supply and Sanitation Department (RWSSD)

Project:

Feasibility study, Detailed Engineering Design, Environmental and Social Impact Assessment of piped water supply and sanitation systems in selected Rural Growth Centres across the country.

CONSTRUCTION OF IGWAYA WATER SUPPLY AND SANITATION SYSTEM

Consultant:

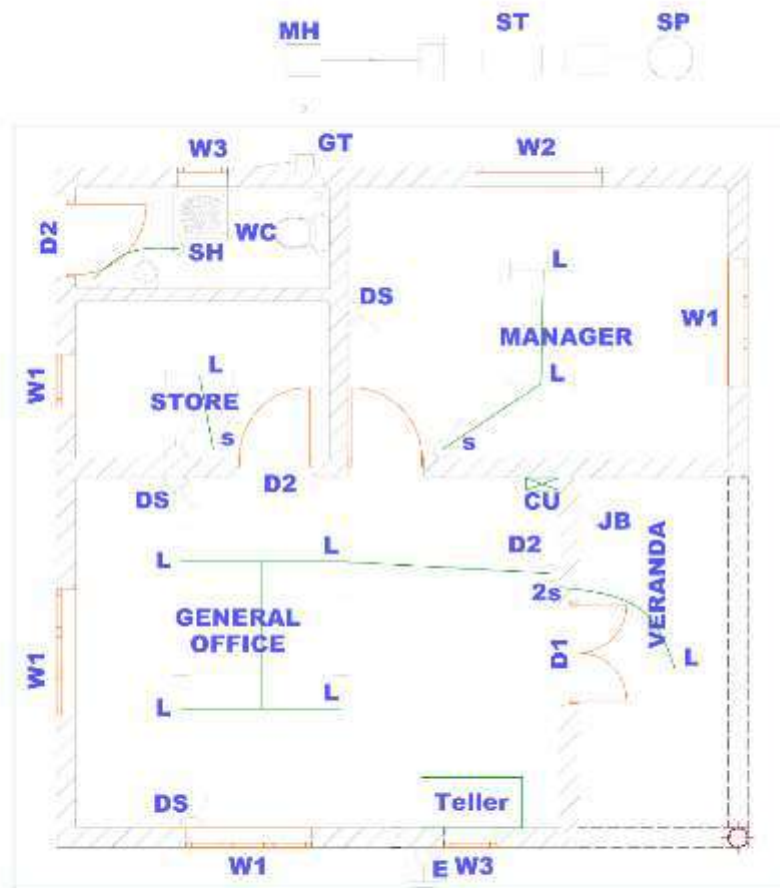


IGWAYA WATER SUPPLY AND SANITATION SYSTEM
Consultant
P.O. Box 42122, Kampala, UGANDA
T: 011 254246, 011 254247
E: igwaya@igwaya.com
www.igwaya.com

Drawing Title

WATER OFFICE BLOCK
SECTION L-J02

Scale: Vertical Scale: 1:20
Horizontal Scale: 1:500
Designed: CBAM/CDR/R JO
Drawn: A.E
Date: 02/2019
Checked: D.Y.M.R & D.L.K
Approved: Eng. Dr. M.R
THE UGANDA ENGINEERING DRAWINGS
Dra No: 01/2019/11 Dra No: 01/2019/11



ELECTRICAL & MECHANICAL LAYOUT Scale 1:50

AMENDMENTS		
No	Date	Revisions

NOTES
1. All dimensions are in millimetres unless stated otherwise.
2. All levels are in metres above sea level.
3. Floor slab thickness and key placement.
4. All valves, hydrants and vertical boreholes are indicated by a circle and a position.
5. Structures walls are not included.

LEGEND

Client:
 THE REPUBLIC OF BOTSWANA MINISTRY OF WATER AND ENVIRONMENT Rural Water Supply and Sanitation Department (RWSSD)

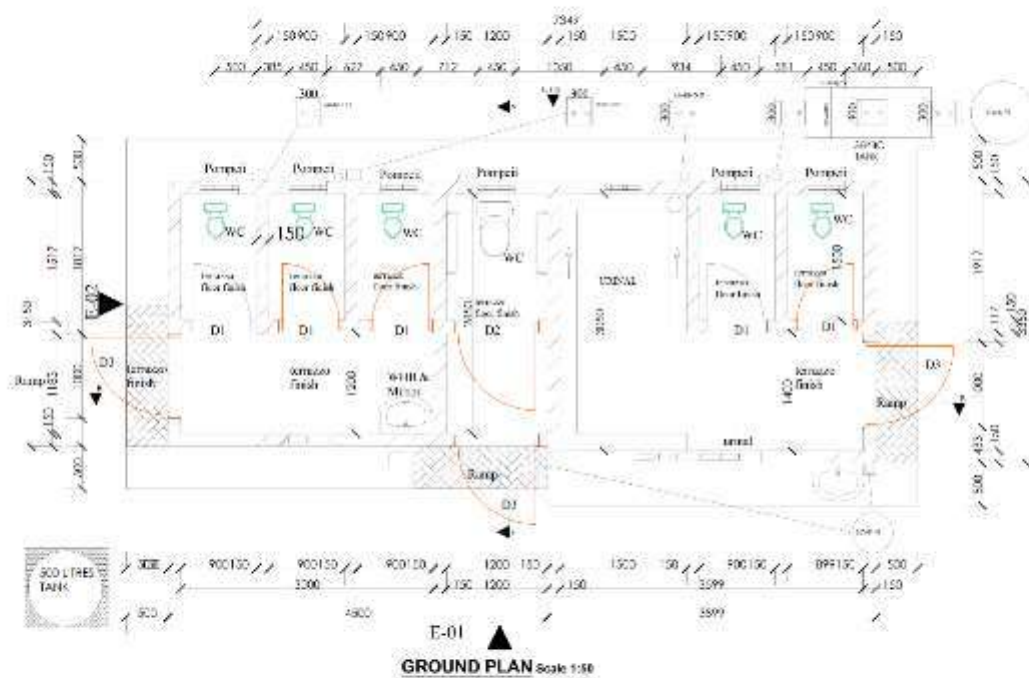
Project:
Feasibility study, Detailed Engineering Design, Environmental and Social Impact Assessment of piped water supply and sanitation systems in selected Rural Growth Centres across the country.

CONSTRUCTION OF IGWAWA WATER SUPPLY AND SANITATION SYSTEM

Consultant:
 GWA AND GPC 215 KATHARPOORTH (GWA) LTD P.O. Box 1000, Maseru District Municipality Cape Town P.O. Box 1000, Maseru District P.O. Box 1000, Maseru District T: 081 884 44 44, 071 355 02 02 E: maseru@gwacorp.com www.gwacorp.com

Drawing Title
WATER OFFICE BLOCK Mechanical and Electrical Installation

Scale:	Vertical Scale: 1:20	Horizontal Scale: 1:50	Designed:	CBAM/CDR/BJO	
Date:	02/10/2019	Checked:	Dr. M.R. & Dr. L.K.	Approved:	Eng. Dr. M.R.
Drawn:	A.E.	Approved:	Eng. Dr. M.R.	T.D. (A) (E) (R) (N) (P) (R) (N) (C) (D) (R) (A) (W) (I) (N) (G)	
Draw No:	1000000111	Drawn By:	A.E.	Drawn By:	D.D.



AMENDMENTS

No.	Date	Revision

NOTES

1. All dimensions are in metric units unless otherwise stated.
2. All levels are in meters above sea level.
3. Part 3 is based on the City of Kigali Code.
4. All valves, fittings and equipment locations are identified by marks and a position.
5. Structural details are not included.

LEGEND

Client:



MINISTRY OF WATER AND ENVIRONMENT
Rural Water Supply and Sanitation Department (RWSSD)

Project:

Feasibility study, Detailed Engineering Design, Environmental and Social Impact Assessment of piped water supply and sanitation systems in selected Rural Growth Centres across the country.

CONSTRUCTION OF KIGALI WATER SUPPLY AND SANITATION SYSTEM

Contract:



A1 WATER CARES (PVT) LTD.
144, Kigali, Rwanda
P.O. Box 14225, Kigali, Rwanda
T: +250 78 822 2800
E: info@watercare.com.rw
W: www.watercare.com.rw

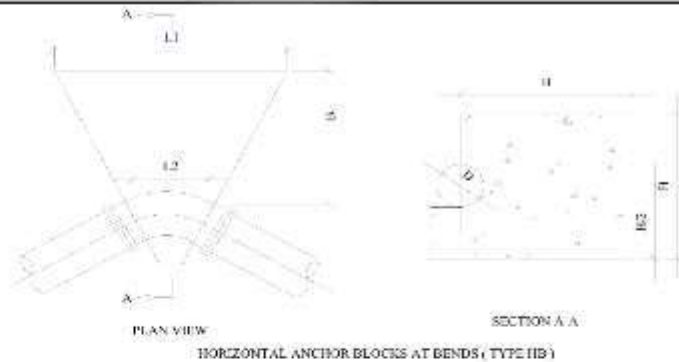
Drawing Title:

**4-STORCK PUBLIC TOILET
WATER BORNE TOILET
GROUND FLOOR PLAN**

Scale: Vertical Scale: 1:20 Horizontal Scale: 1:50	Designed: IRANKUM NJD
Date: OCT/2019	Drawn: A.E
Checked: Dr. V.P.S. Or. L.K.	Approved: Drp. Dr. M. R.

DETAILED ENGINEERING DRAWING

Drawn: IRANKUM NJD **Scale:** 1:50



HORIZONTAL BENDS (TYPE HB)																	
NOMINAL DIAMETER	TEST PRESSURE	90° BEND				45° BEND				22 1/2° BEND				11 1/4° BEND			
		L1 m	L2 m	B m	H m	L1 m	L2 m	B m	H m	L1 m	L2 m	B m	H m	L1 m	L2 m	B m	H m
40-50	250	1.00	0.24	0.25	0.50	0.50	0.24	0.20	0.40	0.20	0.24	0.20	0.20	0.40	0.24	0.20	0.20
	225	0.60	0.14	0.10	0.40	0.50	0.24	0.25	0.20	0.40	0.24	0.20	0.20	0.30	0.24	0.20	0.20
	180	0.60	0.24	0.25	0.50	0.50	0.24	0.25	0.25	0.40	0.24	0.20	0.20	0.30	0.24	0.20	0.20
	135	0.60	0.24	0.25	0.50	0.50	0.24	0.20	0.30	0.40	0.24	0.20	0.20	0.30	0.24	0.20	0.20
	90	0.60	0.24	0.20	0.20	0.50	0.24	0.20	0.20	0.40	0.24	0.20	0.20	0.30	0.24	0.20	0.20
80-100	250	1.00	0.30	0.25	0.50	0.50	0.30	0.30	0.30	0.30	0.30	0.30	0.60	0.50	0.50	0.50	0.60
	225	0.60	0.30	0.20	0.40	0.50	0.30	0.30	0.30	0.30	0.30	0.30	0.60	0.50	0.50	0.50	0.60
	180	0.60	0.30	0.25	0.50	0.50	0.30	0.30	0.30	0.30	0.30	0.30	0.60	0.50	0.50	0.50	0.60
	135	0.60	0.30	0.25	0.50	0.50	0.30	0.30	0.30	0.30	0.30	0.30	0.60	0.50	0.50	0.50	0.60
	90	0.60	0.30	0.20	0.50	0.50	0.30	0.30	0.30	0.30	0.30	0.30	0.60	0.50	0.50	0.50	0.60
100-150	250	1.20	0.45	0.40	0.60	0.60	0.45	0.45	0.45	0.45	0.45	0.45	0.70	0.70	0.60	0.60	0.60
	225	1.20	0.45	0.40	0.60	0.60	0.45	0.45	0.45	0.45	0.45	0.45	0.70	0.70	0.60	0.60	0.60
	180	1.00	0.45	0.40	0.60	0.60	0.45	0.45	0.45	0.45	0.45	0.45	0.70	0.70	0.60	0.60	0.60
	135	1.00	0.45	0.40	0.60	0.60	0.45	0.45	0.45	0.45	0.45	0.45	0.70	0.70	0.60	0.60	0.60
	90	1.00	0.45	0.40	0.60	0.60	0.45	0.45	0.45	0.45	0.45	0.45	0.70	0.70	0.60	0.60	0.60

Client:

 THE REPUBLIC OF UGANDA
 MINISTRY OF WATER AND ENVIRONMENT
 Kibuli Water Supply and Sanitation Directorate (KWSDD)

Project:
 Feasibility study, Detailed Engineering Design, Environmental and Social Impact Assessment of piped water supply and sanitation systems in selected Rural Growth Centres across the country

CONSTRUCTION OF RWAWA WATER SUPPLY AND SANITATION SYSTEM

Consultant:

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Drawing Title:
ANCHOR BLOCKS FOR BENDS-1

Scale: As per Schedule 1
Design: CBAU/CDA/RJD
Drawn: ALE
Date: OCT 2019
Checked: D.M.R & D.L.K
Approved: R.H. TWISS R
DETAILED ENGINEERING DRAWING
 Dwg No: ... Cont No: ... 012

ANNEX C: SAMPLE SIZE DETERMINATION

N	S	N	S	N	S	N	S	N	S
10	10	100	80	280	162	800	260	2800	338
15	14	110	86	290	165	850	265	3000	341
20	19	120	92	300	169	900	269	3500	346
25	24	130	97	320	175	950	274	4000	351
30	28	140	103	340	181	1000	278	4500	354
35	32	150	108	360	186	1100	285	5000	357
40	36	160	113	380	191	1200	291	6000	361
45	40	170	118	400	196	1300	297	7000	364
50	44	180	123	420	201	1400	302	8000	367
55	48	190	127	440	205	1500	306	9000	368
60	52	200	132	460	210	1600	310	10000	370
65	56	210	136	480	214	1700	313	15000	375
70	59	220	140	500	217	1800	317	20000	377
75	63	230	144	550	226	1900	320	30000	379
80	66	240	148	600	234	2000	322	40000	380
85	70	250	152	650	242	2200	327	50000	381
90	73	260	155	700	248	2400	331	75000	382
95	76	270	159	750	254	2600	335	1000000	384

ANNEX D: STAKEHOLDERS ENGAGED AND PARTICIPANT LISTS ATTACHED

CONSULTATIONS WITH BUYENDE DISTRICT LOCAL GOVERNMENT OFFICIALS

Discussions were held with district officials on aspects relating to the proposed project components which all will be useful in the subsequent planning and execution of the assignment. Key stakeholders met during the preliminary visit were among others:

No.	Concern	Remark
1	<p>There are several mushrooming small towns, rural growth centers and landing sites with higher populations compared to the rural areas in the district that require access to social and public services such as water and sanitation. Buyende District needs numerous development projects to reach its full potential. Therefore, the rural water supply and sanitation projects proposed for Igwaya and Igwaya Rural Growth Centres are highly welcome.</p>	<p>Its because such mushrooming towns that MWE targeted Igwala RGC</p>
2	<p>Access to safe drinking water is a big problem in Buyende district, 62% of communities lack access to safe drinking water. The problem is greater in the budding small towns, rural growth centres and landing sites. The selected rural growth centre, namely Igwaya is among the most affected.</p> <p>Although the Ministry of Water and Environment directed phasing out point sources of water in small towns, rural growth centres and landing sites, the main sources of water in these locations remains boreholes. The boreholes are only functional during the wet season and tend to dry up during the dry season. The borehole yields are in themselves not sufficient to cover the demand for water in these budding urban centres. Some boreholes have low yield while others produce hard and/or saline water.</p> <p>Other sources of water include valley dams and unprotected springs; whose water is not safe for domestic consumption. The proposed project is therefore timely and will benefit the growing populations in Igwaya RGC.</p>	<p>The Igwaya RG CWSS project will contribute to increased access to safe, clean and affordable water within Kagulu Sub County. The first phase of the project will cover 5 villages, and by the ultimate year 2041, over 35 villages will have access to water in the RGC.</p>
3	<p>Communities in the district practice open defecation and many households do not own standard sanitation facilities, mainly latrines. Issues of sanitation, therefore, need to be streamlined on the project. Good sanitation strategies, such free conditional individual connections upon evidence of proper sanitation facilities (latrines) at household level should be prioritized as an incentive for increased ownership and use of sanitation facilities on the project.</p>	<p>The project will support Igwaya RGC with one public water borne toilet to be located at GPS coordinates 533940.10E, 136577.39N at Kagulu HCIII. The proposed sanitation facility will contribute to increasing access to proper and improved sanitation in Igwaya RGC. Sensitization focusing on the sanitation and hygiene shall be</p>

No.	Concern	Remark
		undertaken during construction phase.
4	Coordination of the project among the consultants/contractors, Ministry of Water and Environment, District officials and village authorities should be emphasized	The project will have a coordination committee including district, sub county and village officials both at construction and operation phases.
5	Community ownership of the project should be a key component enshrined in project development. The roles and responsibilities of district technical and political teams, sub county, parishes and villages authorities to support the functionality of the project should be defined throughout the project lifecycle.	<p>The roles and responsibilities of the different stakeholders have been clearly stipulated in the ESMP.</p> <p>Continuous Stakeholder engagement shall be part and partial of the project. MWE shall engage the service of consultant to undertake this activities.</p>



Meeting with Buyende District Officials on 3rd February 2022

CONSULTATIONS WITH KAGULU SUB COUNTY LOWER LG OFFICIALS

No	Views	Remarks
1	<p>The current situation on water, sanitation and hygiene in Igwaya RGC:</p> <ul style="list-style-type: none"> Water scarcity is among the major problems faced in the RGC. There is no functional piped water system in whole of Kagulu Sub County. The only piped water system was at Iyingo landing site, but it is currently nonfunctional. There was a major 	The proposed piped water system will contribute to reducing the water stress in Igwaya RGC.

No	Views	Remarks
	<p>technical breakdown and up to now it has never been repaired.</p> <ul style="list-style-type: none"> • The most water stressed parish in Kagulu SC is Bumogoli parish – Igwaya, Buyumba & Iyingo fishing villages. • At Kagulu HC II and Kagulu weekly market (just opposite SC Hdqtrs), there is no reliable water source. • At Kagulu Hill, a major eco-tourism site in Buyende District, there is a motorized borehole but still there is need for a piped water system. There is need to extend piped water to Igwaya, Buyumba & Iyingo fishing villages, Kagulu Hill, Kagulu HC II, Kagulu weekly market and nearby Miru TC which is highly populated. 	
2	<p>Existing water gaps in accessing piped water supply:</p> <ul style="list-style-type: none"> • Every financial year, the sub county receives funding for three (3) boreholes. However, the water is not enough. • A Non-Government Organisation, (Busoga Volunteers) supports constructing boreholes in the Sub County, however, the boreholes have poor yield and some yield saline water. 	Noted
3	<p>Most affected:</p> <ul style="list-style-type: none"> • The most affected are communities near Lake Kyoga, especially in Buyumba and Iyingo fishing villages. Due to increased water levels in the lake, there are increased cases of drowning and the lake water is turbid. Additionally, there has been increased incidences of water borne diseases for communities near the Lake. • Another category of affected persons are the staff and patients at Kagulu HC III. There is no reliable water source at the HC. Therefore, Water supply should be extended to Kigulu Health Centre III, which currently operates a maternity ward with no access to a nearby safe water source. 	<p>Iyingo and Buyumba landing sites are part of the additional 30 villages planned for in second phase of the project.</p> <p>The first phase water distribution network will include Kagulu HC II and Kagulu Market.</p>
5	<p>Project anticipated benefits:</p> <ul style="list-style-type: none"> • Provide public stand pipes and tap stands close to homesteads to reduce the distance and time spent fetching water. • The proposed public toilet should be established at the weekly market. 	<p>Public stands will be put near homesteads after proper assessment and consultations with the communities.</p> <p>The location of public toilet will be selected by the Sub County.</p>

No	Views	Remarks
6	<p>Land ownership:</p> <ul style="list-style-type: none"> • Land is communally owned in Igwaya (Families and clans own the land). • The proposed water source in Mailo village is near and/or even within Lake Kyoga shoreline. More certainly, this does not require compensation because it's within the buffer zone of 100 meters as per national Environmental Act 2019. However, there is need to explain to the communities about ownership of lakeshores in order to avoid grievances. • Owners of land where the transmission line is to traverse should be compensated. • Engagements with the land owners at the proposed reservoir site should be undertaken, as the land is communally owned by a family. 	<p>A resettlement action plan (RAP) is being prepared to inform the compensation and resettlement guided by the Laws of Uganda and World Bank requirements.</p>
7	<p>Issues to note:</p> <ul style="list-style-type: none"> • The location of project components; namely, the laying of transmission and distribution pipes and reservoir for the proposed Igwaya piped water supply system and sanitation facilities should follow the Kagulu Sub County Physical plan for Igwaya Town Board • During the construction phase of the project, youth from Igwaya should be given jobs as a means of training and skills transfer. • Recruitment for available job opportunities on the project should prioritize community members of Kagulu Sub County. • Communities should be trained on proper operation and maintenance of the water systems and sanitation facilities. • The project should clearly spell out roles and responsibilities of the sub county and communities in the management of the proposed projects • The price of piped water and connection to individual households should be affordable • The project should have a proper process for avoiding gender impacts and managing grievances in case they arise • The sanitation facility should be either constructed at the weekly market or the health Centre III, both close to Kagulu Sub County • Before construction, the Contractor and MWE should display and disclose the design of the piped water system, in order to get input into location of PSPs and yard taps 	<p>All planned infrastructure shall be guided by the local governments to comply with approved physical development plans.</p> <p>The contract to work with local stakeholders and mobilize youths for any available job opportunities during construction.</p> <p>O&M trainings have been planned during construction</p> <p>The roles and responsibilities of the different stakeholders have been clearly stipulated in the ESMP.</p> <p>Continuous Stakeholder engagement shall be part and partial of the project. MWE shall engage the service of consultant to undertake these activities.</p> <p>Proper GRM is part and partial of this project from the community, contractor, LGs to MWE levels to ensure effective</p>

No	Views	Remarks
		grievance management including issues f GBV and VAC.



Meeting the political and technical officials of Kagulu SC



Meeting the Health inspector – Buyende District



Meeting the LC III – Kagulu SC



Meeting the SAS – Kagulu SC

Meeting Kagulu Sub County stakeholders

CONSULTATIONS WITH IN MAILO VILLAGE

No.	Issues and concerns raised	Remarks
1	<p>Status quo on water, sanitation and hygiene in Mailo Village:</p> <ul style="list-style-type: none"> The drought is so severe. All our crops are drying up. We are relying on the Lake Kyoga to collect water. There is a borehole, but the lines for fetching water are long. We send children to fetch water, but they come back late. Even at night people go the borehole. A new borehole was drilled by the DAWA HUMANITY an Islamic NGO, but is not functional. The community informed the meeting of scarcity of water in the area ever since the closure of two boreholes that were to be repaired and serviced. However, these boreholes up to date have not been worked 	<p>Mailo is among the 5 villages selected to benefit from the first phase of project.</p>

No.	Issues and concerns raised	Remarks
	<p>hence residents resort to collecting water from the lake and moving about 2-3kms to the nearest boreholes.</p> <ul style="list-style-type: none"> The community informed the meeting that most of the household have latrines and only a few share them with neighbours, children were noted to have a tendency of open defecation especially at the lake shores. 	
2	<p>Most affected:</p> <ul style="list-style-type: none"> The water scarcity affects all the people, it is worse for pregnant women who access medical attention at Kagulu HC II. Last year a woman from Mailo village died, and it was attributed to lack of water in the ward at Kagulu HC II. The school children and teachers also are affected. There is hardly a reliable source of water for drinking, cooking porridge and food. 	Water will be extended to Kagulu HC II, and schools within the 5 villages of the first phase of the project
3	<p>Risks anticipated from the construction phase of the project:</p> <ul style="list-style-type: none"> There is no road to the lake shore, the location of the proposed project borehole. The drilling team destroyed our crops along the community access road using a truck while accessing the borehole site. We anticipate more such destruction during the construction phase. The project should plan to open up an access road to the site to ease access to the site and reduce on destruction of crops along the community footpath. 	The RAP team will assess land requirements for the access road, value and propose compensation for land and crops along the access before project construction.
4	<p>Land ownership:</p> <ul style="list-style-type: none"> The land next to the source is owned by Mwaja Samuel. The community is aware of the law about the Lake buffer zone. However, the project should be considerate and assess and compensate us appropriately. 	The RAP team will assess the sites and advise on acceptable compensation.
5	<p>Cultural sites and beliefs:</p> <ul style="list-style-type: none"> There is a cultural tree about 100m from the abstraction point where some of the resident go to worship ancestral spirits. Activities of the project implementation should not disturb the peace and cultural beliefs at the site. The drilling trucks almost destroyed our grave yards. The project should consider compensation for the graveyard to facilitate relocation. The community informed the meeting of the rampant cases of mob justice in the area as a night before the meeting a resident was allegedly killed over an accusation of holding dangerous charms that claimed a child's life and over 10 animals. 	<p>The project activities shall be confined with the project foot print to minimize any impact outside the RoW.</p> <p>Contractor shall have chance find procedure to guide in identification and management of any cultural resources encountered at the project site.</p>
6	<p>Commonly asked questions:</p> <ol style="list-style-type: none"> Where shall we go to apply for job opportunities? How can one have water extended to their house? How much money will be charged per jerrycan? What will be the payment procedure for the use of water? Concerns were raised on the effectiveness and safety of the piped water. This was in relation to the dosing of water at the intake point. 	<p>People shall apply for jobs at the contractors office that will be established before construction</p> <p>One shall get connected through applying for water connection.</p> <p>The price shall be communicated during further stakeholder</p>

No.	Issues and concerns raised	Remarks
		meetings but is expected to be affordable. MWE shall ensure proper safety of water and shall undertake regular water quality monitoring.
7	One of the residents requested that during project implementation, the community be provided with tree seedlings so as to increase on the vegetation cover of the area that is modified.	Tree planting shall be part of environmental conservation activities.



Community consultative meeting in Mailo village

CONSULTATIONS IN BUYUMBA VILLAGE COMMUNITY

No.	ISSUES AND CONCERNS RAISED	Remarks
1	Status quo on water, sanitation and hygiene in Buyumba Village: <ul style="list-style-type: none"> • There is no clean water source at this fishing village. • The community relies on water from Lake Kyoga, but the water is not clean. • The community expressed an outstanding challenge of water-borne diseases that are rampant, noting however, that Kagulu Health Centre III does not medication or laboratory equipment to confirm prevalence 	The first phase of the project connects Buyumba village, but the pipes don't reach the fishing site. The landing site may be

No.	ISSUES AND CONCERNS RAISED	Remarks
	<p>of the diseases among the residents. The meeting noted high cases of bilharzia among the residents.</p> <ul style="list-style-type: none"> • The lake shoreline has been blocked by sudd. The community only uses a small pool of water under papyrus. There are risks of children and women being bitten by snakes while fetching water. • Residents confirmed that the boreholes they use dry out during the long dry spells and they are left with no alternatives but to collect lake water or pay water vendors UGX 500 for a 20litres jerrycan. 	connected in the project second phase.
2	<p>Most affected by the status quo:</p> <ul style="list-style-type: none"> • Children and women face the burden of fetching water in Buyumba village. 	Noted
3	<p>Anticipated risks from the project</p> <ul style="list-style-type: none"> • Sanitation at the landing site is a major issue. There is no functional public toilet at the landing site. When the sudd recede, fishing will resume and the landing site will become more populated. Buyumba landing site should therefore be selected for location of the sanitation facility. • Risk of non-completion/slow progress in implementation of the proposed project, as most government projects started in the area are never completed, giving an example of electricity transmission in Buyumba TC. • Some farmers were worried about destruction of crops during installation of distribution lines/ pipes. They wanted to know if their gardens won't be affected and if there is a requirement to give up land for project implementation. 	The site for location of the proposed toilets will be determined by Kagulu SC depending on the community with the highest need.
4	<p>Issues to note:</p> <ul style="list-style-type: none"> • The meeting requested that water charges should fit economic earnings in the target communities so as to enable full utilization of the piped water system as in the most preferable way. 	Noted
5	<p>Commonly asked questions:</p> <ol style="list-style-type: none"> 1. Where shall we go to apply for job opportunities? 2. How can one have water extended to their house? 3. How much money will be charged per jerrycan? 4. What will be the payment procedure for the use of water? 5. How much will the water cost? The higher the cost, the lower the people will go to the taps. 6. Will they give us a PSP in our landing site? 	



Meeting in Buyumba in February 2022



Meeting in Buyumba in May 2022

Consultation meetings in Buyumba village

CONSULTATIONS WITH IYINGO LANDING SITE COMMUNITY

No.	Issues and concerns raised	Remarks
1	<p>Status quo on water, sanitation and hygiene</p> <ul style="list-style-type: none"> • The community in Iyingo fetches water from Lake Kyoga. The mini piped water supply system previously operational at the landing site broke down. • The piped water system at the village was constructed by ICEAD (International Congress on Exacerbations of Airway Diseases) to facilitate the fish handling facility on the landing site. • The piped water system was built to boost the hygiene of the community and was handed to the community to take care of it. • Water was pumped from the middle of the lake to the reservoir tank and distributed to Iyingo village. It was pumped using a solar system. • The water source was serving 4 villages which includes Iyingo town village with a population of 400 households; Nagangama village with a 350 HHs; Kasozi village with 250 HHs peoples; Bulongole with 210 HHs. All these were depending on the water system. • The community was responsible for operating the system. Each household paid Ugx 1,000 shillings per month to generate funds for operation and maintenance of the system. • Seasonal changes on the lake facilitate moving weeds in form of islands, which destroyed the pumping system was destroyed. • The matter was reported to the district water office for management. • Three years have passed since the pump was damaged. • However, due to the high cost of water (Ugx. 500 per jerrycan), most people could not afford the charge, therefore they resorted to fetching water from the lake even before the system broke down. 	<p>Iyingo village/ landing site is among the villages proposed for the second phase of the project. However, with the existing water infrastructure at the landing site, MWE could assess the feasibility of repairing the piped water system at Iyingo village as they wait to be connected in the project second phase</p>

No.	Issues and concerns raised	Remarks
2	<p>Other challenges:</p> <ul style="list-style-type: none"> The community is faced with challenges of water borne diseases, more especially; typhoid, malaria, bilharzia, and cholera The community has a primary school (NEW HOPE NURSERY AND PRIMARY SCHOOL), which collects water from the lake. The children are at risk of contracting water borne and water related diseases. There is no functional toilet at Iyingo landing site. The previously provided public latrine was destroyed by the floods. Iyingo landsite should be prioritized in locations for establishment of the sanitation facility 	Noted



Consultation meeting in Iyingo landing site

CONSULTATIONS IN IGWAYA TC

No.	Issues and concerns raised	Remarks
1	There are few boreholes and majority of which broke down due to poor maintenance. The residents commonly collect water from Kyoga. The collected water is unsafe for human consumption. Therefore, the proposed project is timely and welcome.	Noted
2	Will there be public points where they can easily collect water from.	Yes, the design provides for public stand pipes, tap stands and yard taps to be located at public sites
2	Will the proposed supply of piped water discontinue the use of the few boreholes? If not, the abandoned boreholes should be repaired so as to have abundance of water.	The proposed project will not discontinue use of available water sources. Noted

No.	Issues and concerns raised	Remarks
3	Women complained about the limited water at Kagulu HC II especially at the maternity ward.	Kagulu HC II is located among the 5 villages where water will be transmitted in the first phase of the project. The HC will be connected to the proposed water supply project.
4	The residents noted trekking over 2km to access clean water at a borehole, which at times has many people waiting for the same water, which is time consuming and has resulted into assaults on some occasions.	The project through household connections and public water access points will reduce the distance travelled, and time spent at a water source.
5	The community also complained about the quality and quantity of the water abstracted from some boreholes which is brownish with metal particles. They requested that these boreholes be repaired.	Noted
6	Commonly asked questions were; <ol style="list-style-type: none"> 1. How soon will the water supply process start? 2. Is the piped water going to be at a cost or free? If yes how much will be charge per jerrycan? 3. Will the community member be considered for job opportunities? 4. Are people's land going to be affected? If yes, will they be compensated? 	Noted



Meeting in Igwaya TC in February 2022



Meeting in Igwaya TC in May 2022

Meeting in Igwaya TC

CONSULTATION WITH THE KAGULU HEALTH CENTRE OFFICIALS

No.	Issues and concerns raised	Remarks
1	Status quo on water, sanitation and hygiene at the HC: <ul style="list-style-type: none"> • The HC services the entire Kagulu SC with a catchment population of 21,472. The HC offers out-patient and maternity services and out-reaches in the whole sub county. 	Noted

No.	Issues and concerns raised	Remarks
	<ul style="list-style-type: none"> Malaria, dysentery, diarrhea and bacterial infections are the most prevailing infections. There are suspected cases of typhoid and bilharzia, however, there are not testing equipment to confirm cases and their rates. The community built a maternity ward and the staff is overwhelmed with the ever-increasing birth rates, with limited equipment and medication to support deliveries and access to water. There is an overwhelming shortage and lack of water at the facility. There is no water source at or near the HC. The facility obtains water from water vendors at a fee of UGX 500-1000 per 20l jerry can depending on the demand. The health centre has a 2-stance pit latrine that is at the peak of its expected life span (that is about to fill up). 	
2	Operations: the HC has 5 staff, no emergency unit, no ambulance available, no beds assigned to accident victims, handles only first aid cases, no blood transfusion. Has a laboratory and blood group test. Offers reproductive health and VCT services and treat HIV/Aids patients.	The facility may not be in position to offer emergency services in case of accidents on the project.
3	Request from the project: <ul style="list-style-type: none"> The staff requested water to be distributed to the facility and where funds allow, a water tanks for rain harvesting be installed at the health centre. The sanitation facility needs to be improved with a sanitary facility in order to improve on the hygiene of the patients. 	Noted
4	Questions asked: <ul style="list-style-type: none"> If the HC is connected to the proposed piped water supply system, will it be charged to use the water? How much are will a jerry cost? 	



Consultation with Kigulu HC III patients and workers

CONSULTATIONS WITH FISH FARMERS

No.	Issues and concerns raised	Remarks
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1	<p>Opinion about the planned Igwaya TC piped water system</p> <ul style="list-style-type: none"> The Chairperson of the Igwaya fish farming group appreciated the tap water extension project which he considered timely since their ponds would easily dry up during the dry seasons because they are only dependent on the rain water harvested during the rainy seasons. He further requested for the diversion/ extension of the distribution pipes to their site. 	Noted
2	<p>Challenges faced in access to water</p> <ul style="list-style-type: none"> Over dependence on the rains which limits their fish production and sometimes causes losses due to fish deaths when the water levels reduce. Lack of adequate tree cover for providing a good ambience for fish farming. 	Noted
3	<p>Anticipated benefits from the piped water project</p> <ul style="list-style-type: none"> All year-round production with the availability of constantly flowing water taps for easy changing and refiling of water in the fish ponds. Increased incomes because of the minimised losses due to deaths as a result of the reduced water levels. Good tree varieties for planting around the fish ponds 	Noted



Fishing community in Igwaya TC

CONSULTATION WITH KAGULU POLICE POST

No.	QUESTIONS ASKED	ANSWERS
	1) Security of the Project Area	
	Name of police station	Kagulu Police Station
	Common crimes in the project area and causes	Assaults, defilement, domestic violence, theft and murder by mob
	Available facilities (patrol vehicles, motorcycles, communication equipment)	Motorcycle and personal phones
	Capacity in terms of number of officers	Inadequate number of officers

	Coverage in terms of outposts	One outpost
2) Fire Emergency Situation		
	Fire station nearby	No
	Emergency response numbers	0706421969 Afande Yunus
	Fire engine and water tanker	No
	Well-trained fire officers	No
	Firefighting training	No
3) Traffic Safety Situation		
	Common accidents on roads along the project area and their causes	Motorcycle crashes
	Observe the nature of the roads, narrow, wide, potholes, bushy, marram or tarmac, etc.	Marram with potholes
	Traffic volume if the roads are busy	About 300 motorcycles and 30 cars per day
	Type of traffic on the roads	Motorcycles, saloon cars, trucks, bicycles and pedestrians



Meeting the Meeting the Incharge – Kagulu Police post on 14-02-2022

MEETING WITH MGLSD

No.	Issues and concerns raised	Remarks
1	<p>Land acquisition: For water supply system issues, land will have to be secured especially for intake, WTP, reservoir and along transmission and distribution networks.</p> <ul style="list-style-type: none"> Consent forms from local leaders and other concerned authorities on land ownership should be availed to address the issues of land ownership. 	The project RAP
2	<p>Permits and approvals:</p> <ul style="list-style-type: none"> All certification from concerned ministries and authorities i.e.; Directorate of water resources etc., should be acquired. 	All permits to be obtained by the Contractor and the Client

	<ul style="list-style-type: none"> Site layout plans and architectural designs for solar powered piped water system and all that is entailed therein, should be submitted to the ministry for approval. Additionally, geotechnical survey/ study reports on bearing ratio to hold the pipes should be submitted 	
3	<p><u>Design considerations:</u></p> <ul style="list-style-type: none"> The design lifespan of the sanitary facilities should be based on the size of the septic tank and the target population. 	Discussions will be conducted with the design engineer
4	<p><u>Health and welfare:</u></p> <ul style="list-style-type: none"> Welfare provision based on gender ranging from accommodation and sanitation facilities. All employees should have written documentation of their contracts (explaining their salary/ wage, time-off duty etc.) The employees should be pre-medically examined to determine mental capabilities before they are engaged or assigned with different tasks. HIV/AIDS services should be extended to the employees through provision of contraceptives and allowing them to optionally share among themselves. 	Noted
5	<p><u>Health and safety considerations:</u></p> <ul style="list-style-type: none"> Emergency preparedness should be in place, emergency contacts displayed to know whom to contact e.g., red cross has Ambulances to attend to emergencies on road accidents. There should be internal preparedness in case of emergencies. Firefighting mechanisms especially in camps e.g., Assembly points, fire extinguishers and smoking places should be designated. Personal Protective equipment should be provided based on the risk assessed. Safety (occupation & community) during construction should be observed. Risk assessment should be done, mitigation measures addressed and protection explained for preparedness. The contractor should construct sanitation facilities to cater for labour force to be employed different from public toilets planned for the communities. During digging of ditches, sites should be hoarded off with clear signage. Traffic control through signage / flagmen and diversions should be done with the aid of Police and other concerned stakeholders. Traffic management plans, excavation methods (machines), dust pollution and emanating noise should be addressed. Driver competency, vehicle maintenance schedules should always be assessed and safe operating distances from the 	

	road addressed (50m for borrow pits and 15-20m for transmission mains)	
6	<p>Pollution and environment management:</p> <ul style="list-style-type: none"> Restore the site to a more likely pristine nature, revegetate and encourage tree planting along the mains and more should be planted around the sludge treatment plant to curb the odour. 	Noted
7	<p>Community engagement:</p> <ul style="list-style-type: none"> The vulnerable groups should be planned for especially during the design of sanitary facilities The redress mechanism plans should be in place to address challenges among workers, workers to community. A committee should be formed therein having natives of the area especially LC chairperson to bridge the gap between workers and community. 	Noted
	<p>Employment:</p> <ul style="list-style-type: none"> The employment policy of the country should be followed; contracts, payment mechanisms, appointment letters should be in place. Children should not be employed The contractor should be gender sensitive during employment for gender equality. And when employing, some percentage should be from the local people as part of ownership and sustainability of the project. 	Noted

MEETING WITH UNRA

No.	Issues and concerns raised	Remarks
1	Where there is proposed road crossing, the project design team should provide definite crossing points especially at town junctions called service ducts	Noted
2	There is lack of consultations with UNRA as decisions are made to cross roads without notification and inputs to UNRA	Noted
3	There is no interface from Ministry of Water and Environment to update UNRA on their master plan for water networks or other specific requirements for decisions to be made collectively	Noted
4	There is extortion of money from UNRA due to co-existence in the roads right of way. In most cases, UNRA is required to pay money for relocation of utilities located in their right of way during road upgrades. There should be agreements on who undertakes re-establishment of utilities in the roads right of way for better implementation of projects	Noted
5	If there is need to be in road's right of way, considerations should be established for issues to be discussed before implementation as described in UNRA's new regulations	Noted

6	In case there is need of implementing water works with crossing points on UNRA proposed road constructions, consultations should be made to harmonize works and prevent cutting of pipes during the initial road works.	Noted
7	The design team should submit their typical road crossings and typical valves so as they can be synchronized with UNRA's class of concrete and to know the size of ducts required especially in big towns.	Noted
8	Liaise with UNRA to know future road constructions especially bridges / right of way are not in proximity with water abstraction points so as not to contaminate the quality of water sources during road upgrades	Noted

MEETING WITH MWE (DWRM & DWM)

No.	Issues and concerns raised	Remarks
1	What are the possible solutions to flooding around the boreholes incase flooding re-occurs? This was in line with the ground water abstraction sources for Igwaya RGCs.	The ESIA has proposed relocation of the borehole site to a location outside the flood plain of the lake
2	Develop Water Source Protection Plan and ensure that it is implemented during the commencement of the construction phase of the project through to implementation. The WSPP should consider 3% of the total development and implementation budget (include in the BOQ) as stipulated in the guidelines	Noted
3	Ensure to develop sanitation/ solid waste management plans and clearly indicate the appropriate dumping for fecal waste	Noted
4	Assess and make recommendation on other water users around the water sources	Noted
5	Were the boreholes test pumped? Abstraction rates, design basis. Identify the number of boreholes in the same locality to avoid conflicted abstraction	Yes, ground water assessments including testing and identification of other boreholes in the same location were assessed, and are included in the project feasibility report.
6	Water supply should indicate the positive and negative impacts anticipated from providing piped water to small towns such as increased semi-urban population and pressure on socio-economic infrastructure	Noted, these impacts have been assessed in the impact section of this report
7	The project is abstracting water from a wetland around Lake Kyoga. The project should consider the concept of payment for ecosystem services to the communities and the sub county and district of origin.	The concept will be explored in the source protection plan for Igwaya water source.
8	Consider baseline water quality assessment and water quality monitoring after project establishment.	<ul style="list-style-type: none"> Baseline water quality assessment was conducted at feasibility stage.

No.	Issues and concerns raised	Remarks
		<ul style="list-style-type: none"> The ESIA conducted water quality assessments on surrounding water sources, mainly the lake in the vicinity of the project. Water quality monitoring is a requirement under water supply and has been suggested under the water quality impact of this project.
9	Ground water sources – type of water treatment planned for boreholes	Disinfection of the water from the well will be effected by the installation of a DOSATRON online proportional chemical dozer at the reservoir.
10	Coordinates of wetlands that are likely to be used/ affected	The Borehole (DWD 60898) will be located in the Lake Kyoga flood plain at coordinates (1°15'23.72"N, 33°16'30.71"E).



Meeting with DWRM and DWM

PARTICIPANTS LISTS

ATTENDANCE LIST

Project Name: IWMMP - ERACs (Eastern Uganda) ESWAP/SSP

Location: Munyonyo, Iganga District, Kampala Date: 27 Jan 2022

No	Name	I/M	Designation	Contact/ Email	Signature
1.	JAMES SESA	M	PE	sesa.jr@jbn.co.ug	[Signature]
2.	Maurice Edrisi Madira	M	ESS-IWMMP	edrisimaurice@jbn.co.ug	[Signature]
3.	Esthera Musunguzi	F	Pr. Sec	estheramusunguzi@jbn.co.ug	[Signature]
4.	Martina Nanyago	F	SETSO	martinanyago@jbn.co.ug	[Signature]
5.	Eliu Ismail	M	Sen. Specialist	elium@jbn.co.ug	[Signature]
6.	Cabr Nanyago	F	Sen. Tech. Auth	canyago@jbn.co.ug	[Signature]
7.	Ahmed Gwiza	M	Technical	ahmedgwiza@jbn.co.ug	[Signature]
8.	Sarah Selent Kazanda	F	Environmental Specialist	sarahselent@jbn.co.ug	[Signature]
9.	Nelson Omagor	M	ESIA TL	nelsonomagor@jbn.co.ug	[Signature]
10.	Cekema S. Pkw	M	Hydrogeologist	cekemas@jbn.co.ug	[Signature]
11.	Brigadier W. MAFUKU	M	RAP	brigadiermafuku@jbn.co.ug	[Signature]
12.	Martin Nanyago	M	Project Manager JBN	martin.nanyago@jbn.co.ug	[Signature]
13.					
14.					

ATTENDANCE LIST

Project Name: IWMMP - ERACs (Eastern Uganda)

Location: Munyonyo, Iganga District, Kampala Date: 27 Jan 2022

No.	Name	Contact	Email	Signature
01	Esthera Musunguzi	0772474667	estheramusunguzi@jbn.co.ug	[Signature]
02	Cabr Nanyago	079317009	canyago@jbn.co.ug	[Signature]
03	Ivan M. Okuni	0772718306	ivanm@jbn.co.ug	[Signature]
04	Bicemba P. Pwani	0772673518 (0772673518)	bicemba@jbn.co.ug	[Signature]
05	Mpigoza Pwani	0772663270	mpigozapwani@jbn.co.ug	[Signature]
06	Miriam Chabwa	0772321607	miriamchabwa@jbn.co.ug	[Signature]
07	Kazanda Sarah	0772167887	sarahselent@jbn.co.ug	[Signature]



ATTENDANCE LIST

Project Name: MAMP - SAGE (Kediri, Jember)

Location: Bureh... Bureh... Bureh... Bureh...

Date: 21/1/22

No.	Name	Contact	Email	Signature
06	KARUNIA Mauli Kusni	0715774705	Karuniamauli@gmail.com	[Signature]
07	Marta Nugraha	0704312522	marta.nugraha@pt...	[Signature]
10	ZUSIA REGREY	0779481505	zusia-regreys@gmail.com	[Signature]
11	BALWIKA MUSEA	0760310224	balwika.musea@gmail.com	[Signature]



ATTENDANCE LIST

Project Name: SAGE - Kediri, Jember - Kediri KSC

Location: Kediri, Jember, Kediri

Date: 15/02/2022

No.	Name	Gender	Occupation	Contact	Email	Signature
1	ZUSIA REGREY	M	DLSD	0779481505	zusia-regreys@gmail.com	[Signature]
2	KARUMELLA MEDANI	M	PICULAT	0757270202	-	[Signature]
3	MPANILA RICHARD	M	PICULAT	0771750074	-	[Signature]
4	KABILIEU ATIAS	M	PICULAT	077456622	-	[Signature]
5	Dr. Othman Arifin	M	Medan	073220891	othmanarifin@gmail.com	[Signature]
6	IP. MUSAHA JORDAN	M	OTC KILWA	0776495225	-	[Signature]
7	KULAN RICHARD	M	PICULAT	0772360011	kulansubandono@gmail.com	[Signature]
8	BALWIKA MUSEA	M	PICULAT	0760310224	-	[Signature]
9	KARUNIA MUSEA	M	PICULAT	0757270202	-	[Signature]
10	LABUAN RICHARD	M	PICULAT	0772360011	-	[Signature]
11	HANI MUSEA	M	PICULAT	0757270202	-	[Signature]
12	HENI MUSEA	M	PICULAT	0757270202	-	[Signature]
13	BALWIKA MUSEA	M	PICULAT	0760310224	-	[Signature]

Stakeholder consultation record:

Name of Assignment:	ESMP	Environmental Audit
Purpose of consultation (tick appropriate box):	<input type="checkbox"/> RPP <input checked="" type="checkbox"/> BBA	<input type="checkbox"/> RAP <input type="checkbox"/> Other (specify):
Date:	20/02/2022	
Location:	KAWALI, KABUPATEN BUREH, DISTRICT	
Project name:	SAGE BUREH, WATER SUPPLY AND SANITATION FACILITIES (LIMATA BSC)	
Propositor:	MHC	
Name of person official list:	Gender	Village
	M F	
MUJIBATI ROBERT	✓	BUREH
KATRANTA MURAHIM	✓	BUREH
ESORU ISMIL	✓	BUREH
MARSAH GADSY	✓	BUREH
KIRANT SAUJI	✓	BUREH
MAHENDWA MATHIAS	✓	BUREH
MUSAH ALI	✓	BUREH
ROBERTA HAKMI	✓	BUREH
M. Samsul	✓	BUREH
ARZINSURA STEVEN	✓	BUREH

Stakeholder consultation record:

Name of Assignment:	ESMP	Environmental Audit
Purpose of consultation (tick appropriate box):	RFP	RAP
	ESIA <input checked="" type="checkbox"/>	Other (specify)

Date: 06th/05/2022

Location: KAGULU SUB-COUNTY BUTENDE DISTRICT

Project name: SOLAR POWERED WATER SUPPLY AND SANITATION FACILITIES (IGWATA BGC)

Propositor: NINE

Name of person official met:	Gender		Village	Designation	Contact (Telephone)	Sign/Initial
	M	F				
NGANDIMUNDA ALIYEMUNDA		<input checked="" type="checkbox"/>		Farmer	07841617371	
NAKULIHO - SHARIZI		<input checked="" type="checkbox"/>	KAGULU	Hotel	0257273680	
MWANGAZI HASSAN		<input checked="" type="checkbox"/>		Dr-Vet	0781347340	
KIANDA KEAH		<input checked="" type="checkbox"/>	Iqumpa		0702544050	
BWAMUKI HASSAN HADHAMI		<input checked="" type="checkbox"/>			0776264161	
Kakwaza Pita			Iqumpa		0768200935	
Mwandu Juvon		<input checked="" type="checkbox"/>	Mkigoma	Farmer	072015735	
MWANGAZI ANHET		<input checked="" type="checkbox"/>	Butemera	MCD	0787136730	
MABIRTE ALICE MAKEMA		<input checked="" type="checkbox"/>	Butemera	Farmer	078708385	
KATANKU EMMANUEL		<input checked="" type="checkbox"/>	Kagulu	Farmer	0774522250	

Stakeholder consultation record:

Name of Assignment:	ESMP	Environmental Audit
Purpose of consultation (tick appropriate box):	RFP	RAP
	ESIA <input checked="" type="checkbox"/>	Other (specify)

Date: 06th/05/2022

Location: KAGULU SUB-COUNTY BUTENDE DISTRICT

Project name: SOLAR POWERED WATER SUPPLY AND SANITATION FACILITIES (IGWATA BGC)

Propositor: NINE

Name of person official met:	Gender		Village	Designation	Contact (Telephone)	Sign/Initial
	M	F				
BALUNJA MURAMBU		<input checked="" type="checkbox"/>	Butemera		07720107500	
KILIA JAMES		<input checked="" type="checkbox"/>	Butemera	Asst. Comm.	077755630	
MWANGAZI YUSUFU		<input checked="" type="checkbox"/>	Butemera		077755630	
MWANGAZI ANHET		<input checked="" type="checkbox"/>	Butemera		0702552780	
MWANGAZI ISMAIL		<input checked="" type="checkbox"/>	Butemera		0775754628	
BWAMUKI ANHET EMMA		<input checked="" type="checkbox"/>	Butemera		0777537594	

Stakeholder consultation record:

Name of Assignment:	ESMP	Environmental Audit
Purpose of consultation (tick appropriate box):	RFP	RAP
	ESIA <input checked="" type="checkbox"/>	Other (specify)

Date: 6/05/2022

Location: KAGULU SUB-COUNTY BUTENDE DISTRICT

Project name: SOLAR POWERED WATER SUPPLY AND SANITATION FACILITIES (IGWATA BGC)

Propositor: NINE

Name of person official met:	Gender		Village	Designation	Contact (Telephone)	Sign/Initial
	M	F				
BALUNJA GAD		<input checked="" type="checkbox"/>	Nangoni	Farmer	0778005660	
SABU MOSES		<input checked="" type="checkbox"/>	Nangoni	Farmer	0771619077	
ABU-SALWA ISMAIL		<input checked="" type="checkbox"/>	Nangoni	Farmer	0772565131	
MWANGAZI MUKEMBA		<input checked="" type="checkbox"/>	Nangoni	Business	0766422458	
BILIMBA ABIDA		<input checked="" type="checkbox"/>	Nangoni	Farmer	0766976000	

Stakeholder consultation record:

Name of Assignment:						
Purpose of consultation (tick appropriate box):	ESMP			Environmental Audit		
	RPF			RAP		
	ESIA <input checked="" type="checkbox"/>			Other (specify)		
Date: 6 th /05/2022						
Location: KAGULUUBA COUNTY BUTENDE DISTRICT						
Project name: SOLAR POWERED WATER SUPPLY AND SANITATION FACILITIES (IGWATA BGC)						
Proponent: NWE						
Name of person/official met:	Gender		Village	Designation	Contact (Telephone)	Sign/Initial
	M	F				
WASINE EMMANUEL	M		BUTENDE	TEACHER	0782 125908	[Signature]
KAYIRA SHARIF	M		"	"	0754906897	[Signature]
MUSUNGA MULEMWE	M		"	"	0755165023	[Signature]
WAMBI ASSAD	M		"	"	0776608538	[Signature]
Ngobi George	M		"	"	0784960578	[Signature]
NAMWASE ANNET	F		"	"	0760478335	[Signature]
KAGUNA - EDZIMANDI	M		"	"	0777957058	[Signature]
NGOBI MAGIDU	M		"	"	0785610254	[Signature]
KIGANIRA PETER	M		BUTENDE	TEACHER	0779367780	[Signature]
Emuet Wilson	M		"	"	0783603264	[Signature]

Stakeholder consultation record:

Name of Assignment:						
Purpose of consultation (tick appropriate box):	ESMP			Environmental Audit		
	RPF			RAP		
	ESIA <input checked="" type="checkbox"/>			Other (specify)		
Date: 6 th /05/2022						
Location: KAGULUUBA COUNTY BUTENDE DISTRICT						
Project name: SOLAR POWERED WATER SUPPLY AND SANITATION FACILITIES (IGWATA BGC)						
Proponent: NWE						
Name of person/official met:	Gender		Village	Designation	Contact (Telephone)	Sign/Initial
	M	F				
KUZA MARTIN	M		BUTENDE		0778444577	[Signature]
MUGUMBA MICHAEL	M		BUTENDE		077524260	[Signature]
MUKUNDA JAMES	M		BUTENDE		0785743620	[Signature]
BALUTE MICHAEL WAISDA	M		KAMUSI/A		0706-145303	[Signature]
MUTASA ABBEY SALONGO	M		BUTENDE		070998871	[Signature]
Zambona Mairi	M		BUTENDE		0783293905	[Signature]
Kuruba Stefan	M		BUTENDE		0793459630	[Signature]
KOOSI PATRIC	M		BUTENDE		071495705	[Signature]
Makoma ISA	M		BUTENDE		077596305	[Signature]
MAGENJI ROSE NDIKIBU	M		BUTENDE		0773680615	[Signature]

Stakeholder consultation record:

Name of Assignment:						
Purpose of consultation (tick appropriate box):	ESMP			Environmental Audit		
	RPF			RAP		
	ESIA <input checked="" type="checkbox"/>			Other (specify)		
Date: 6 th /05/2022						
Location: KAGULUUBA COUNTY BUTENDE DISTRICT						
Project name: SOLAR POWERED WATER SUPPLY AND SANITATION FACILITIES (IGWATA BGC)						
Proponent: NWE						
Name of person/official met:	Gender		Village	Designation	Contact (Telephone)	Sign/Initial
	M	F				
MUTABI DAVID	M				0770362299	[Signature]
MUKYALA TAFE	M				0783981316	[Signature]
MATUVU ABDULKADER	M				0776718585	[Signature]
NWAGEMBE JUSTINE	F					[Signature]
NWAGEMBE YDUM	F				0775-596290	[Signature]
OLUJI HAMUDA	M				0779322150	[Signature]
NWAMUNDE ASHA	F				0773062502	[Signature]
Isabirye Ahmed	M				0776458670	[Signature]
Isabirye Martin	M				0786132652	[Signature]
Bwamizi Shadia	F				078287057	[Signature]

Stakeholder consultation record:

Name of Assignment:		ESMP		Environmental Audit							
Purpose of consultation (tick appropriate box):		RPF		RAP							
		ESIA <input checked="" type="checkbox"/>		Other (specify)							
Date: 6 th /05/2022											
Location: KAGUMU SUB-COUNTY BUTENDE DISTRICT											
Project name: SOLAR POWERED, WATER SUPPLY AND SANITATION FACILITIES (IGWATA R.G.C)											
Proponent: MWE											
Name of person/ official met:		Gender		Village		Designation		Contact (Telephone)		Sign/ Initial	
		M F									
Babita Monica				<input checked="" type="checkbox"/>				0785127601			
GALIBOKWALA FALUKU		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>				0774112167			
Nabomu Samuel		<input checked="" type="checkbox"/>						0777674426			

Stakeholder consultation record:

Name of Assignment:		ESMP		Environmental Audit							
Purpose of consultation (tick appropriate box):		RPF		RAP							
		ESIA <input checked="" type="checkbox"/>		Other (specify)							
Date: 6/05/2022											
Location: KAGUMU SUB-COUNTY BUTENDE DISTRICT											
Project name: SOLAR POWERED, WATER SUPPLY AND SANITATION FACILITIES (IGWATA R.G.C)											
Proponent: MWE											
Name of person/ official met:		Gender		Village		Designation		Contact (Telephone)		Sign/ Initial	
		M F									
MAGALIRO ABUKADIRI		<input checked="" type="checkbox"/>		BUTENDE		"		0789215677		MWE	
KIIRYO MUSA		<input checked="" type="checkbox"/>		BUTENDE		"		0776210927		KIIRYO	
NYALO STEPHEN		<input checked="" type="checkbox"/>		BUTENDE		Market		0785714525		MWE	
MATEGE FALUKU		<input checked="" type="checkbox"/>		BUTENDE		"		0776716639			
KIRIMWA MUHAMMAD		<input checked="" type="checkbox"/>		BUTENDE		"		07826733		MWE	
TENYUA LATIFU		<input checked="" type="checkbox"/>		"		"		0781041207		MWE	
BASALIRWA CHARLES		<input checked="" type="checkbox"/>		"		"		0779745227			
DENGU ALEX		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>				077678295		DENGU	
SOMONY RUSALI		<input checked="" type="checkbox"/>		BUTENDE				0784631885			

Stakeholder consultation record:

Name of Assignment:		ESMP		Environmental Audit							
Purpose of consultation (tick appropriate box):		RPF		RAP							
		ESIA <input checked="" type="checkbox"/>		Other (specify)							
Date: 6/05/2022											
Location: KAGUMU SUB-COUNTY BUTENDE DISTRICT											
Project name: SOLAR POWERED, WATER SUPPLY AND SANITATION FACILITIES (IGWATA R.G.C)											
Proponent: MWE											
Name of person/ official met:		Gender		Village		Designation		Contact (Telephone)		Sign/ Initial	
		M F									
KURITA KRIMATI		M		BUTENDE				0775427097			
SEMWAHA CHARLES		M		BUTENDE				078600650			
MUKULWA JAMES		M		BUTENDE				0785743620			
Sebele Hakim		M		BUTENDE				0772372000			
KIDOMWA AMIK		M		BUTENDE				0772873687			
Bageny James		M		"				0786661457			
Sambayo Bimali		M		"				0782593269			
WANYA ASKIRAF								0756918805			
Bagalana Stephen		M		BUTENDE				07765412237			
NGOO RASHID		M		"				0782806213			

Stakeholder consultation record:

Name of Assignment:		ESMF		Environmental Audit							
Purpose of consultation (tick appropriate box):		RPF		RAP							
		ESIA		Other (specify)							
Date: 6/08/20		<input checked="" type="checkbox"/>									
Location: KASULU SUBCITY, BUNENGE DISTRICT											
Project name: SOLAR PUMPER WATER SUPPLY AND IRRIGATION FACILITIES - ISHARA REG.											
Proponent: LWE											
Name of person/official met:		Gender		Village		Designation		Contact (Tel/Email)		Sign/Initial	
		M F									
Nakabambwe JESSE				Bukama		member		0874191086		Jesse	
Nyanganda AUSA		<input checked="" type="checkbox"/>		Bukama				0772988897		AUSA	
Munyamba Etana		<input checked="" type="checkbox"/>		Bukama		member		0797244806		Munyamba	
HELEN NAMAGANDA		<input checked="" type="checkbox"/>		Bukama		member		-		Helen	
TANGAHA KAREEM		<input checked="" type="checkbox"/>		Bukama		member		078578801		Tanga	
Namatosa Miriam		<input checked="" type="checkbox"/>		Bukama		member		0772617388		Namatosa	
Kanyaga Isaac		<input checked="" type="checkbox"/>		Bukama		member		0796263694		Kanyaga	
Kifurika Samuel		<input checked="" type="checkbox"/>		Bukama		member		-		-	

Stakeholder consultation record:

Name of Assignment:		ESMF		Environmental Audit							
Purpose of consultation (tick appropriate box):		RPF		RAP							
		ESIA		Other (specify)							
Date: 06/08/20		<input checked="" type="checkbox"/>									
Location: KASULU SUBCITY, BUNENGE DISTRICT											
Project name: SOLAR PUMPER WATER SUPPLY AND IRRIGATION FACILITIES - ISHARA REG.											
Proponent: LWE											
Name of person/official met:		Gender		Village		Designation		Contact (Tel/Email)		Sign/Initial	
		M F									
EMAH MUSAHA		<input checked="" type="checkbox"/>		Bukama		member		0785173800		-	
TULABE GERALD		<input checked="" type="checkbox"/>		Iganga		manager		0777865252		Tulabe	
KARI ALEX		<input checked="" type="checkbox"/>		Bukama		member		0780212923		Kari	
JOHN NABONGI		<input checked="" type="checkbox"/>		Bukama		member		0785247278		John	
MUCANA EYDIA		<input checked="" type="checkbox"/>		Bukama		member		07722213209		Mucana	
MUCANA JEMATHAL		<input checked="" type="checkbox"/>		Bukama		member		07714435707		Mucana	
MUNYEMBA JUAN		<input checked="" type="checkbox"/>		Bukama		member		0786125088		Munyemba	
EMISA NAMUKEMBA		<input checked="" type="checkbox"/>		Bukama		member		-		Emisa	
MUGABI KARIM		<input checked="" type="checkbox"/>		Bukama		VHT		0785-205188		Mugabi	
MUGABU EDWARD		<input checked="" type="checkbox"/>		Bukama		member		0770865611		Mugabu	

Stakeholder consultation record:

Name of Assignment:		ESMF		Environmental Audit							
Purpose of consultation (tick appropriate box):		RPF		RAP							
		ESIA		Other (specify)							
Date: 06/08/20		<input checked="" type="checkbox"/>									
Location: KASULU SUBCITY, BUNENGE DISTRICT											
Project name: WATER SUPPLY & IRRIGATION FACILITIES											
Proponent: LWE											
Name of person/official met:		Gender		District		Designation		Contact (Tel/Email)		Sign/Initial	
		M F									
MUSATA CHARLES		<input checked="" type="checkbox"/>		Bukama		member		0756466277		Musata	
MAGAZI PASCAL		<input checked="" type="checkbox"/>		Iganga		member		0776634483		Magazi	
BALAZI DAVID		<input checked="" type="checkbox"/>		Mamwizuka		member		0787527526		Balazi	
MUBALI EMMA		<input checked="" type="checkbox"/>		Mamwizuka		member		0783212732		Mubali	
KALUMBA EMMA		<input checked="" type="checkbox"/>		Mamwizuka		member		0761502729		Kalumba	
EUTIZA DAVID		<input checked="" type="checkbox"/>		Mamwizuka		member		0777630629		Eutiza	
KALUMBA EMMA		<input checked="" type="checkbox"/>		Mamwizuka		member		0781522761		Kalumba	
BALAZI DAVID		<input checked="" type="checkbox"/>		Mamwizuka		member		0776131246		Balazi	
BALAZI DAVID		<input checked="" type="checkbox"/>		Mamwizuka		member		-		Balazi	
KIMWETO NATHAN		<input checked="" type="checkbox"/>		Mamwizuka		member		-		Kimweto	

Stakeholder consultation record:


Name of Assignment:						
Purpose of consultation (tick appropriate box):	ESMP	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Environmental Audit	<input type="checkbox"/>
	RPF	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	RAP	<input type="checkbox"/>
	ESIA	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Other (specify)	
Date: 24/10/2022						
Location: KASINDU SUBCOUNTY, AUYEMBE DISTRICT						
Project name: WATER SUPPLY AND SANITATION FACILITIES						
Propositor: WMO/MLP						
Name of person official met:	Gender		District	Designation	Contact (Telephone)	Sign/Initial
	M	F				
IZACOU ALLOMANZA	✓		Igwanga			
IZIA MAGES	✓		Igwanga		0775245312	IZ
ELIABINETIJA	✓		Igwanga		0772411167	ELI
KASABWA FRED	✓		Igwanga		0783162340	KA
EMETIPIKA AMIA	✓		Igwanga		0782226146	EM
ENGBEE JOSEPH	✓		Igwanga		0772500621	EN
KIALUSA SAMSON	✓		Igwanga		0724644206	KA
PICAKALAMA ROBIN	✓		Igwanga		0784864522	PI
ITAMBI CHARLES	✓		Igwanga		07863520140	IT
KIOTO ALMINZAN	✓		Igwanga			KT
ISAMBA BEN	✓		Igwanga		0788452266	IS
BIRUMBI DAVID	✓		Igwanga		0786274445	BR

Stakeholder consultation record:

Name of Assignment:						
Purpose of consultation (tick appropriate box):	ESMP	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Environmental Audit	<input type="checkbox"/>
	RPF	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	RAP	<input type="checkbox"/>
	ESIA	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Other (specify)	
Date: 15/10/2022						
Location: MUMUNYU/IGWANGA REC. AUYEMBE DISTRICT						
Project name: WATER SUPPLY AND SANITATION FACILITIES						
Propositor: WMO/MLP						
Name of person official met:	Gender	Village	Designation	Contact (Telephone)	Sign/Initial	
	M	F				
BARBARA KIMINGI	✓		IGWANGA	TRAINER	0784026624	BAR
KIMBE DAVID	✓		"	TRAINER	0772652351	K.David
BARBARA MAGES	✓		IGWANGA	TRAINER	0771461370	BAR
WALY FLORENCE	✓		IGWANGA	TRAINER	0783162340	WAL
MUNGE GEORGE	✓		"	TRAINER	07770059190	MUN
KIMBERLY JANE	✓		"	ESIA/ENV	0775608445	KA
KYRILLINE NIMONI	✓		"	ESIA/ENV	07711028320	KA
KUNDE ISMIA	✓		"	ESIA/ENV	0776756091	KA
MURRAY JAMES	✓		"	TRAINER		KA
MURRAY SCOTT	✓		"	TRAINER	07711028320	KA

ANNEX E: WATER QUALITY RESULTS

Water quality result for borehole



NATIONAL WATER AND SEWERAGE CORPORATION
CENTRAL LABORATORY-BUGOLOBI
 P.O. Box 705, Kampala
 Tel: 041237540/341144 Fax: 041 237441
 E-mail: waterquality@nwscc.co.ug

CERTIFICATE OF ANALYSIS

<p>CLIENT: Royal Techno Industries Ltd ADDRESS: P.O. BOX 29009, Kampala TEL: 256-014-230573</p>	<p>Serial No: ES /2018/0793 Sampled by: Client Type of container: plastic Sample source: Borehole water Date of Report: 28-08-2018</p>
--	---

Sample received: 27-08-2018

Title of analytical results:


Parameter	Units	Location: Site: District: DWD:	Lugemuh Kagulu Buyende 00898	National Standards for Natural potable water
WS Sample No	-	K2223/2018A		
pH	-	6.74		5.5 - 9.5
Conductivity	µs/cm	182		2500
Turbidity	Ntu	3.0		25
Total dissolved solids	mg/l	149		1500
Total Alkalinity (as CaCO ₃)	mg/l	81.0		500
Magnesium (Mg ²⁺)	mg/l	4.80		100
Calcium (Ca ²⁺)	mg/l	8.20		150
Hardness: total as CaCO ₃	mg/l	92.0		600
Iron: total	mg/l	0.031		0.3
Total suspended solids	mg/l	0		0.0
Chlorides-Cl	mg/l	19.0		250
Nitrate-N	mg/l	0.0		45
Hard Carbonates as CaCO ₃	Mg/l	82.0		500
Colour	Pcc	28		50
Sulphate: SO ₄ ²⁻	mg/l	12		400
Fluoride: F	Mg/l	0.05		1.5

Remarks:
 The sample showed satisfactory physico-chemical characteristics of the source, which was commensurate with the National Standards for natural potable water.

ANALYSED BY: Robinah Muhairwe
AUTHORISED BY: MANAGER, Central Laboratory Services..... *M*

APPROVED BY: SENIOR MANAGER, Water Quality Management Department..... *M*

NB: The NWSCC certificate of analysis by no means constitutes a permit to any person or undertaking to supply water.



DATE: 28/08/18

Water quality result for Lake Kyoga



MINISTRY OF WATER AND ENVIRONMENT
NATIONAL WATER QUALITY REFERENCE LABORATORY - ENTEBBE
Certificate of Analysis

Client Name : JBN Consults and Planners Ltd
 Client Address : Block 216, Plots 577 & 578, Dr Asea Road, Ntinda
 Sample type : Surface Water
 Date received : 11th April 2022
 Analysis Completion data : 14th April 2022

TEST RESULTS

Source Name	SW3 Lake Kyoga		Drinking water standards (IDEAS 12 2018 Maximum permissible for Natural Potable Water)
Village	Bumogoli		
Subcounty	Kagulu		
District	Buyende		
Date Sampled	11-Mar-22		
Lab Identifier code		E51491	
Turbidity	NTU	5.2	25
pH	Units	7.15	5.5 - 9.5
Electrical Conductivity	µS/cm	330	2500
Total Dissolved Solids	mg/L	231	1500
Total Hardness as CaCO ₃	mg/L	92	600
Fluoride	mg/L	0.07	1.5
Sulphates	mg/L	12	400
Chlorides	mg/L	21	250 *
Nitrates as N	mg/L	0.17	10
Nitrites as N	mg/L	<0.002	0.003
Manganese	mg/L	<0.01	0.01
Total Iron	mg/L	0.07	0.5
<i>E. Coli</i>	CFU/100mls	23	<1

Notes:

Samples are analyzed on as received basis.
 The client does bear sampling responsibility as to the representative characters of the sample delivered. Results are therefore based on the sample delivered and analyzed. mg/l-stands for milligrams per liter

Checked by

**LABORATORY
MANAGER**
 NWQR: 14 APR 2022 NWQR
 NATIONAL WATER QUALITY
REFERENCE LABORATORY-ENTEBBE

Water Quality Management Department
 Directorate of Water Resources Management
 Water Quality Laboratories@minawac.go.ug
 P.O. Box 10, Entebbe
 Tel: 041-321342

Principal Analyst
LABORATORIES
 14 APR 2022
 NATIONAL WATER QUALITY
REFERENCE LABORATORY-ENTEBBE
 Sign:.....

ANNEX F: LIST OF PLANTS

S/N	Family	Species	Borehole site	Transmission Lines	Lifeform	Status
1	Amaranthaceae	Amaranthus dubius	1		Herb	LC
2		Amaranthus graecizans	1		Herb	LC
3		Amaranthus spinosus	1		Herb	Invasive
4		Pandiaka angustifolia		1	Herb	LC
5	Anacardiaceae	Lanea schweinfurthii		1	Tree	LC
6		Mangifera indica	1	1	Tree	LC
7	Apocynaceae	Cascabela peruviana	1		Shrub	LC
8		Saba comorensis		1	Liana	LC
9	Asclepiadaceae	Periploca linearifolia	1		Liana	LC
10	Asphodelaceae	Bulbine abyssinica	1		Herb	LC
11	Asteraceae	Acanthospermum hispidum	1		Herb	Invasive
12		Ageratum conyzoides	1		Herb	LC
13		Conyza sumatrensis	1		Herb	LC
14		Siegesbeckia orientalis	1		Herb	LC
15		Synedrella nodiflora		1	Herb	LC
16		Vernonia amygdalina		1	Shrub	LC
17	Bignoniaceae	Markhamia lutea	1		Tree	LC
18	Capparidaceae	Crateva adansonii		1	Tree	LC
19	Caricaceae	Carica papaya		1	Shrub	LC
20	Combretaceae	Combretum adenogonium	1	1	Tree	LC
21		Combretum collinum	1		Tree	LC
22		Terminalia schimperiana		1	Tree	LC
23	Commelinaceae	Commelina benghalensis	1		Herb	LC
24	Cucurbitaceae	Momordica foetida	1	1	Liana	LC
25	Cyperaceae	Cyperus dives	1		Herb	LC
26		Cyperus rotundus	1		Herb	LC
27		Kyllinga chrolotropis	1		Herb	LC
28	Euphorbiaceae	Acalypha bipartita		1	Herb	LC
29		Bridelia scleroneura	1		Shrub	LC
30		Euphorbia candelabrum	1		Tree	LC
31		Euphorbia hirta	1		Herb	LC
32		Jatropha curcas	1		Shrub	LC
33		Phyllanthus amarus	1		Herb	LC
34		Phyllanthus overiifolia		1	Liana	LC

S/N	Family	Species	Borehole site	Transmission Lines	Lifeform	Status
35	Fabaceae	Acacia polyacantha	1		Tree	LC
36		Acacia sieberiana	1		Tree	LC
37		Albizia coriaria	1		Tree	LC
38		Cassia siamea	1	2	Tree	LC
39		Crotalaria spinosa	1		Herb	LC
40		Desmodium triflorum	1		Herb	LC
41		Lonchocarpus laxiflorus	1		Tree	LC
42		Senna spectabilis	1		Tree	Invasive
43		Tamarindus indica	1		Tree	LC
44		Tephrosia pumila	1		Herb	LC
45	Lamiaceae	Hoslundia opposita	1		Herb	LC
46		Hyptis suaveolens	1		Herb	LC
47		Leonotis nepetifolia	1		Herb	Invasive
48	Lauraceae	Persea americana		1	Tree	LC
49	Loranthaceae	Englerina woodfordioides	1		Shrub	LC
50	Malvaceae	Abutilon longicuspe	1		Herb	LC
51		Sida acuta	1	1	Herb	Invasive
52		Triumfetta tomentosa	1		Herb	LC
53	Meliaceae	Melia azedarach	1		Tree	LC
54		Trichilia prieuriana	1		Tree	LC
55	Menispermaceae	Cissampelos mucronata	1		Liana	LC
56	Moraceae	Antiaris toxicaria		1	Tree	LC
57		Artocarpus heterophyllus		1	Tree	LC
58		Ficus amadiensis		1	Tree	LC
59		Ficus glumosa		1	Tree	LC
60		Ficus ovata	2		Tree	LC
61		Ficus sycomorus	1		Tree	LC
62		Ficus thonningii	1		Tree	LC
63		Milicia excelsa	1	1	Tree	LC
64	Moringaceae	Moringa oliefera	1		Tree	LC
65	Nyctaginaceae	Commicarpus pedunculatus	1		Herb	LC
66	Nymphaeaceae	Nymphaea cearulea	1		Herb	LC
67	Palmae	Borassus aethiopicum	1		Tree	LC
68	Passifloraceae	Adenia cissampeloides	1		Liana	LC

S/N	Family	Species	Borehole site	Transmission Lines	Lifeform	Status
69	Poaceae	Brachiaria documbens		1	Herb	LC
70		Cynodon dactylon	1	2	Herb	LC
71		Dactyloctenium aegypticum	1		Herb	LC
72		Eleusine indica	1	1	Herb	LC
73		Leersia hexandra	1		Herb	LC
74		Melinus repen		1	Herb	LC
75		Panicum maximum		1	Herb	LC
76		Paspalum notatum	1	1	Herb	LC
77		Paspalum scrobiculatum	1		Herb	LC
78	Polygonaceae	Oxygonum sinuatum	1		Herb	LC
79	Pontederiaceae	Eichhornia crassipes	1		Herb	Invasive
80	Rhamnaceae	Maesopsis emini	1		Liana	LC
81	Rubiaceae	Gardenia ternifolia		1	Herb	LC
82		Mitracarpus virosa	1		Herb	LC
83		Psydrax schimperianum		1	Tree	LC
84		Vangueria madagascariensis	1		Tree	LC
85	Solanaceae	Solanum incanum	1		Herb	LC
86	Typhaceae	Typha domingensis	1		Herb	LC
87	Verbenaceae	Clerodendrum umbellatum		1	Herb	LC
88		Stachytarpheta indica	1	2	Herb	Invasive
89	Vitaceae	Cayratia ibuensis	1		Liana	LC
90		Cissus oliveri	1		Liana	LC
91		Cissus rotundifolia	1		Liana	LC

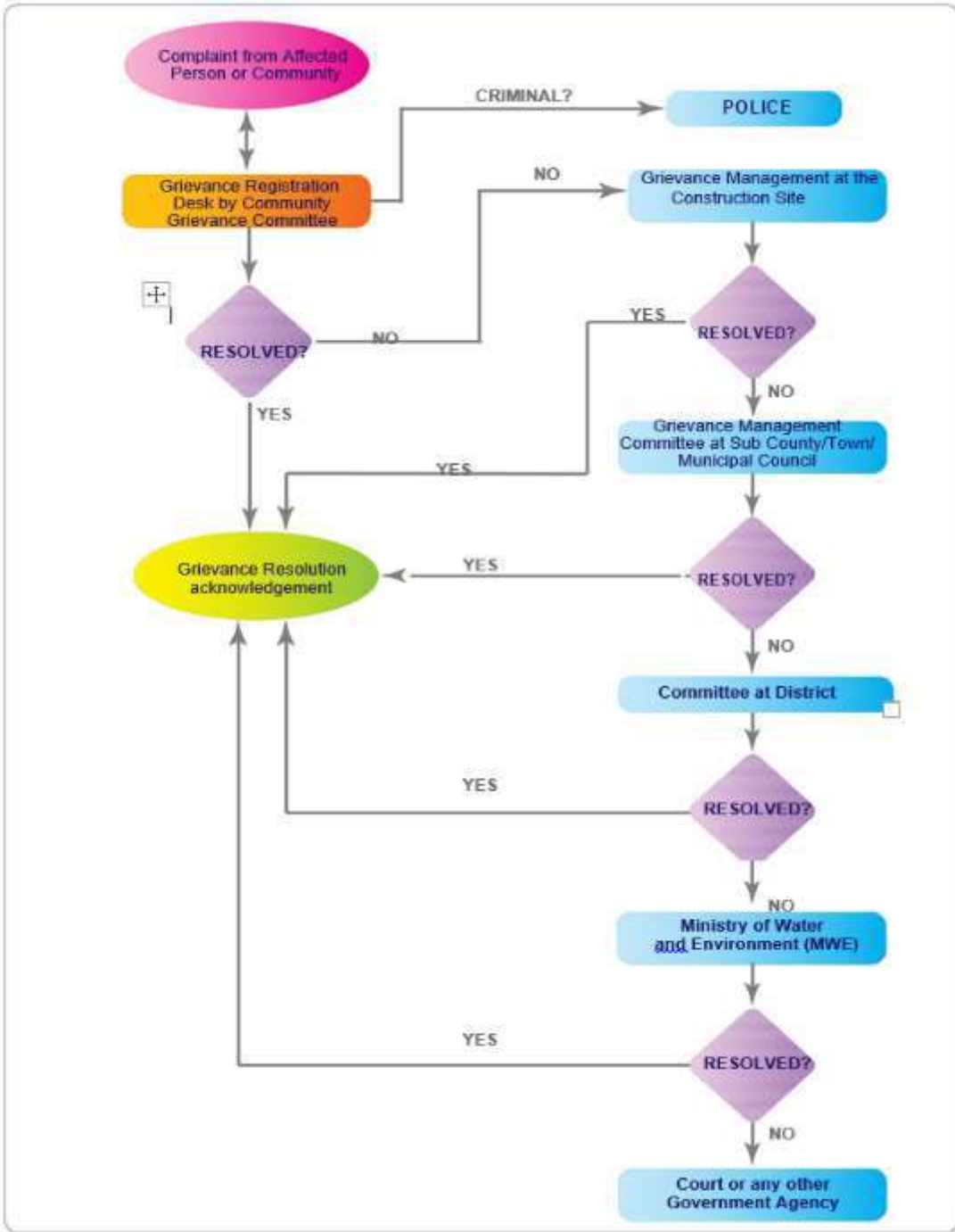
Table 11-1: A list of invasive species, their uses, and the Impact of invasiveness on the ecosystem

Family	Species	Status	Impact	Uses
Asteraceae	<i>Bidens pilosa</i>	Introduced	high reproductive potential and fast-growing rates, rapidly spread and colonize new areas. Seeds may remain viable for 5-6 years	The leaves are highly medicinal (The sap from the leaves is used to speed up blood clotting in fresh wounds, while the sap from the plant is used to help treat ear infections. The leaves are used to create a powder that's used to treat kidney problems, as a well as an herbal tea to help with flatulence).
	<i>Acanthospermum hispidum</i>	Exotic	The spiny fruits are a particular hazard to livestock and assist the movement of the weed in agricultural produce	It is used as a diuretic and sudorific
	<i>Conyza sumatrensis</i>	Native	introduced internationally as a seed contaminant	Leaf sap is used as a remedy for ophthalmia in the form of nose or eye drops. Nasal drops are also given in cases of vertigo and epilepsy. The leaves are made into cigarettes to treat tuberculosis and asthma. They may be used as a vegetable
Fabaceae	<i>Senna spectabilis</i>	Native	Damaged ecosystem services, seed profusely, and re-sprouts readily when cut successional patterns.	Fuelwood, exudate gum,
	<i>Leonotis nepet</i>		It is listed as a pest plant, it has the potential to form large colonies that displace native plants Infests wetlands, alters open grasslands into dense thorny thickets and negatively impacts on native biodiversity, affects large mammal	The leaves and stems decoction are applied topically as a treatment for eczema, skin infections and itchiness

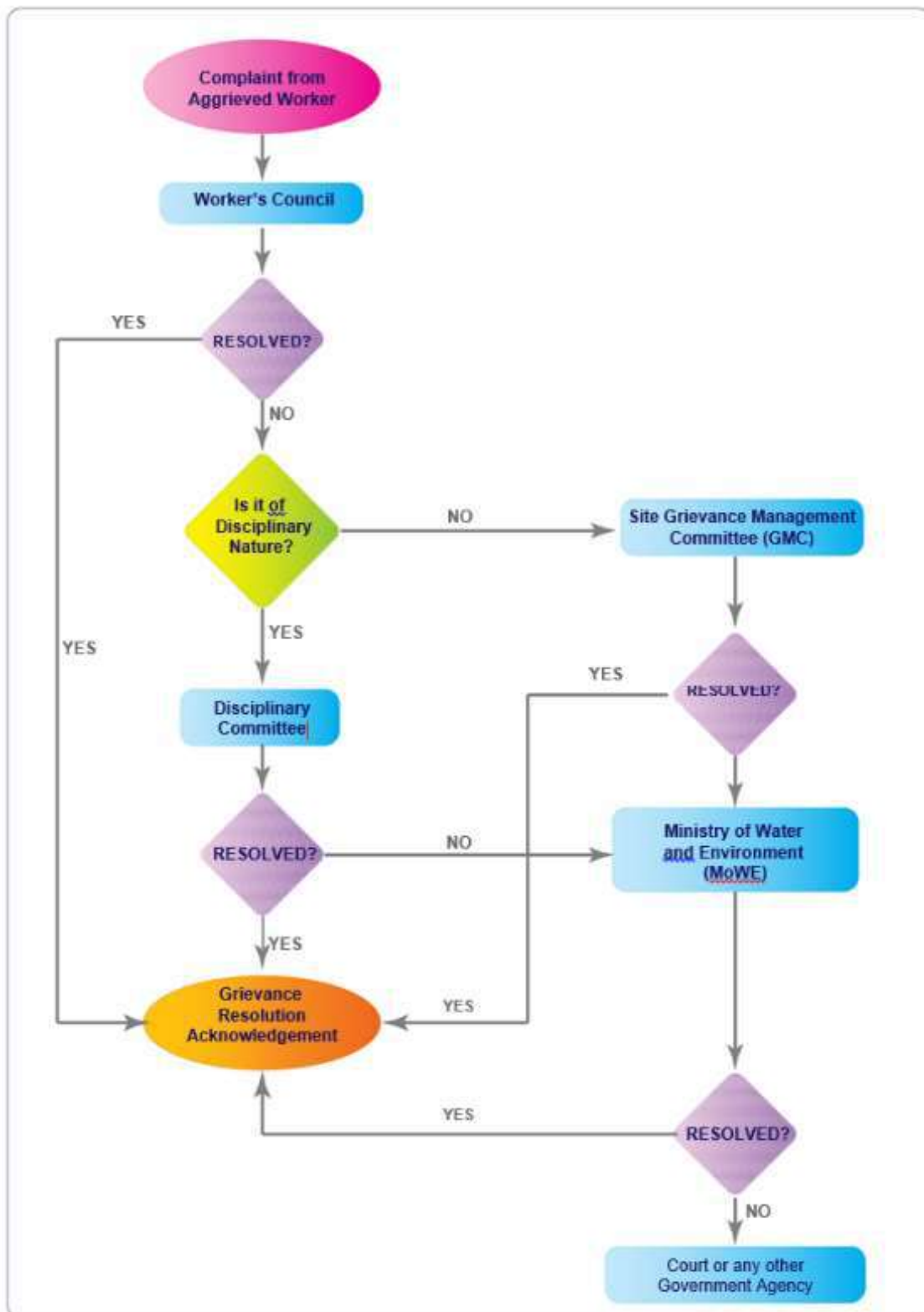
Family	Species	Status	Impact	Uses
			distribution and their health	
Malvaceae	<i>Sida acuta</i>	Exotic	infests various habitats, becomes most problematic in pastures and rangelands	used for various purposes such as neurological disorders, headache, leucorrhoea, tuberculosis, diabetes, malarial and other fevers, uterine disorders, rheumatic problem, renal inflammation, asthma, ulcers, childbirth and worms,
Pontederiaceae	<i>Eichhornia crassipes</i>		Adversely affects human activities (fishing, water transport) and biodiversity	It ferments rapidly due to its high-water content and can supply biomass for biogas production.
Verbenaceae	<i>Stachytarpheta jamaicensis</i>	Exotic	Damaged ecosystem services, fire regime, negatively impacts: agriculture animal health; forestry; human health, Reduced native biodiversity	Highly medicinal

ANNEX G: GRIEVANCE REDRESS MECHANISMS AND FORMS

Community Grievance Flow Chart



Workers Grievance Flow Chart



Village Level GRC Reporting Template

District.....

Sub-county.....

Village.....

Indicators

SN	Indicator	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
1.	No of grievances related to project activities logged per month												
2.	Number of grievances that received timely response (within 7 days)												
3.	Number of grievances received and addressed at village level												
4.	Number of recurrent complaints received (over a period of 15 days)												
5.	No. of meetings held												
6.	Number of unresolved grievances												
7.	Number of grievances referred from village to sub-county level for addressing												
8.	Number of grievances referred to other legal institutions e.g. LCs, Police, Courts of Law												

Provide details on recurrent complaints raised (attach evidence where necessary)

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Subcounty Level GRC Reporting Template

District.....

Sub-county.....

Indicators

SN	Indicator	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
1.	No of grievances related to project activities logged per month												
2.	Number of grievances that received timely response (within 14 days)												
3.	Number of grievances received and addressed at sub county level												
4.	Number of recurrent complaints received (over a period of 15 days)												
5.	No. of meetings held												
6.	Number of unresolved grievances												
7.	Number of grievances referred from sub county to district level for addressing												
8.	Number of grievances referred to other legal institutions e.g. LCs, Police, Courts of Law												

Provide details on recurrent complaints raised (attach evidence where necessary)

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National Level GRC Reporting Template

Indicators

SN	Indicator	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
1.	No. of grievances related to project activities logged per month												
2.	Number of grievances that received timely response (within 14 days)												
3.	Number of grievances received and addressed at district level												
4.	Number of recurrent complaints received (over a period of 15 days)												
5.	No. of meetings held												
6.	Number of unresolved grievances												
7.	Number of grievances referred from the district to national level for addressing												
8.	Number of grievances referred to other legal institutions e.g. LCs, Police, Courts of Law												

Provide details on recurrent complaints raised (attach evidence where necessary)

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REPORTING AND REFERRAL OF VAC, GBV AND OTHER SEXUAL RELATED CASES ON THE PROJECT.

Stakeholder	Action and support is to be provided	Where the case should be Referred?
VAC /GBV Victim	<p>Reports to immediate persons like relatives, friends, peers, and other resourceful persons such as teacher, religious leaders, CSOs, LC, Police</p> <p>Makes a statement providing details on what happened, form of violence, perpetrator, any witnesses.</p>	Immediately refer the case to LC and Police for recording and further investigation.
Community Persons including LCs, parents, guardians, Water user Committees, Project Management Committees, contractors' management teams, Grievance committees, Contractor's worker, Faith based member like church members, CSOs	<p>Reports the case and perpetrator immediately to nearby Local Council, Contractor's supervisor, Probation Officer/ CDOs and Police for further action.</p> <p>Liaises with other actors and ensures that the survivor gets support services such as medical care and check-up, counselling and other basic needs such as food.</p> <p>Follow-up the case with LCs, Police, health services and courts of law.</p>	Refers the case to Police for further investigation.
Police	<ul style="list-style-type: none"> Investigates the case, Signs the PF3 forms and other sources of evidence to support court proceedings, Supports the child survivor to access required support services and evidence such as a medical report. 	Refers the case to State Attorney for committing the perpetrator to courts of Law for hearing and sentencing
Designated Medical Centre	<ul style="list-style-type: none"> Medical Examination for bodily harm or other injuries caused, Produces medical report for police investigations and other evidence for the courts of law, Provides medical care for the victim survivor to ensure recovery. 	Reports to the Police and to the Courts of Law as evidence against the perpetrator.
Probation and Social Welfare Officer/ CDO	<ul style="list-style-type: none"> Assess the needs of the survivor/victim and refers the victim to services providers for appropriate support services, Collects data and information on the victim for processing and management 	Reports to Police
Courts of law	<ul style="list-style-type: none"> Hears the case, decides on support services to the child survivor or the parents of the child victim, Sentences the perpetrator according to the existing laws regarding the case. 	Commits the person found guilty to serve his/her sentence and orders for any care and

Stakeholder	Action and support is to be provided	Where the case should be Referred?
		support to be provided to the victims
Prison	<ul style="list-style-type: none"> • Ensures that the person found guilty serves his/her sentence, • Person is rehabilitated. 	Freed at the end of serving the sentence.
Contractors	<p>Ensure workers are well screened for VAC&GBV before employment with involvement of LC and Police</p> <p>Ensure workers files and background information is on file for future references</p> <p>Ensure workers are trained in company policies specifically on VAC & GBV</p> <p>VAC & GBV Tool box meetings organized</p> <p>Ensure that there is a site clinic and medical service provider for workers and other victims on referral by the site clinic</p> <p>Have MoU with Police to expedite any investigations and trainings</p> <p>Create awareness to the communities on VAC & GBV risks and referral pathways</p> <p>Cooperate with law enforcement agencies and officials in detecting, investigations and managing VAC & GBV cases</p> <p>Provide any other relevant support to victims</p>	Refer all allegations of VAC & GBV to the Supervising Consultant, VAC&GBV Consultant for independent investigations and reporting to Uganda Police
Local Government (CDOs and other relevant Officials)	<p>Monitors cases of any GBV/VAC allegations on the project</p> <p>Participate in GBV&VAC sensitizations to project workers and communities</p> <p>Provides technical guidance to contractors and communities on any referral pathway for a specific incident</p> <p>Maintains a directory of services providers (Government and Civil Society Organizations) for survivors and victims</p>	Refers to Uganda Police and existing service providers to victims and survivors of VAC & GBV

Stakeholder	Action and support is to be provided	Where the case should be Referred?
	<p>Links victim and survivors for more support to existing service providers</p> <p>Follows up on the progress of judicial processes for the suspects</p>	
MWE	<p>Ensure that the Civil works contracts have strong penalties for contractors and workers involvement in VAC & GBV</p> <p>Provides effective orientation of contractors and their staff on safeguards management on the project</p> <p>Deploys dedicated service provider for VAC& GBV on the project sites</p> <p>Monitors VAC & GBV cases in the community and assesses any cases involving the contractors and their workers</p> <p>Provides reports to World Bank on any incidents related to VAC & GBV within 48 hours; provides root cause analysis (RCA) and safeguards correction action plans (SCAP)</p> <p>Make follow up to ensure that all cases are judiciously managed</p> <p>Liaise with other MDAs to ensure appropriate actions to the VAC & GBV victims and offenders</p>	Ensures zero occurrence of VAC cases in relation to the Project.

Reporting form for VAC and GBV incidents on the project.

Part I: Details of the Reporter

Name of the Person reporting the case	Address: Location:	Date of reporting the case:
Designation and relationship with the child victim and survivor	Contact details; Tel. No (Landline): Tel. No (Mobile): Email:	Time of Reporting:

Part II: Details of Victim/ Survivor

S/N	Indicators	Details captured
	Name of the victim	
	Sex	
	Date of birth and Age	
	Residence	
	Contacts- telephone	
	Reference number	
	Nature/type of the alleged act of violence:	
	Location: where the incident took place	
	Number of times the victim has encountered such a form of violence	
	Other associated forms of violence the victim has encountered by the alleged perpetrator	
	Relationship of the victim with the alleged perpetrator	
	Impact of the act of violence on the victim i.e. physical, mental, health etc	

	Date or time frame of the act of violence	
	Witnesses (if any) and their observations and their willingness to appear in case of further investigations and their telephone contacts	
	Status of reporting (if there are previous efforts of reporting the case and the person/officer reported to	
	Measures or actions taken	
	Outcomes of the measures if any	
	Recommended actions and support services for the survivor/victim	
	Witnesses Name: Address: Contact number:	Describe the event as witnessed:
	Any other information found necessary to support the case- photographic or recorded evidence	
	Form compiled by: Name: ----- Signature: -----	Position----- Date-----

Part III: Details of the alleged perpetrator

Notes		Attach all the necessary supporting information or documents and remember to retain a copy for follow-up
S/N	Indicators	Details captured
1	Name of the alleged perpetrator (attach a photo) if available	
2	Sex	
3	Age (if known)	
4	Residence	
5	Marital status	

6	Contacts- telephone	
11	Consent or non-consent of the perpetrator on committing the act	
12	Previous incidents of violence committed by the alleged perpetrator	
13	Measures taken by the duty bearers and other stakeholders against the perpetrator	
14	Outcomes of the measures if any	
15	Recommended actions against the perpetrator	
16	Any other information found necessary	
17	Form compiled by: Name: ----- Signature: ----- Position:----- Date:-----	Contact details: Tel:-----Email:-----

ANNEX H: VALUATION CERTIFICATE